SISCODE CO-DESIGN FOR SOCIETY IN INNOVATION AND SCIENCE

DELIVERABLE 2.2:
CASE STUDIES AND BIOGRAPHIES REPORT

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Executive Summary

Research activities in the project SISCODE (Society in Innovation and Science through CO-Design) are dedicated towards a European-wide exploration to understand how co-creation practices based on design principles interact with the environments they are embedded in. In WP2, to which this deliverable contributes, we strive to generate a systematic, comparative view on co-creation initiatives all across Europe in diverse spaces of co-creative thinking and working (i.e fab labs, living labs, science museums, smart cities and regions and all kind of other accelerators and incubators). The goal is to analyse and uncover their heterogeneous approaches and found solutions to a fruitful co-creative working manner to better understand how co-creation can be applied to facilitate the integration of science and society. Thiswill be done underlying a mixed-methods study design, consisting of quantitative and qualitative research methods. Building on the previous deliverable of the SISCODE Knowledge Base (D2.1), this Deliverable is a Compilation of the qualitative case selection covering 40 Co-Creation Case Studies and 15 Co-Creation Innovation Biographies (D2.2). All cases from the Knowledge Base (D2.1) and from the Case Studies and Innovation Biographies (D2.2) will be triangulated in a further deliverable – the Comparative Analysis Report (D2.3).

Both tasks, writing the case studies and the biographies, have been a complex endeavour for all partners involved due to the complexity of processes that are of relevance to the SISCODE analysis. In sum, 9 partner organisations have contributed cases based on the same templates but each with a unique approach to their 'case story'. Generally, partners had good access to stakeholders and interview partners as most cases where conducted by native speakers in the respective context which also allowed improved access and understanding of the case. Last but not least, all partners stated that writing up the Co-Creation Case Studies and Co-Creation Innovation Biographies has been an important learning experience, because each case represents in itself a detailed analysis of a specific co-creation project/initiative. It has widened and shaped the perspectives of authors on the complexity of the processes involved.

1. Introduction

In the SISCODE (Society in Innovation and Science through CO-Design) project 17 partner organisations from 14 EU-countries aim to provide insights into how design processes and tools may be incorporated into Responsible Research and Innovation (RRI) and Science, Technology and Innovation (STI) Policy-Making. In view of a flourishing landscape of co-creation in Europe as a bottom-up and often design-driven phenomenon, one important part of SISCODE is to better understand how these practices are performed in diverse contexts and organisational forms to learn from them for the areas of RRI/STI Policy Making. In order to benchmark and compare Co-Creation cases across Europe, a three-step research process was designed to organise, moderate and carry out an exploration of existing practices of co-creation and to set up a coherent learning framework. At first, a *Knowledge Base* of 138 examples of co-creation in heterogeneous fields and forms was collected, allowing a first descriptive analysis of these practices and collecting hints towards possible classifications (cf. Deliverable 2.1). In a second step, 40 *Case Studies* were selected that allow do 'dig deeper' into specific practices of co-creation, tools used and lessons learnt during the processes. Third, out of the 40 case studies, 15 cases were developed further as '*Co-Creation Innovation Biographies*' to study time-space dynamics of knowledge transfer and knowledge integration within innovation processes on a micro-level.

The compiling report at hand presents the work done by the SISCODE-community in the second and third research step. All Case Studies and Biographies are fully displayed in the course of this document and altogether form a 'reference book' of SISCODE's cut-out of the world of Co-Creation. At the same time, this compilation forms the basis for the comparative analysis report (D2.3), which merges the research efforts through synthesizing the findings obtained and reflects them on an overarching analytical level.

Initially, the following second chapter summarizes the overall research design of work package 2 (Benchmarking and comparison of Co-Creation Cases across Europe) as already displayed in preceding reports (cf. D1.3, D2.1). After some detailed explanations concerning case study selection, methodology and its theoretical approach at the beginning of chapter 3, all 40 case studies are to be found, arranged according to the fields their co-creation practices address (RRI, policy making, RRI *and* policy or other areas). Chapter 4 presents the innovation biographies. A concluding fifth chapter links the reader to the comparative

report (deliverable 2.3) and contains an outlook regarding what to expect from the upcoming final integration of our research results.

2. Research Design

Altogether, the study design in WP2 consists of three successive and at the same time interrelated phases of research, which were described in detail in previous deliverables 1.3 and 2.1. In brief, WP2 aims to **describe, explain, compare Co-Creation practices** and in doing so **understand** how these practices as well as their supportive and hampering conditions are situated in their specific ecosystems. These ecosystems are heuristically described as interrelated complexes of the roles that stakeholder and beneficiaries hold, functions of organisational and governmental elements, structures and path dependencies of framework conditions, normative standards, and legal conditions that are of impact for the fundamental functionality of the co-creation routines.

To reach this goal, SISCODE follows an explorative and practical research design oriented towards real-life circumstances and with a direct reference to everyday-life.

1. Description

Quantitative Analysis of 138 cases of co-creation from various fields of practice, first hints towards a possible classification

2. Explanation

Qualitative Analysis of 40 case studies and 15 Biographies to explain praxeology and micro-processses of co-creation in contexts

3. Comparison

Syntheizing data from all research phases to refine and adapt the classification/ typology of co-creation

Fig. 1 Research process in WP2 – Benchmark and compare co-creation

Again, the research design decisively relies on the categorical grid that was developed and used for data collection in the quantitative survey (D2.1, SISCODE knowledge base), which in turn derived from the theoretical groundwork and literature review performed in WP1 (see D1.3 Theoretical framework). To create an appropriate empirical access to the field of practices of co-creation, these theoretical presumptions were enriched with elements from social innovation research and the social innovation ecosystem perspective. In social innovation research, the focus on ecosystemic settings is increasingly gaining popularity. It is seen as a fruitful approach to visualise and describe the arrangements of actors, structures, norms and codes as well as regulating entities and policies that set the frame for social innovations, i.e. phenomena of co-creation. When actors from different backgrounds come together to work on solutions in a co-creation process, the potential of joint innovating as explained in the quadruple helix model (Carayannis & Campbell, 2012) can be unfolded. In order to examine specific environments or ecosystems, a simplified model of interacting layers may help to structure all those factors which promote or hinder the successful development of initiatives. Recent research in the field of social innovation tries to find ways of describing and operationalizing important factors within ecosystems of social innovation that work as impeding or hindering components for the single initiatives or cases. One model was developed within the project "Boosting the Impact of Social Innovation in Europe through Economic Underpinnings (SIMPACT)", funded in the 7th Framework Programme of the European Union. Here, the complexity of ecosystemic factors influencing initiatives was described on four layers - *roles, functions, structures and norms*.

Ecosystem of Co-Creation

Norms
Political, Normative and Regulatory Context
Societal Attitudes and Framework Conditions
Culture of Cooperation/Collaboration
Culture of Innovation

Macro-Level

Structures
Socio-economic Parameters
Demographic Parameters
Technological Parameters
Regional Scope

Meso-Level

ECOSYSTEM

Co-Creation Case

Functions
Stages of Co-Creation
Stakeholder Involvement
Role of Design, Methods and Tools
Organisation and Management, Business Models and Governance
Scaling, Diffusion and Impact

Micro-Level

Actors and Roles
Challenges, Purpose and Objectives
Motivation
Initial Moment(s)/Initiation Phase
Stakeholder Landscape

Fig. 2 Ecosystem of Co-Creation

The innermost layer forms the ***context of roles or actors***, where roles of different stakeholders are identified. This may also include political and social attitudes, motivations, socialization, self-concepts, capabilities and skills of iddferent actors involved in co-creation (funder, initiator, facilitator, participant). In the co-creation case, that may e.g. concern citizens where "personal characteristics, intrinsic values, and biographic dimensions (education and family background)" are considered to be deterministic for the willingness and forms of participating in processes of co-creation programs (Wise et al., 2012).

On the level of a ***context of function*** management procedures, business and governance models are described. For co-creation we have to ask, how its process has been initiated. It is known from research in the field that already the selection process of relevant stakeholders is highly important for the success of co-creation activities. Descriptions on this level may also comprise design approaches to co-creation, including methods and tools as well as the way digital devices are handled. Furthermore, the role of communication is addressed.

Shedding light on the **context of structures,** constraints and the influence of existing institutions, economic, political and technological imperatives might become visible. Very objectively, one could ask for the resources (e.g. financial, knowledge, etc.) that are available in a specific ecosystem and if existing infrastructures are construed to support co-creation. Related issues might range from spatial accessibility to legal hurdles or the availability of physical space and so forth.

Finally, the **context of norms** has to be considered to examine contexts of co-creation. Societal framework conditions and challenges are important when trying to find out more about the framework-conditions of co-creation. This normative layer bears hints towards professional and ethical standards, historical and legal conditions and widely accepted social standards or even towards social standards that are questioned within a society. Therefore, it is also providing a fruitful perspective for understanding possible accelerators or hurdles to collaboration, cooperation and innovation between different societal actors on certain issues or in general.

Obviously, observing these layers as standalones is not very promising. It is much rather the effects of their interplay which are of interest for the SISCODE project. This will become evident in the comparative analysis of all empirical data developed in W2 (D2.3).

To further explicate the levels of investigation for the cases, we identified seven dimensions of observation that function as a guideline through all three phases of research (*description – explanation – comparison*) (see Table 1 'Observation Units'). A first complex is dedicated to gather factual knowledge to form an initial starting point. Deriving from that, it is possible to take a closer look at the partnerships and networks the initiative/project upholds to then gain insights into concrete environmental factors playing a relevant role in carrying out the initiatives. To broaden the knowledge on pathways of processes and practices of co-creation, one unit of observation is dedicated to the shape of the route the cases took to reach their specific status quo. This includes the drivers and barriers they encountered on their way and also some characteristic interfaces and turning points. The specific form of co-creation in each case is an extra unit within the framework. Thereby, the concrete processes (e.g. how the participants were selected, motivated and briefed) are likewise in focus, as are the tools used by the cases to guide through the co-creative processes. As this is another key aspect of SISCODE, the tools and instruments form a unit for themselves. In a final step, the 'lessons learned' from the individual pathways will be examined. The following table gives an overview on the units of observation identified.

Block	Designation
I	Factual knowledge concerning the cases
II	Networks and partners
III	Context and environment
IV	Pathways, drivers and barriers
V	Processes and practices of co-creation (incl. role of design)
VI	Tools and instruments
VII	Lessons learned

Table 1 Observation Units

These dimensions form the heuristic model and 'search pattern' for relevant categories to gradually build up a coherent context-sensible understanding of practices of co-creation in the various fields of action, their common features and distinctive elements (cf. Deliverable 1.3, p. 20 ff.). The quantitative analysis conducted for Deliverable 2.1 provided first results shedding light on relevant questions and directions for the in-depths case studies.

Furthermore, a guideline of questions was prepared and integrated into the Case Study Template to support the single partners in going in-depth with their interview partners during the research process. Also, the survey answers were shared with them containing already a lot of desired information to provide the best possible starting point for them synthesizing all information previously collected. The guidelines and templates can be found in the annex of this report.

The final comparative analysis should lead to a preliminary proposal towards categorisations of co-creation in contexts, which then will be adapted and refined in work package 5 and in proceeding scientific publications of the SISCODE project.

3. Conducting the Case Studies

In the following, the theoretical approach and the research process regarding the logic of case selection and data collection and -management is briefly presented in chapter 3.1 and 3.2. Chapter 3.3 contains all Case Studies conducted by the SISCODE partners, assorted by their field of action. In line, paragraph 3.3.1 is dedicated to Co-Creation projects and

processes, which can be subordinated into the field of RRI and 3.3.2 contains all examples of Co-Creation in Policy Making. In chapter 3.3.3 cases are to be found whose co-creative practices address both of these fields at the same time and finally, chapter 3.3.4 lists initiatives, projects and routines of co-creation, which cannot be assigned to one of these categories.

3.1. Theoretical approach and research methods

A clear focus was drawn towards the general question how co-creation practices and routines are embedded in everyday-life of the respective examples in the second, qualitative research phase, the 40 case studies. Therefore, the guiding questions focused on practical mechanisms and the elements they inherit centred around the general research interest of what happens on the spot in specific contexts. In general, case studies focused on the two different levels of the co-creation activities themselves, the ideas and solutions that are developed within and the coordinating structure/ organisation/ network facilitating those co-creation activities. Especially from interconnecting these two levels in correlation with the specific contexts we aim to deepen knowledge on forms and functions of co-creation practices.

Again, the case study design decisively relies on the categorical grid that was developed and used for data collection in the quantitative survey (D2.1, SISCODE knowledge base), which in turn derived from the theoretical groundwork and literature review performed in WP1 (see D1.3 Theoretical framework). To create an appropriate empirical access to the field of practices of co-creation, these theoretical presumptions were enriched with elements from social innovation research and the social innovation ecosystem perspective. Seven dimensions of observation were identified that function as a guideline through all three phases of research (*description – explanation – comparison*) described in chapter two. These dimensions form the heuristic model and 'search pattern' for relevant categories to gradually build up a coherent context-sensible understanding of practices of co-creation in the various fields of action, their common features and distinctive elements (cf. Deliverable 1.3, p. 20 ff.). The quantitative analysis conducted for Deliverable 2.1 provided first results shedding light on relevant questions and directions for the in-depths case studies.

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during the research process. Also, the survey answers were shared with them containing already a lot of desired information to provide the best possible starting point for them synthesizing all information previously collected. The guidelines and templates can be found in the annex of this report.

3.2. Case selection and data collection

As practices of co-creation can be observed in various surroundings and are often carried out as already naturalized routines, it was an initial challenge for the partners to identify appropriate cases in the field of co-creation, which could serve as exemplary cases to conduct further research. For the initial SISCODE database, all partner organisations gathered a total number of 138 international cases of co-creation from all over the world. To be accepted as a SISCODE case, the partners agreed upon two non-optional selection criteria. Accordingly, an initiative/organisation or project qualified as a case, if it

1) Is built on at least one or more principles of SISCODE's working definition of co-creation (cf. D1.1) and;
2) Had sufficient data available to be turned into a properly developed case study.

From these 138 cases, that all had the potential to be turned into a case study – the 40 most promising ones have been selected to conduct further research on.

To generate a sample representing the variety of co-creation found in the initial survey, two main selection criteria have been addressed:

1) The **field of action** where the initiative takes place with a specific focus on RRI and policy making, but not excluding relevant cases from other fields
   a. RRI
   b. Policy Making
   c. RRI & Policy Making
   d. Other relevant field

   In the database, RRI-cases were most frequently represented (52 cases, 38%), followed by cases representing both RRI and Policy Making (32, 23%) and relevant cases addressing other topics (28, 20%). 24 cases are especially directed towards co-design in policy (17%).

Out of the 40 case studies illustrated in this document, 15 initiatives are situated in an RRI context, 8 cases work in Policy Making, 9 projects do address both issues while 8 activties are from different backgrounds than RRI or Policy Making.

2) For the second selection criteria, the **specific scope of the case** relating to the size of the ecosystem in which the operation takes place, the procdure of selection was carried out in a similar manner dividing the cases according to the context size addressed

   a. Neighborhood, urban district
   b. Regional or national level
   c. Supranational / EU level

Beyond the mentioned criteria of selection, the project members were consulted during an interactive session to fully exploit their expertise and to reach a final selection of 40 examples of co-creative practices.

In order to guarantee a structured overview, the following display of SISCODE's case studies is oriented towards the main selection criteria, the field addressed by the specific case. Tables 1-4 below give a short overview and first impression of the single cases, their respective main stakeholders and the scope of the case.

Co-Creation Case RRI	Main Stakeholder(s)	Scope (City, Region, State)
Sharing City Umeå	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	City
Making Sense H2020 Project	Single citizens/ interest groups, Platform makers	Urban district
Extreme Citizen Science's Intelligent Maps Project	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Those living in these forest areas - forest communities, non-literate	Neighbourhood
Será que o mar vai engolir o	Civil Society Organisations,	Neighbourhood

Bairro?	Residents of the targeted precarious neighbourhood, Academia	
Mirrorable	Single citizens/ interest groups, Civil Society Organisations, Children with disabilities	Nation State
The BrainHack Project	Single citizens/ interest groups, Academia, Designers	Nation State
MARINA - Marine Knowledge Sharing Platform for Federating Responsible Research and Innovation Communities	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers, Academia	EU
Fine Feathers Make Fine Birds	Single citizens/ interest groups, Consumers/ Users of a specific product, Employees and volunteers, People dependent on long-term healthcare in combination with physical disabilities, Designers	Nation State
REMODEL	Business/ Economy, Employees and volunteers	Nation State
Sliperiet / Den Koldioxidsnåla Platsen (The Low Carbon Place)	Single citizens/ interest groups, Business/ Economy, Academia	City
LTsER Montado	Single citizens/ interest groups, Civil Society Organisations, Business/ Economy	Region
Science Frugale	Single citizens/ interest groups, Civil Society Organisations, Employees and volunteers, Academina	World-wide
SPARKS - Rethinking innovation together	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product	EU

Centre for Social Innovation (CSI) Toronto	Single citizens/ interest groups, Civil Society Organisations, Business/ Economy, Employees and volunteers	City
Ocean Living Lab - Smartifier Case	Single citizens/ interest groups, Consumers/ Users of a specific product, Business/ Economy	EU

Table 2 List of Co-Creation Case Studies in RRI

Co-Creation Case Policy Making	Main Stakeholder(s)	Scope (City, Region, State)
Borgernes Hus (The Citizen House)	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	City
Lab of Collaborative Youth (LoCY)	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Employees and volunteers	Neighbourhood
ninux.org	Single citizens/ interest groups, Consumers/ Users of a specific product, Employees and volunteers, Digital-divided People	City
Urban Mediaspace Aarhus Project – Dokk1	Single citizens/ interest groups, Civil Society Organisations, Business/ Economy, Employees and volunteers	City
Medialab Prado	Single citizens/ interest groups, Civil Society Organisations, Employees and volunteers	City
Apulian ICT Living Lab	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product,	Region

	Business/ Economy, Administration	
Innovation Strategy for the Capital Region of Denmark	Business/ Economy, Employees and volunteers	Region
PIKSL – Person-Centered Interaction and Communication for More Self-Determination in Life	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers, People with disabilities, Refugees	Nation state
Boxing Future Health	Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	Region

Table 3 List of Co-Creation Case Studies in Policy Making

Co-Creation Case Policy Making and RRI	Main Stakeholder(s)	Scope (City, Region, State)
NESTA - Everyone Makes Innovation Policy - 10:10's Heat Seekers' Quest	Single citizens/ interest groups, Consumers/ Users of a specific product, Inhabitants	Urban district
Ecomuseo Casilino ad Duas Lauros (Rome)	Single citizens/ interest groups, Civil Society Organisations, Business/ Economy, Employees and volunteers	Urban district
Smart Kalasatama Well-being Centre	Single citizens/ interest groups, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	Urban district
Social Innovation Lab Kent (SILK)	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product , Business/ Economy, Employees and volunteers, Administration	Region

Ilona - Robot Brings Joy in Elderly Care	Consumers/ Users of a specific product, Employees and volunteers, Older people, Administration	City
SMART_KOM. Kraków in Smart Cities Network	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product , Business/ Economy, Employees and volunteers, Academia	City
Library Living Lab	Single citizens/ interest groups, Civil Society Organisations, Employees and volunteers, Children, People with disabilities	Neighbourhood
Sciencewise – Involve and UK Government BEIS	Single citizens/ interest groups, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers, The Public	Nation state
The Australian Centre for Social Innovation (TACSI)	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers, Marginalized groups	Nation state
RETRACE – Interreg Europe Project	Civil Society Organisations, Business/ Economy, Administration	Region

Table 4 List of Co-Creation Case Studies in Policy Making and RRI

Co-Creation Case Other fields	Main Stakeholder(s)	Scope (City, Region, State)
Museomix	Single citizens/ interest groups	Neighbourhood
Engineering Comes Home	Single citizens/ interest groups, Business/ Economy, Low income inhabitants/tenants and landlord, Greater London	Neighbourhood

	Authority, Environmental consultants, Water efficiency charity	
inDemand	Administration	Region
E-FABRIK'	Single citizens/ interest groups, Civil Society Organisations, Employees and volunteers, People with disabilities, NEET young adults	Region
Innovation Loop Region Västerbotten	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Employees and volunteers, Academia	Region
Fab City Grand Paris (FCGP)	Single citizens/ interest groups, Business/ Economy Makers	City

Table 5 List of Co-Creation Case Studies in other fields

3.3. Co-Creation Cases

3.3.1. Case Studies in Responsible Research and Innovation

Sharing City Umeå | Sweden

Eva Wascher (TU Dortmund University)

Sharing City Umeå is a test-bed for sharing economy activities in the city coordinated by Umeå municipality. Partners include Akademiska Hus, Coompanion, Umeå Energi, UPAB, VAKIN, Region Västerbotten and Umeå University. The purpose of the programme is to share resources in a city more effectively, sharing knowledge between the participating cities. Sharing Cities are also based on the principles of open source and open data.

What is the project/ initiative all about?

Sharing City Umeå is a project within the Swedish national programme 'Sharing Cities Sweden'. The programme enhances sharing economy projects and initiatives. The duration

of the programme is August 2017 to September 2021 and aims to put Sweden on the map as a country that actively and critically works with sharing economy in cities. [1] Overall goals of the program are to develop world-leading test beds for sharing economy in Stockholm, Gothenburg, Malmö and Umeå. Furthermore, the programme aims to develop a national node, Sharing Cities Sweden, in order to strengthen national (and international) collaboration and promoting good exchange of experience. The 'Sharing Cities' are supported by the national node for coordination, national learning and international exchange. The Sharing Economy is promoted for several economic, ecological and social reasons. For example, many of society's resources are partially underutilized and could be shared (e.g. office space, mobility services and cars, tools etc.). At present, economic and legal institutions often have no clear ruling for the sharing economy. Furthermore, societal norms of private and single ownership prevent people from using sharing services. Systems and functions for sharing among many users need to be adapted to a large extent. Here, municipalities have a special role in providing support for this development.

The project Sharing Cities Umeå is coordinated by Umeå Municipality. As Umeå Municipality is planning for a growing city the project aims at supporting the development of growing in a sustainable and inclusive way. For the city, it is important to be inclusive and build trust among all involved stakeholders, irrespective of whether they have been living in Umeå for a long time or are first semester students or a newly arrived citizen. [2] Sharing services can be supportive in this way. The different sub-projects or test-beds try to stimulate and experiment with changing citizen's behaviour in the urban planning process. This means that the city tests different conditional settings for sustainable urban planning with citizens and other stakeholders. The sub-projects include establishing a Service Mobility Hub, a mobile sharing box and interactive films to enhance primary-school education and increase knowledge about sharing, migration and sharing services, a library of things for leisure and sports activities as well as a special cycle parking space and a digital sharing platform. Sharing Cities Sweden is part of a national innovation initiative called Viable Cities. Viable Cities is a programme focused on innovation for smart and sustainable cities. The aim is to accelerate the transition to climate-neutral and inclusive cities by 2030 with digitalisation and civic engagement as enablers.

Context and environment: Where does it all take place?

The programme Sharing Cities Sweden is part of a national innovation initiative called Viable Cities. Viable Cities is a strategic program that wants to facilitate the innovation capability of Swedish cities.[3] According to the UN Global Sustainability Goals (SDGs), Viable Cities wants to enable Swedish Cities to be climate neutral by 2030.[4] Furthermore, Sweden's strength in innovation, research and entrepreneurship should be transferred into a competitive advantage for growth of sustainable cities and make Swedish cities a driving force for climate neutral cities.[3] The long-term innovation initiative runs from 2017 to 2030. Viable Cities is the largest investment ever in Sweden on research and innovation for smart and sustainable cities with a budget of approximately SEK 1 billion (ca. 100 million Euro). The program is led by KTH Royal Institute of Technology, the largest technical university in Sweden, and brings together some 70 actors from several different fields of research, industry, public activities and civil society. Viable Cities is a member organisation platform that is free to join. It enables new forms of cooperation between industry, academia, research institutes, civil society and cities. Viable Cities is jointly funded by the Swedish Energy Agency, Vinnova and Formas and is complemented by co-financing of participating actors[3]. Formas is a Swedish government research council for sustainable development. The institution carries out studies in the areas of environment, agricultural sciences and spatial planning.[5] Vinnova is a government agency under the Ministry of Enterprise and Innovation and the Swedish Government's expert authority in innovation policy. The third Viable Cities funding partner is the Swedish Energy Agency.[6] Like the other partners the Swedish Energy Agency is a governmental institution and is subordinated to the Ministry of Infrastructure[7]. The Swedish Energy Agency is managing the funding of projects as well as progress reporting and financial statements[8] Viable Cities launches a variety of research efforts and innovation projects through calls that are open to different stakeholder groups, including citizens. This means that not only municipalities, companies and research institutions can submit an application, but also civil society organisations or neighborhood community groups.[9] The program Viable Cities uses a Transition Lab approach which is developed by KTH. Viable Cities Transition Lab is about exploring and shaping change theory and method as well as building distributed knowledge and expertise as a basis for action. This requires to build a common awareness and ability to invest beyond isolated operations that take on individual parts and instead focus on large-scale investments for system change, for example in the nine municipalities that are among the first funded projects in the Call for climate-neutral cities by 2030.[10] Viable Cities projects take place in

the Swedish cities Enköping, Gothenburg, Järfälla, Lund, Malmö, Stockholm, Umeå, Uppsala and and Växjö.[11] One example for a project supported by Viable Cities is "City as a Platform". The project unites ten municipalities which work together on Internet of Things to create advantages for the city. Another project is "Activity based energy and mobility modelling for future cities", which tries to find new ways to foster the local use and supply of energy.[12]

Sharing Cities is a Swedish national program to enable Swedish cities to become known for their active and critical work in the sharing economy. The program, which has a budget of 12 million euro over 4 years, creates test-beds to develop sharing services and digital solutions. With this method the advantages and disadvantages of the sharing economy will be examined.[13] The context, in which the test-beds take place, are so-called Urban Living Labs that are located in Gothenburg, Malmö, Stockholm and Umeå. Additionally, the test-beds are limited to a few areas and activities in each city. The aim of the test-beds is to develop and test sharing services in a transparent manner and in real environments. The Living Lab projects are designed and headed by the municipality and research institutions. Collaboration takes place with various users and stakeholders. In addition to that, the projects are continuously evaluated to improve sharing services.[14] On the one hand sharing services help to reduce energy and climate impact and to expedite sustainable development. This way, sharing services advance sustainability and social innovation in Swedish cities.[15] Another aim of Sharing Cities is arranging a national node to enhance the national and international cooperation while the exchange of experiences in sharing services should be supported at the same time.[13] Through strategic projects Sharing Cities also wants to conduct studies on existing sharing economy initiatives in different cities. The strategic projects support the national node and the benefits of the test-beds and contain topics of business modelling, digital platforms, small towns and behavioural economics.[16]

One strategic project is 'Sharing Behaviour'. The project has a background in behavioural economics. With the method of experiments the project develops policy recommendations that should enhance sustainable urban sharing economy initiatives in Sweden.[17] Another strategic project is 'Sharing Digital Platforms' that aims to raise knowledge about the design of sustainable digital sharing platforms. This aim should be reached by an investigation that explores whether platforms which are more user-centered can fix problems of platforms that are more resource-centered.[18]

For achieving their aims Sharing Cities unites partners from the public sector, civil society, academia und business. Furthermore, the innovation project links people, cities and information and communications technology (ICT)[15].

Although the city of Umeå is partner in the program as a city they work closely together with the regional administration Region Västerbotten. For the municipality, it is important to enable the whole region to advance in the sharing economy. On the one hand, public sector actors need to identify factors that are crucial for sharing to grow and on the other hand, ensuring at the same time that sharing contributes to sustainable development. The 'Sharing Cities' movement connects public sector actors internationally. In the network, municipalities get an opportunity to develop forms of sharing that are both about managing the risks of sharing and about taking advantage of the great potential of sharing: new companies, more resource efficiency and increased equality. For the region of Västerbotten, it's municipal and regional politicians could take leadership in the issue. For example, opening up for sharing in detailed plans and planning processes and strategies would be one way. Furthermore, municipalities could impose requirements for sharing in public procurement, share car pools through public housing companies and share underutilized public operating premise.[19] The platform Green Umeå was created as an initiative by Umeå municipality to connect local companies, organizations, groups and associations that are environmentally aware, and have a lot of will and commitment for cooperation. Green Umeå brings together everyone who believes in sustainable development and wants to contribute to co-created projects, gender equality and diversity to create a greener future.[20] The platform features ongoing progress and project results of a variety of sustainability related initiatives in Umeå and region Västerbotten, including Sharing City Umeå news.

Brief outline of the project/ initiative's pathway

Sharing City Umeå is a test-bed of the Swedish national program Sharing Cities Sweden, part of the national initiative Viable Cities. The innovation programs envisage a quadruple helix approach to stakeholder collaboration (public actor, private companies, academia and civil society working together). Sharing City Umeå is coordinated by the City of Umeå (municipality) and project partners include Akademiska hus, Coompanion, Umeå Energi, UPAB, VAKIN, Region Västerbotten, and Umeå universitet.[21]

Before joining the Sharing City Sweden initiative, Umeå municipality was already part of two major EU projects. One project, RUGGEDISED[22], together with Rotterdam and Glasgow, works on smart city solutions. In RUGGEDISED, Umeå focuses on an Innovation District that is situated immediately to the east of Umeå city centre, the University city area (smart city district 'Universitetstaden'), which includes a mix of residential, academic and research facilities from two universities, a regional hospital, and community, recreational and commercial buildings. The neighbourhood is characterised by its young, student-influenced, population and as such, the neighbourhood is one of the least car-dependent neighbourhoods in Umeå. Another major EU funded project was the Low-Carbon Place (see SISCODE Innovation Biography 'Den koldioxidsnåla platsen'). Because Umeå was already conducting urban planning projects around smart and sustainable cities and is a major innovation centre in the north of Sweden, the Innovation Director of Umeå, Johan Gammelgård, was invited to sit on the board for the Viable Cities initiative. Furthermore, as Viable Cities aims to be an inclusive initiative, it was decided that the three big city regions from south and middle of Sweden, Stockholm, Gothenburg and Malmö, will be joined by the biggest northern city region, Umeå – giving a national representation in the program. This is an important step to strengthen the national innovation system by including the northern regions at a larger scale.

Umeå was invited by Viable Cities to initiate a pre-phase for the Sharing Cities project in order to examine if the city can set up a large project consortium. Viable Cities is a 50% co-funded project, meaning that from the overall project budget of 24 million SEK, the municipality receives 12 Million SEK as a grant and the other 12 million SEK need to be put up by local partnerships. In the pre-phase in 2017, Umeå municipality partnered with Esam, an environmental and sustainability consultancy. Together, they conducted a pre-study about 'Who wants to engage in sharing economy activities and what could these be?' Several workshops and stakeholder group meetings were arranged. There was high interest among stakeholders. Interestingly, participants of the workshops were not most of all citizens and civil society organisations, but more often private businesses, municipality-owned companies as well as civil servants from different public administrations and higher education institutions. Fortunately, many of these actors already engaged in different projects with the municipality and it was not so difficult to access them with a request to join Sharing City Umeå. Overall, it was a fast process for the municipality as coordinator and the involved project partners. With the pre-phase starting in summer 2017 and the actual project starting in January 2018. So far, the project activities have contributed to an

increased understanding and knowledge of the sharing economy opportunities for Umeå, especially regarding the goal of sustainable city growth with the vision of 200,000 inhabitants in 2050. Some of the obstacles and policies / regulations constraints have been identified that currently still make sharing difficult. These results will be further examined at system level in the project Climate Neutral Umeå 2030, which is also part of the strategic innovation program Viable Cities. Sharing City Umeå has eight partners and 15 people in the project group from the public, private, idea-based sector and academy which is a good example of how collaborative projects contribute to urban governance for sustainable development. The sub-projects include establishing a Service Mobility Hub, a mobile sharing box and interactive films to enhance primary-school education and increase knowledge about sharing, migration and sharing services, a library of things for leisure and sports activities as well as a special cycle parking space (Cykelstället) and a digital sharing platform. Furthermore, Sharing City Umeå is closely working together with several other actors. For example, with eXpression Umeå the project conducted events in the pop-up area at the MVG gallery (big shopping mall in the city centre). Additionally, the project organised the first Nordic conference on 'Cooperative Cities ' with an emphasis on co-owned sharing platforms. Another sub-project, Campusparken is a special focus area for the test-bed in Umeå. The aim is to facilitate sharing of space, parks and infrastructure in the context of a growing city district. Furthermore, Fritidsbanken Umeå was launched. It allows locals and visitors to loan sports and leisure equipment for free.[23] In 2019, Fritidsbanken Umeå will reach over 45,000 loaned products and gained several awards, including the Umeå municipality's environmental award and the ICLEI Transformative Action Award[24]. Sharing City Umeå is also developing digital tools that support sharing ervices. For example, the tool UMIGO has been developed into a sharing platform that builds user cases around several project parts. With several user tests, the platform has been refined and can potentially be implemented with energy providers to match the needs of local players with current demands. During 2020, the platform will act as a digital support for Fritidsbanken's parasport lending; linking associations with newly arrived and tested as a tool within Sharing Umeå Toolkit. The Sharing Umeå Toolkit has been further developed during the year. It features learning meetings for business models, meetings with students and coaching for entrepreneurs and is now being developed into a Smart Map together with resources for entrepreneurs. The project also develops sharing facilities for bikes in the city which is presented below.[25]

Management & Organisation: Who interacts how to facilitate co-creation?

Sharing City Umeå is coordinated by the City of Umeå (municipality). Partners include Akademiska hus, Coompanion, Umeå Energi, UPAB, VAKIN, Region Västerbotten, and Umeå universitet.[26] Akademiska Hus is a state-owned property company and takes special responsibility for being a leader in sustainability. It is one of Sweden's largest property companies and a specialist for building, developing and managing environments for education, research and innovation in collaboration with universities and colleges.[27] Vakin is a water and waste company, jointly owned by Umeå and Vindeln's municipalities.[28] Coompanion is a consultancy for cooperative business models[29]. Umeå Energi is a municipality-owned energy company. UPAB is the municipality-owned parking space provider. Other partners are Region Västerbotten and Umeå University. The budget of the project 'Sharing City Umeå' is about 24 million SEK of which 12 million SEK are a grant through Viable Cities program and 12 million SEK are co-financed by all involved project partners. Regarding the governance of the project, Sharing City Umeå is handled as one of four sub-projects in the project Sharing Cities Sweden. Because for the main programme Viable Cities, Sharing Cities Sweden is just one of many projects. This in turn makes it difficult for the involved cities to align progress and project results, because as each city as manifold partners, the Sharing Cities Sweden project has more than 40 actors involved as consortium partners. It is a uniqueness in this program that the national level comes down to the local level and then up again as a cross-sectoral endeavour. In the general program of Sharing City Sweden there are regular monthly meetings with the project consortium. For example, Lund University is steering this knowledge exchange for the partners involved, also inviting experts for specific topics. On the local level the municipality is the owner and coordinator for the program and in Umeå the project is governed from the environmental department. Though, it is cross-sectoral because four other administrative departments are involved as well. The project manager is employed full time with the project. Additionally, there is a communication officer for the project working part-time. Each of the consortium partners for Sharing City Umeå has appointed a project lead at his/her organisation. This project lead or board meeting takes place quarterly to discuss strategic questions of the project. Additionally, there are project meetings approximately once a month where all the stakeholders are involved, including the partners and colleagues from different departments in the city administration. The core project team sometimes uses individual stakeholder meetings with each partner organisation involved to work on specific sub-projects. In the beginning, each partner had strong interests and expectations to the project

and there was not much trust among participants. Now, after two years in the project, involved partners also see the advantage of co-created projects and the necessity for cooperation. Overall, the willingness to share knowledge and other resources has definitely increased among participants. As all sub-project groups also meet once a month, stakeholders see and collaborate with each other in different settings on a regular basis.

What are the concrete processes and practices of co-creation?

One of the co-creation projects that Sharing City Umeå is promoting is the electric cargo bike sharing service 'U-Bike' and a bike facility called 'Cykelstället'[30]. Both services are owned by the municipality, which is not common compared to other cities in Sweden and Europe generally. The political background to the projects is one of the city's sustainability goals to achieve by 2025 that 65 % of all travels within Umeå should be by a sustainable transportation mode, like walking, cycling or by public transport. In order to reach that goal the municipality needs to enable citizens to decrease their usage of the car.[31] U-bike and Cykelstället contribute to reaching that goal. One of the purposes of enabling the rental of electric cargo bikes was to study whether citizens have an interest in making other choices of means of transport than usually by car. The need for a vehicle with good load capacity is important for many people, especially families. Today, 60 %t of mobility connected for purchases in Umeå is made by cars. At least, electric cargo bikes for rent might provide for a shopping trip without the car once in a while or even replace a second car per household. During the project, one of the lessons was to engage property owners to build facilities for bike-sharing very close to where people live, like if they had a car parking space nearby. Therefore, the city is constantly involving property owners in their planning. Reducing the volume of short car journeys would benefit the accessibility of an increasingly denser city, make a great climate benefit and have a positive impact on public health. The idea for U-bike dates back to a political decision in 2016 when the municipality agreed to offer an alternative to the car for travels within the city centre and the campus area. For short car travels like about 5 kilometres the opportunities of using an electric cargo-bike should be introduced to inhabitants. By then it was still a rather uncommon way of transportation in the city, although citizens use regular bikes very often and the cycling infrastructure of the city is generally good. When the municipal administration got the political mission to set up an electric cargo-bike pool, they started research about booking and renting systems. It was not easy because there were no best-practice examples in

Sweden to look at. It was decided to build three cycling garages for the bike pool, one in the city centre by the municipality (Cykelstället), one at the Campus area by Akademiska Hus and one garage at the local IKEA, just outside the city center. In the very end of the planning phase IKEA dropped out their commitment and it was decided to build two garages with each 8 bikes for rental. The first garage opened in September 2017 at the campus area. The second one is located at Cykelstället, the bike rack in the city centre which opened in autumn 2018. Before the opening, the municipality wanted to test the available services with users. To that purpose a group of 16 citizens was invited to join the test-phase during the summer 2017period. The municipality just posted the invitation on Facebook without a further marketing campaign and received 477 answers for those 16 spots. It became clear, that the service was of high interest to citizens. For the test-phase, users were allowed to try the service for two weeks, including using the bikes, the booking system and the functionality of the garage facility (e.g. doors and locks). After two weeks, users had to return the bikes to the garage and then the day after the next trial group started to pick up the bikes. The municipality also tested if instructions given to users were clear enough, because there was no staff available for help at the garages. Therefore, users had to follow app instructions on how to get into the garage, how to get the keys and how to use the bike. For evaluation, the municipality provided an online-survey for the test group participants. Users described their experience with all parts of the rental service and were quite satisfied with the offer. Furthermore, the municipality does an annual evaluation per garage of all registered members to improve the U-bike service. Everyone who has been a member for the last year gets invited to participate in the evaluation. For day-to-day problems members of the sharing service can also contact the municipality directly by e-mail or in the sharing service app. With the annual evaluation the municipality receives feedback on how they could improve the service provision, e.g. what best fits the users' needs etc. For example, opening hours have been extended in the evenings and some regulations in the reservation systems have already been adjusted. Furthermore, the municipality receives a lot of suggestions where to put up more garages. The U-bike service already reached the maximum numbers of 250 members at the same time. Therefore, people that want to become new members have to wait until someone else is leaving the service. For the city, this is a rather 'good' problem because they experience that the service is really popular. Though, there are no plans to extend U-Bike at the moment. But the municipality engages in convincing housing companies with building sites in the city centre

how to implement a service for bike pools for their future residents to create value for the houses and to save space for building parking lots.

Cykelstället in the city centre is becoming a meeting place for cyclists in the city. Beside the U-Bike rental service the place offers locked parking space where people can place their own bike and there is also a bike service station with the possibility to wash bikes and do small repairing. The garage reached the maximum of thirty spots inside to rent a parking lot for bikes. For the city, this proves that there is a need to build more garages of that kind. Especially close to the two train station areas. Umeå already has another big bike garage at the airport which is not heated, but it's well covered from wind, snow and rain. At Cykelstället, there are additionally a lot of good parking spots outside the glass garage for regular bikes and for cargo-bikes and a small bike carousel for kids. With the Sharing City Umeå project, the whole space of Cykelstället will be transformed into a sharing space not only in relation to mobility but also other services. The municipality is inviting civil society organisations to contribute to further development of the area. Some workshop meetings took place about how to improve Cykelstället in that direction and how to attract even more people to use the provided services. There is an open invitation to interested parties to be able to use the space for their activities, e.g. 'Friend in Umeå', an organisation working with people who recently migrated to Sweden for helping them to integrate, has organised a bicycle day with reparation, decoration and a caravan through the city. There are also collaborations with an organisation for DIY-repair cafés. Furthermore, a local bike company, Umeå Wheels, rents out old bikes mostly to students that they have been repairing. Because they need several locations, they can use Cykelstället for couple of days or weeks. Furthermore, the city considers to open a flea market space or post-delivery boxes at Cykelstället.

1 Bicycle stand - a service place for bicycles with box-bike rental and bicycle garage
(Source: Umeå Municipality Photo by: Mikael Sjöberg)

Specification: What tools and instruments were used to co-create?

Sharing City Umeå involves stakeholders in different ways for the different sub-projects.
Although, citizens have not participated in designing the services for U-Bike and
Cykelstället in the beginning, trial groups were arranged for improving the service later on.
Furthermore, a service-design consultancy helped to create prototypes for mobility service
hubs (see Innovation Biography 'Service Hub'). Another sub-project, the showroom Vakin,
included several different actors in creating an exhibition for sustainable water and waste
management. The first idea was to transform a minivan into a mobile and interactive
showroom to increase knowledge and commitment about water and sewage as well as
waste and recycling. The showroom was also meant to inspire and to see opportunities with
the sharing economy. Main stakeholder in the project was the municipality-owned water
and waste company Vakin. The co-created the exhibition with with Sustainergies Academy
and Umeå University of Design for the concept development. Sustainergies is a consultancy
that provides opportunities for students to work with sustainability in practice. In this way,
they increase the competence for sustainability of students at Swedish universities and
colleges. They conduct competitions, mediate student assignments and internships, lead
workshops and design projects in close collaboration with the academy as well as
companies and organizations in the private, public and idea-based sectors.[32] The Digital

Media Production of Umeå University produced information films about challenges to be included in the exhibition. Furthermore, students from the technology program of the high school Dragonskolanin Umeå were invited to build objects for the exhibition.[33] When, Vakin starting testing the prototypes and interactive films with the students in the elementary school they got a positive feedback. But they also realised that a minivan exhibition will not be able to reach all schools. Therefore, it was decided that there will be a common education package with a sharing box and the interactive films. In this way, all elementary schools can be reached in a cost-effective way. It is also possible for other cities to replicate. The prototypes were successful and as a follow-up Umeå's Science centre, Curiosum will build one of them in real size and function.

Which learnings emerged?

During the time of the project the involved actors already saw a change in the way they cooperate. The kind of collaboration as conducted by the project is a fruitful way 'to get things done' and to make things happen. Furthermore, project partners are also keen to engage in similar cooperation. Especially, on the side of property owners of housing or facilities expectations by the city are high that these actors will also introduce more and more sharing services. Cooperation also increased among different departments within the municipality that are involved in the Sharing City project as well as other third-party funded projects. As a lesson learnt the role of the project coordinator as enabler and facilitator of cooperation among all stakeholders is extremely important. Even though, the project coordination was placed at the environmental department there were a lot of 'border-crossings' with other departments. Furthermore, as coordinator it is important to use one's own overview about different projects and sub-projects to connect actors across projects and to facilitate knowledge exchange. To sit in a municipality also offers some kind of neutral role for each stakeholder who can trust the municipality. The role of the municipality as an enabler and facilitator for this kind of collaboration is one key element for the overall success of the project. During the project duration, the municipality had to figure out what kind of role they want to have. Usually, a municipality acts as a regulator and steers activities on their own. With projects like Sharing City Umeå the municipality acknowledges willingness to share power and shows commitment to cooperate with other relevant actors in order to design and implement activities. This also relates to acknowledging that power should be shared and that ownership of projects can be shared.

Regarding the involvement of partners, it was rather easy to set up the initial project consortium. Though, once a project is granted there is almost no room for inviting other partners in because the budget is already fixed. In order to stay a bit more flexible, the project consortium included Companion, a consultancy specialised in cooperative and social entrepreneurship business models. This way, other actors interested in the Sharing City project, e.g. with a car sharing scheme they developed, could be engaged with the project at least in the way that Coompanion helped to acquire new project funding. This way, the project aimed to be much more diverse and inclusive beyond the initial consortium. Involving civil society actors has been one of the hardest parts in the project and to find ways to make their ideas implementable. As a co-creation process, Sharing City aimed to involve a high number of other actors, especially civil society organisations and citizens. In a new program called "climate neutral cities 2030" launched by Viable Cities, the consultancy 'Uminova expression', an incubator for creative business, will join the program and work out ways to engage civil society actors more intensely. Additionally, the municipality examines ways to engage bigger companies of the region in their projects as well as banks and other financial institutions. This way, consumption and investment practices might be better directed towards circular and sharing economy activities.

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Making Sense H2020 Project | EU

Milena Juarez Calvo and Marion Real (Fab Lab Bcn)

This Horizon 2020 project aims to explore how open source software, open source hardware, digital maker practices and open design can be effectively used by local communities to fabricate their own sensing tools, make sense of their environments and address pressing environmental problems in air, water and soil. As an outcome it developed a toolkit for participatory sensing, which aims on deepening our understanding of the processes that might enable collective awareness. The project ran between 2015 and 2018 in nine pilots in Amsterdam, Barcelona and Prishtina.

What is the project/ initiative all about?

Making Sense is a project funded by the European Commission within the H2020 Call ICT2015 Research and Innovation, specifically under the CAPS 'Collective Awareness Platforms for Sustainability and Social Innovation' programme (grant number 688620). The project ran between 2015 and 2018, and combined the efforts of Waag Society in Amsterdam, University of Dundee in Scotland, Fab Lab Barcelona at the Institute for Advanced Architecture in Catalonia, the Joint Research Centre of the European Commission in Brussels, Peer Educators Network in Kosovo, and University of Twente in Enschede.

The Making Sense project builds on and extends the Smart Citizen Kit (an open-source, bottom-up sensing platform developed by Fab Lab Barcelona) and several previous pilots run by Waag Society in Amsterdam, FutureEverything in Manchester, Fab Lab Barcelona and the Peer Educators Network in Kosovo.

The project was designed to show how open-source software, open-source hardware, digital maker practices and open-source design could be used effectively by local communities to appropriate their own sensing tools to understand their environments and address environmental problems. The main critical environmental issues explored were concerning air, water, soil and sound pollution.

Based on nine pilots in three cities (Amsterdam, Barcelona and Prishtina), Making Sense developed a toolkit for participatory sensing aimed at deepening our understanding of the processes which might enable collective awareness. The pilots led to the development of a conceptual and methodological framework for participatory environmental maker practices based on co-creation activities. This framework acted as a guide to providing citizens and communities with the generative tools to enhance everyday environmental awareness. As a result, these tools enabled significant intervention in surroundings, change in individual and collective practices, and a hands-on transformation of the environment in the spaces participants use.

Through the use of co-creation methodologies, the project was designed to create collective and individual environmental awareness by harnessing the power of networks of people, knowledge and sensors. Its specific contribution was to underline and reinforce the move from collective awareness to collective action, by leading to better informed decision making practices and citizen empowerment through a bottom-up and participatory

approach. Multiple co-creation dynamics were applied over the project, including co-design and generative design tools to create and visualise a common participatory framework for community engagement. Considering the different contexts for each pilot city, Making Sense project was guided by general principles of creativity and collaboration in a flexible way, encouraging the citizens and communities to recognise themselves as the main deciders and co-creators of the process. Understanding that in-depth engagement of citizens and communities varies on the local conditions in the contexts, the project took attention to the local and available resources, environmental awareness and political priorities for each pilot.

Context and environment: Where does it all take place?

The Making Sense participatory sensing pilots were conducted in three different European cities: Amsterdam (Netherlands), Barcelona (Spain) and Prishtina (Kosovo). The pilots conducted have addressed a combination of environmental issues and focused on participatory sensing of environments. For each of the pilots, the location and their consequent context had a crucial influence on the process. The participatory strategies took into account the unique characteristics of each local context in the pilots, considering the socio-economic and demographic structure, the regulatory context as well as the political and societal values towards collaborative approaches for each pilot city.

Each Making Sense partner supported different activities with the goal to engage with communities at the grassroots level and collect data on matters of concern. The pilots of Amsterdam, Barcelona and Prishtina were led by Waag Society, IAAC and Peers Educators Network, respectively.

In Amsterdam the identification of the needs of local communities was based on an ongoing process that Waag Society has been carrying out since 2013. Through working with the communities, experts, academics and government in previous works, *air quality, noise pollution, water and soil quality* were identified and tackled during the Making Sense pilot.

In the Barcelona pilot, *noise pollution* caused by mass tourism appeared as a major problem for citizens among others as humidity and damp, air quality, and preservation of green spaces identified through various studies and ethnographic analysis.

The pilot in Prishtina was an extension of an action called Science for Change Kosovo that has started in 2014 as an experimental initiative to bring together affected communities, young people and other civil society organisations to discuss, monitor and investigate air pollution in Kosovo which is an important concern specifically due to coal and lignite-based Power Plants increasing the toxicity near Kosovo's capital city.

Even with certain particularities among the pilots' contexts, the intention of Making Sense project was focused on how to build robust conditions for a successful participatory approach that can empower the communities to assess their needs beyond traditional top-down policies led by governments.

Brief outline of the project/ initiative's pathway

The Making Sense project understands that the ultimate goal of empowering citizens and communities to make social change in their local contexts will only be achieved if this is done over the process within open and highly engaging and encompassing frameworks. Understanding that bottom-up and participatory approach in the context of European projects needs to start from the real needs of citizens and communities who are trying to understand concrete problems is just a first step. It is also essential to really understand the necessary pathways to design and achieve sustained actions.

According to the project, the reason to apply co-creation as a crucial way to solve specific issues related to urban participatory sensing was the necessity to have a broad range of stakeholder involvement in the process. By evaluating the Making Sense project as a case study, it is clear that the success of the project was highly associated to open and inclusive relationships between citizens, communities, NGOs, public administrations, business and industry players, and several other actors in a given territory or context.

Additional questions were evaluated by the project members over the initial phases that required a plan for intervention to maximize their efforts and perception of the problem definition for each pilot context. Some of the questions were: 'How to position participatory sensing communities in larger scientific and technological ecosystems?' 'How to engage already established institutional actors in processes that sometimes conflict with their own goals?' 'How to make the best of possible connections with those who are already engaging

with similar issues?' 'How to position citizen and community outputs within debates already being led by some of these actors?'

The main reasons identified about using co-creation practices for the Making Sense project was the comprehension of how to solve the obstacles in putting a bottom-up participatory approach into practice. The crucial challenge described in the project results was not just related to the problem definition by citizens and communities: After identifying what they wanted to achieve in the end, it was necessary to choose an adaptable path taking all the environmental, economic, social, cultural and political circumstances into account that always change with time.

As a means to start the co-creation in an open participatory approach, the project members developed a co-design and generative tools training workshop with partners and key players from the Making Sense Project. For this, a co-creation platform and wide set of co-design generative tools were chosen and put into use within this activity to build and enact a framework for Making Sense simultaneously. The ideas was to create a transdisciplinary approach that actively attempts to involve all stakeholders in any design process, therefore helping to ensure that the results meet their needs and were ultimately actionable.

Once the communities were recognised and the challenge identified, many other events and campaigns to generate awareness were developed to create a larger number of participating citizens.

Management & Organisation: Who interacts how to facilitate co-creation?

The Making Sense project's goal was to move towards a more co-created and collaborative interventions in participatory sensing, in which citizens were considered at the core of the whole process.

The management of the project Making Sense was coordinated by the WAAG society and in collaboration with the Joint Research Centre, the FabLab Network, IaaC, the Peers Educators Network and the University of Dundee. The project consists of six work packages. WP2 and WP3 are run by IAAC and WAAG, that respectively instrument the citizen sensing approach with open tooling and support the pilots in the three territories (Amsterdam, Barcelona, and Prishna). Over the project, each pilot identified relevant stakeholders which varied across the stages of the pilot's processes, and they were divided

between community of practice (driven by the interest in maker practices) and community of interest (driven by the environmental issue). For all of the pilot campaigns, the communities of practice and interest were the largest groups of stakeholders. In the context of participatory sensing, the Making Sense project considered communities of interest as groups of people who jointly perceive an environmental challenge in their local environments.

Different tools and methods of co-creation were applied over the project lifetime following a step-by-step approach in the design of participatory sensing and changemaking activity. The cooperation between partners was thought as a design process itself and have been fed by learning experiences provided to the partners, all along the project. Even if they were free to use and customise tools in their process, the pilots could learn from other WPs activities and use the different tools proposed by the consortium partners to build their local actions. For instance, one of the workshops were facilitated by Liz Sanders, founder of MakeTools (http://www.maketools.com/about.html), in which she presented co-designing and Generative Tools. This workshop was a key inspirational and learning moment for the consortium that support the construction of a first roadmap for the pilots. Liz Sanders' approach is characterised by a participatory mindset that values people as co-creators in the design process and is oriented to concrete action. In this sense it stands in contrast with critical design approaches, such as speculative design and design fiction, more oriented by an expert mindset in which design researchers are designing for the people, not with the people. In the Making Sense workshop, a set of methods and tools were put to use using the making/telling/enacting model:

Making

The workshop emphasised hands-on experiences with both 2D and 3D materials for making. A large variety of materials were made available for the participants to use for planning co-design activities and toolkits in the workshop and also potentially in the pilots.

Enacting

The participants were encouraged to explore it as a collaborative co-design method. Velcro-modelling materials and other props were made available for their use.

<u>Telling</u>

The telling methods were used throughout the workshop as the participants shared their homework content, explained what they have made using the 2D and 3D materials as well as reflect on the enactments.

An introduction and examples of the Participatory Prototyping Cycle (PPC) in action was also shared, covering projects in industry as well as academic research projects that could offer useful inputs for Making Sense. Several other workshops were placed over the project to guide the pilots to define their journey and learn about facilitation techniques and sensing tools.

The design of the Making Sense Framework follows three iterations refining the process of designing participatory sensing activities. The project applied co-creation as a key element between all Making Sense partners, starting from previous experiences of participatory sensing and community-led environmental monitoring initiatives, incorporating constantly the ongoing activities and pilots, and developing the main points of the framework in a co-design and generative tools workshop with partners and key players from the Making Sense communities.

What are the concrete processes and practices of co-creation?

This section is a direct copy from the Citizen Sensing Toolkit introducing the process of co-creation issued from the Making Sense project.

The Making Sense approach consisted of campaigns that first engage citizens and other stakeholders such as scientists, policy makers and other representatives related to environmental decision making and action. The Making Sense Framework identified stakeholders within the first phase of the project and applied a community building strategy that followed several steps: 1) community recruitment; 2) starting engagement process with communities of interest & practice; 3) Identifying skills available in community to address gaps; 4) fostering community cohesion & communication; 5) management and governance; 6) instilling principles and finally 7) documentation protocol.

1. SCOPING. At this first stage, the important issues are discovered, mapped and discussed by the key participants. Information is gathered by internet searches; collecting articles, news reports and literature; or by conducting surveys and interviews. At this time existing communities are established and new ones start to form. Scoping has no time limit; it can take a few weeks, or can develop over years.

2. COMMUNITY BUILDING. The aim of Community Building is for all participants to come to a shared understanding of the issue, the goals of the campaign, the organisation of the project and how to document activities. This is the stage when the skills of the participants are identified and new skills are developed, and it is also when others are brought on board if there are any skills or expertise missing.

3. PLANNING. Planning sees participants collectively decide on the project goals, on sensing strategies and on protocols for collecting data. This includes a plan for collecting other types of indicators. It is when the sensing tools are created or developed from existing resources and are tested and calibrated. Participants learn about sensors and are introduced to approaches for understanding data.

4. SENSING. Sensing is the phase in which everyone collects data on the issue i.e. environmental pollution. The data can be uploaded to a publicly accessible online platform. Participants can also take notes and record observations about how their lives are affected by the issue. Collecting these indicators can support the sensor data and be used to demonstrate the impacts to external individuals and government officials.

5. AWARENESS. Using all the data and complementary indicators gathered during the sensing phase, the information is analysed and discussed amongst the community. Bringing this information together is important for identifying areas for action and change. The aim is to build a collective awareness from the data. The analysis stage can include activities such as data visualisation, and people from professional science or academia.

6. ACTION. Once awareness has been raised on the issue at hand, participants work together to propose courses of action. The aim is to devise, organise and deliver an action, or series of actions, that can generate recognition of the issue, make an impact and make change. Actions can range from an individual change to public-facing activities (e.g. a protest) aimed at widening awareness, or even policy change.

7. REFLECTION. Participants reflect on the process to date, and consider what worked well and what could be improved. This can include looking at the data and seeing if there was change as a result of the action. This might require the participants to repeat stages, or return to previous phases (such as 'Sensing').

8. LEGACY. A legacy is created by looking towards the future of the project and making a plan for lasting impact. Plans for sharing information and news should be included to ensure that the project is sustainable, the project's tools are being reused, and uptake continues. For community organisations, this is a phase for writing reports and publications, as well as for sharing project assets that might be useful for other initiatives.

Alongside these stages, four principles could be used as a guide for participants at any stage, and for citizen sensing as a whole. These principles are co-creation; empowerment; openness; and changemaking.

Specification: What tools and instruments are/ were used to co-create?

Many good practices have been used to facilitate participation and support co-creation inside the Making Sense project.

What was really effective in the pilot is the time spent not only to analyse the context, but identify and reframe the problem. For instance, in the Barcelona pilot, two lines of research and action were conducted aimed at identifying both, the environmental issues that concern local communities and the challenges that users face when interacting with the Smart Citizen Kit and platform. The first one aimed to map existing matters of concern and their associated communities of interest. The second one aimed to collect data on users' technical requirements. Additionally, IAAC conducted field and desktop research to identify the existing grassroots organisations, ranging from neighbourhood associations to citizen movements, NGOs and cooperatives, and mapped them on the territory in order to better identify how they are connected to each other and the local issues. After that, a database of 274 community groups was created. With the goal to identify the most critical environmental concerns to citizens in Barcelona, the project conducted a rapid ethnography with a customised approach. By using cameras, they engaged in a field trip covering the areas of the city that were associated to environmental issues: the Gothic quarter, Born, Poblenou and Barceloneta.

A set of tools were used by the pilots with practical insights to support each step, from engagement processes to ideation, prototyping, assessment and documentation. These tools are presented in the toolkit that guide readers on how to use it. Here is an overview, directly picked out of the book:

- *Geographical mapping* is a visual tool, mapping out issues of concern in collaborative workshops where to discover things that might otherwise have missed.

- *Common Mapping* is a large wall canvas which openly allows people to log contributions that they are willing to make to the campaign, such as resources (e.g. sensors, meeting space, and funds), time, or even specific skills. Facilitators can fill out the fields in the chart according to the specific needs of the campaign. Participants' contributions can be mapped using sticky notes on the big target where they will also find an instructions sheet and a call for participants to provide their name and contact details.

- *Collaborative pilot schedule* consists in opening up the planning process, so to design a campaign that takes into account the needs and aspirations of the community, as well as the availability of individual members.

- Onboarding kit is a set of informative resources to welcomes and guides new participant into the project and the team. It is composed of both informative resources as well as community-building tools.

- *An empathy timeline* facilitates community building by bringing people together to discuss issues and consider them in a way that they perhaps have not often done before.

- *Community level Indicators* are measures that refer to population groups rather than individuals, to collect complementary information to sensor data and better understand the sources and causes of environmental issues.

- *Sensing Strategy canvas* helps communities co-create plans for deploying their sensors and capturing data.

- *Sensing guides, data journals, operation manuals and open Hardware* support to understand, use and follow up with the sensors and make sense of the data collected.

- The use of *awareness and data discussion sheets* as well as *data dashboards* could ensure data is not only shared, but also understood within the community (and potentially, within intermediary organisations or local government).

- Building a digital presence, using prospective tools like future newspapers scenario can enhance new opportunities for inclusion or futures collaborations.

- *Co-creation assemblies* are events in which desirable possible futures are proposed, discussed and prototyped. In these assemblies, it is important to include as broad a range of stakeholders as possible, especially those who might be considered antagonistic to the campaign. Issues can be grouped into themes, with each theme assigned to a table. At each table, themes are discussed at length in order to find common ground and potential solutions.

One interesting point is the capacity of the partners in pursuing their goal in an extremely participatory way. For example, in the Issue Onboarding workshop (part of the Community Champions pilot in Barcelona), the community champions were introduced to the underpinning principles of the pilot, including ideas around participatory sensing and data collection. They were engaged in a series of activities that assisted them in understanding the complex issue of noise pollution, helped them collectively define the main goals of the pilot, and considering some of the CLIs that could be collected. Worksheets showing two 24-hour timelines were given to groups. Each group populated the timelines with the noises they heard on one timeline, and the noises they made on the other. The participants were asked to use red and green dots to identify what sounds they considered as positive and negative. This method was effective in creating participant awareness on the subjectivity of noise. Specifically, how it relates to personal perceptions and that the issue is indeed a complex and socially constructed one. After the Noise Timeline each group discussed and wrote down two goals or objectives for the pilot. These goals reflected collective aims of what they wished to achieve through the actions of the campaign. The groups devised ten goals in total and each community champion was given two votes each to select which of the goals they thought were the most appropriate for the pilot. Taking the two goals that were considered the most favourable, the groups used these goals as a premise for considering what CLIs could be used as a way to track progress and complement the sensor data during the pilot

Which learnings emerged?

The learning can be described through seven bullet points:

- Starting with a challenge that comes from the real needs and have the potential to engage community. The choice and justification of the challenge faced locally needs to make sense for the territory. The intense work done within each territory in the early stages of the pilot processes have legitimised the actions.

- Being humble and in coherence within the values of the project. The pilot leaders emphasised the importance to adopt a posture of cooperation with the community without promising anything, being positive, empathic and realistic, and based on shared values, in this case openness, empowerment, co-creation and change-making.

- Being agile, designing and sharing tools during the pilots. One specific feedback from the pilot of Barcelona was that the co-creation activities were built during the pilot from the emerging needs of the community. Indeed, the toolkit was transformed afterwards to gather the local 'innovative practices' in one book.

- Engage with Community champions. One success of the Making Sense project was to succeed in identifying, training and motivating 'community' champions to increase their level of engagement by being ambassadors of the projects themselves.

- Build upon existing communities. It is hard to start from scratch. Working within existing communities in all territory have supported the development of the processes.

- De-complexify processes, information and sensing. One difficulty in technological projects is to make knowledge accessible and understandable for people participating in the process. In Making Sense, efforts were made to involve people all along the process no matter the level of difficulty of the activities. Transparency was also important even when delays or problems were presents.

- The importance of documenting the process to sustain community. The last learning from Making Sense comes from the design and dissemination of the toolkit, remade after the ending of pilots and diffused online. This allowed the replication of the process in other cities with a clear facility to use tools and tips present in the book.

References

Interview

Guillem Camprodon (IAAC)

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Extreme Citizen Science's Intelligent Maps Project | Congo, Namibia, Brazil

Trupti Patel and Melanie Smallman (UCL)

(Adapted from thesis of Julia Bultechner)

The project designs, develops, evaluates and deploys methodologies and tools that enable people with no or limited literacy to use smartphones and tablets to collect, share, and analyse (spatial) data. They create Community Memories as representations of the environment and their relationship to it. It started in Africa by developing tools to allow non-literate people to engage in participatory mapping. This demonstrated how non-literate people could successfully participate in formulating research questions and collecting the data that is important to them.

Please note: the majority of this case study has been written from information contained within the thesis of Julia Altenbucher after a conversation with Muki Haklay – the PI of the Extreme Citizen Science group (For a copy of the thesis, please see http://discovery.ucl.ac.uk/10047142/)

What is the project/ initiative all about?

Extreme Citizen Science (ExCiteS) is a situated, bottom-up practice that considers local needs, practices and culture and works with broad networks of people to design and build new devices and knowledge creation processes that can transform the world. It is an initiative located within University College London's (UCL) Geography department. The initiative is supporting many projects including *Doing it Together Science (DITOs), Extreme Citizen Science Analysis and Visualisation, WeGovNow!, and Challenging Risk* and has

supported 15 past projects, including one on non-literate populations in Congo and their use of land called *Intelligent Maps*. The project has run since 2006 and is currently being funded through an ERC Advance Grant (ECSAnVis)[1].

The aim of *Intelligent Maps* is to design, develop, evaluate and deploy a set of methodologies and tools that enables people with no or limited literacy – in the strict and broader technological sense – to use smartphones and tablets to collect, share, and analyse (spatial) data. The platform is and will be used in a variety of concrete projects, often related to environmental monitoring. Ultimately the goal is to let communities build so-called Community Memories: evolving, shared representations of the state of their environment, their relationship with it, and any threats it faces.

Context and environment: where does it all take place?

The project sits within a non-government organisation with a research organisation standing behind it. It is a grassroots initiative. It takes place in forest areas, which can be quite big so can be considered either a district or a neighbourhood. As the project focusses on non-literate populations, it obviously produced tools and methodologies in a highly unique way, engaging with individuals using pictorial representations. As logging companies were working in the area, there was pressure to ensure they met legal and/ or social demands.

This research is situated in the Republic of Congo (RoC) as this is a core focus of work by ExCiteS deputy director, Dr. Jerome Lewis. The Congo rainforest covers an area of 200 million hectares located within six African countries. It stretches into Democratic Republic of Congo (DRC), Republic of the Congo, Cameroon, Central African Republic (CAR), Gabon and Equatorial Guinea, making it the second largest tropical forest after the Amazon rainforest. Much like the Amazon, it is a unique biodiversity centre[2], home to over 10,000 species of plants, 1,000 species of birds, 400 species of mammals and 400 species of fish[3]. Among the forest's inhabitants are rare animals facing extinction such as the mountain gorilla and the central chimpanzee[4]. The rainforest is also of great significance to people, as it provides food, fuel, fibre and a wide range of other ecosystem services to a total of 200 million people[5]. Furthermore, it is home to roughly 29 million rural people, up to 500,000 of who rely heavily on forest resources for their livelihoods[6]. As Eisen, Counsell and Thornberry[7] note, however, population estimates vary widely. Within the people who live

in the forest and rely on it for livelihood to various degrees, two main groups can be differentiated. One is the indigenous or forest people living as hunter-gatherers, and the other is the settled Bantu and Ubangian farmers and fisher people, who are most commonly referred to as Bantu[8].

The indigenous people of the Congo rainforest are collectively referred to as Pygmies and constitute more than 150 different hunter-gatherer ethnic groups[9]. This is the largest and most diverse population of nomadic, hunter-gatherers that exists in the world today[10]. These ethnic groups are often marginalised and face discrimination therefore the word 'Pygmy' has come to have negative connotations. In fact, the usage of the term is forbidden by law in the Republic of the Congo (Law no.5 Article 1, 2011), thus the government and local NGOs are using the French word 'autochtone', meaning 'indigenous' instead[11]. In academic writing, however, the term 'Pygmy' is widely used to describe physically, geographically and culturally different, indigenous peoples in equatorial Africa that share cultural and economic practices, the most common of which is hunting and gathering and the nomadic lifestyle[12]. The work uses the term 'Pygmy' in accordance with the academic practice and has no intent to disrespect or offend in any way. Bahuchet[13] distinguishes between 20 major groups of Pygmies based on ethnic, linguistic and geographical differences. The most prominent groups in the Congo rainforest include the Aka, Baka, Bongo, Cwa, Koya, Mbuti, Medzan and Twa. Each group is also known under several different names. The study sites for this project lie between the Congo and the Sangha River, primarily inhabited by Aka Pygmies. According to Bahuchet[14], the Aka group is referred to as Bayaka, Biaka, Babinga, Bambenga, BaMbenzele, and Babenzele. The researchers on the project call them Mbendjele, consistent with the naming convention of local project partners. Despite the ethnic, linguistic and geographical differences, the lifestyles of these communities are similar in that they are closely tied to the forest they inhabit, so much so that they identify themselves as 'forest people' to underline the significance of the forest to their culture, history and livelihood[15]. According to Lewis[16], the Yaka Mbendjele pygmies have a proverb which translates to 'A Yaka loves the forest as he loves his own body.' To them, a life is unimaginable without the forest, which is not only important for its physical resources but also for its cultural and spiritual role in a Pygmy's everyday life. The forest is regarded as a sacred place home to forest spirits and the Pygmies are closely connected to them as 'children of the forest'[17]. There are over 20 forest spirits and spirit performances described by Lewis[18]. One of the most important spirits of

the forest is Djengi (also Ejengi). This is one of the few words that multiple Pygmy languages share.

Most of the Pygmy communities live a nomadic or semi-nomadic existence in small, egalitarian groups that set up temporary huts in different areas of the forest[19]. They sustain themselves by hunting wild animals and gathering wild produce, including fish, reptiles, caterpillars, honey and fruits[20] [21]. The forest is also their source of medicine and a series of materials used for constructing tools, hunting weapons, household utensils etc.[22]. Resources acquired from the forest are consumed by the community or offered to nearby settlements in exchange for cultivated products such as manioc, maize and iron. The development of strong trading relationships between certain forest and settled communities has led to complex economic and social dependencies[23].

Settled people - The Bantu and Ubangian farming and fishing communities, collectively referred to as Bantu, migrated to the Congo Basin approximately 3,500 years ago[24]. They live in open spaces next to the rainforest and sustain themselves from farming cassava, coco, yams, oil palm, cocoa and coffee and from fishing, trapping and trading[25] [26]. Having lived side by side for thousands of years, the indigenous and the Bantu people have developed strong economic and trading relationships[27]. Forest resources such as bush meat, palm-nuts, honey and leaves are traded for items not available in the forest such as iron and salt. Many Pygmies also acquire work in agriculture, clearing farmlands or harvesting land for Bantu communities[28]. Despite these ties, forest people are subject to discrimination from the Bantus who claim exclusive rights over the territories that Pygmies use, as well as over the persons and labour of forest people[29].

Local issues - Although the lifestyles outlined above are considerably different, both Pygmy and Bantu communities rely on the forest for their livelihoods. Yet, they do not have control of the forest they so much depend on. They are excluded from the management of the areas. Efforts from conservation and natural resource management organisations such as Wildlife Conservation Society (WCS), the World Wildlife Fund (WWF) or other NGOs have even disenfranchised the locals[30]. Whereas there has been an aggressive push for industrial resource extraction in parts of Central Africa, the tendency since the 1990s has been to establish protected areas in the rainforest, which have led to the exclusion of indigenous people living on the area[31].

The Congo Basin acts as a vital climate regulator and is recognised internationally for its direct impact on climate change. Nevertheless, the forestry and resource extraction sectors have seen a rapid growth in the past two decades[32]. This has led the Congo Basin's countries to reshape their national legal systems in order to encourage international investments to control and manage forest territories as Cameroon has done in 1994, RoC in 2000, Gabon in 2001 and DRC in 2002[33]. These measures are taken without considering the needs of the local forest people. Figure 1 illustrates the issue of forest dwelling communities not holding any formal usage rights in most of the Congo Basin's countries. Current politics divide the forest into Permanent Forest Domains (PFDs) and Non-Permanent Forest Domains (nPFDs). PFDs are either leased as logging or mining con- cessions or protected as national parks that prohibit even subsistence hunting for local forest people. The remaining nPFDs do not fit into the above categories and are mostly used by settled communities, putting indigenous forest people in a vulnerable position[34] [35].

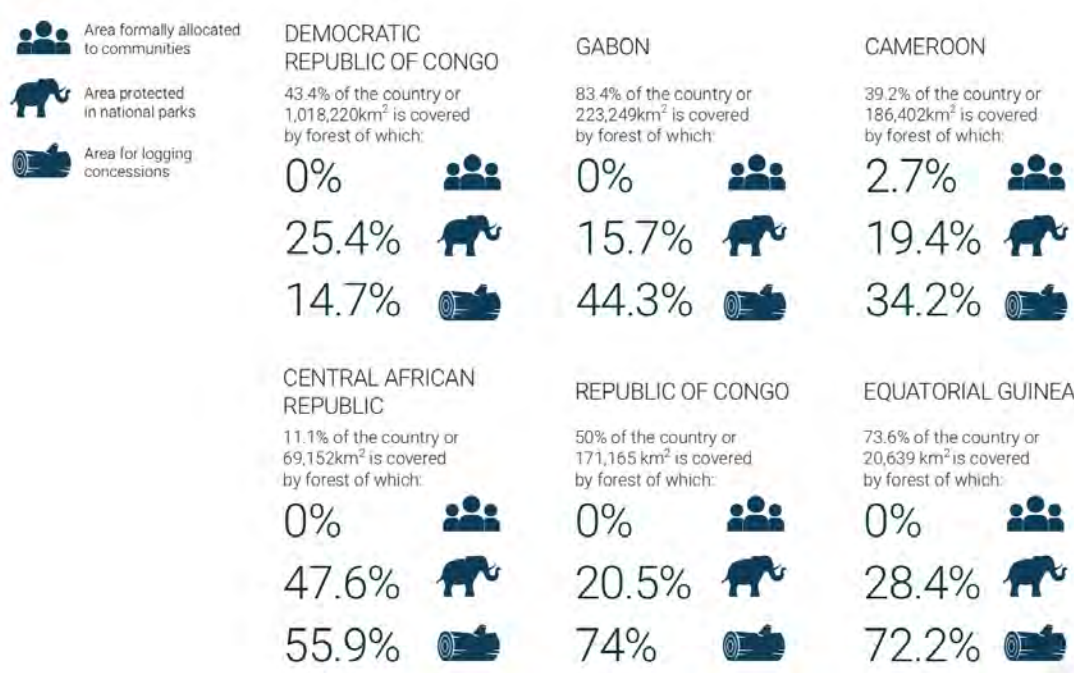*Fig. 1: Forest ownership and usage rights in the Congo Basin*

Permanent Forest Domains are further divided into multiple concessions called FMUs (Forest Management Units) or UFAs (Unitie Forestieres d'Amenagement). These units are forest plots designated for management, protection, conservation, restoration and production[36]. According to Lewis[37], the aim of this division was to attract foreign

investment. It brought on a surge of activities from companies interested in exploiting forest resources. During the late 1970s, concessions with river access were mostly of interest, as logging roads had not yet been established due to the lack of efficient machinery. Tractors transported the timber down to the riverbank, where it was then floated down to the sea. During the late 1990s and early 2000s, further concessions became available as a result of advances in technology both in terms of hardware (GPS receivers, earth moving and road making gear) and software (GIS, forestry specific programmes relating to road planning, felling, and transformation procedures). This saw a burst of logging activity in the region as the forest became commercially viable[38].

The forest-dependent population of the Congo Basin is experiencing rapid environmental changes. Climate change has become an unpredictable addition to political instability, predatory market forces and rapidly expanding industrial activities[39]. The resource base of forest people is diminishing as remote regions are opened up to the commercial activities of logging companies. There are various obstacles that need to be overcome in order to address the needs of local people, such as the weak or non-existent infrastructure, corrupt governments and resource-fuelled conflicts as well as economies dominated by multinationals. These companies extract oil, minerals and timber, and increasingly promote large scale land-use change by establishing palm oil plantations[40].

In the Republic of Congo, local and indigenous communities do not have formally recognised land rights to the forest territories they inhabit. In fact, RoC is one of only ten countries in the world where the government does not administer and reserve forests for such communities[41]. Despite the lack of formal land rights, local people's way of life is theoretically protected as a result of an array of certification schemes in place in the Congo Basin. These schemes give an incentive to logging companies to harvest and manage forests sustainably in the tropics, while also taking the lifestyle of local people into consideration. The Forest Stewardship Council (FSC) is the largest certifier in the region and the most popular in Central Africa[42]. It is an international membership association established in 1993 with members from environmental and social non-governmental organisations, the timber trade, forestry organisations, indigenous people's organisations, community forestry groups, retailers and manufacturers, forest certification organisations, as well as individual forest owners and interested parties[43]. The FSC promotes responsible forest management that is environmentally appropriate, socially beneficial and economically viable. Certifying bodies carry out regular forest inspections and audits for the FSC.

Although inspectors and auditors are expected to be independent, their services are often paid for by the logging companies they are auditing[44]. Logging companies who are FSC certified are able to sell timber in Europe for up to 30 % more per cubic metre than companies without FSC certification. As companies operating in landlocked parts of the Congo Basin require a very high oil expenditure in order to power timber transport, they welcome this extra profit[45].

According to Cerutti et al.[46], people living in FSC certified logging concessions are experiencing better social conditions in the Congo Basin than people outside these areas.

An important part of forestry legislation is undergoing revision in the Republic of the Congo after, in May 2010, the country signed a Voluntary Partnership Agreement (VPA) with the European Union (EU). The agreement concerns the Forest Code which outlines the frame- work for governing the forest sector in the country[47]. The VPA was established under the EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan (EC- EDA-ESA-CSG, 2010) with the aim of introducing more participatory forms of forest governance. Under participatory activities, the action plan defines monitoring logging company compliance with socio-economic indicators, mapping readiness for Reduced Emissions from Deforestation and Forest Degradation (REDD), and collecting evidence of both illegal poaching and the negative impacts of anti-poaching enforcement measures on local people. In order for a company to trade with the EU, the country where their logging operations are based will be required to reach a formal agreement with the EU to assure that they are legally exporting timber from the country. An additional incentive to acquire certification by the FSC, whose criteria are stricter than those in the VPA, is its formal recognition as proof of legal compliance.

Despite their potential readiness to honour the FSC's requirements for inclusivity, logging companies are often at a loss when it comes to addressing social responsibility as part of certification. Lewis[48] reports that even companies who have been present in the region for over three decades have little knowledge of the needs of the local indigenous people. The reasons are manifold. Firstly, being semi-nomadic hunter-gatherers, these communities are regularly on the move and physically difficult to track down in remote parts of the forest, especially since there are multiple groups associated with a particular territory. Camps consist of twelve to sixty individuals relocating frequently within the forest as part of regular seasonal movements or for various other reasons such as a simple visit to friends[49]. There is also a linguistic barrier standing in the way of the companies' abilities to

understand the needs of the forest people, who speak a multitude of different languages. Even with an interpreter at hand, a cultural obstacle emerges. Being an egalitarian society, the hunter-gatherers have trouble understanding hierarchically organised institutions who expect to find a non-existent leader amongst them. To respect their way of life, the companies would need to communicate with each community as a group, as opposed to the temptation of imposing a 'leader'[50]. Communicating with indigenous people has therefore proven to be both challenging and time-consuming for logging companies.

Previously, I explained how the traditional way of life of forest communities in the Congo Basin is threatened by external economic interests. Based on their nomadic hunter-gatherer lifestyle, a particular characteristic shared by Pygmy groups are their vast knowledge of the forest and the threats it is facing. However, the lack of written information exchange makes it difficult to communicate their needs to outsiders. Nonetheless, local communities have shown willingness to challenge existing power relationships by participating in community mapping projects with the aim to prove their existence and to demand rights over forest usage[51].

According to Gartner, Bennett and Morita[52], '(m)aps can now be created and used by any individual with modest computing skills, from virtually any location on the Earth's surface, and for almost any purpose'. The following section highlights why even ten years after that statement was published; there are still substantial obstacles to overcome until this statement becomes reality.

As Congo is a low developed country, the digital divide is seen as an issue. Technologies for non-literate people had to be adapted so as to use pictorial representations. A second issue is the lack of mapped areas in Congo. The most accurate and up to date topographical map is from a survey carried out in the 1960s by the National Geographic Institute.

The project began by working on the examination of how Swiss forestry companies achieve free, prior and informed consent from local people living in the forests they exploit. The project thus pioneered practices, appropriate technologies and institutionalized procedures to ensure the co-management of 1.3 million hectares of forest by local indigenous people and company managers. The project has defined the basic practices and procedures required for achieving free, prior and informed consent from indigenous peoples in the Congo Basin. As this issue was so pressing, and fit in well will the vision of environmental

and community lobbyists, policy maker support followed. In particular, from international governments such as the swiss government where the logging companies were based.

The project was initially funded by EPSRC and the World Bank but now gets funding from other sources through the umbrella Extreme Citizen Science initiative. The project works in partnership with the Forests Monitor, the Forest People's Programme and Independent Observatory of Congo-Brazzaville. The locals were already known to a researcher on the project who had worked with indigenous people in the past. While communities living in the Congo Basin have varying lifestyles, including semi-nomadic hunter- gatherers as well as sedentary farmers, they all depend on the forest and its resources to various degrees. Despite this dependency, local people are rarely involved in the management of the areas in which they live, and often get forcefully excluded from their lands[53]. At the same time, industrial resource extraction is promoted by timber producing countries, and logging roads increasingly open up remote regions of the forest to commercial activities. To counteract this development, work carried out by the ExCiteS research group aims to enable local communities to play an active role in monitoring logging activities in order to demonstrate their claims to forest land. For this, the research group is applying the concepts of Extreme Citizen Science to develop monitoring and analysis tools that are accessible and comprehensible by local populations as well as the scientific community.

Brief outline of the project/initiative's pathway

The project started by developing tools to allow non-literate people to engage in participatory mapping. To extend participation beyond mere data collection the team introduced novel approaches to visualisation, analysis and editing of spatio-temporal data, comprehensible for non-literate users – a concept called Intelligent Maps.

This work demonstrates how non-literate people and those with limited technical literacy can successfully participate in formulating research questions and collecting the data that is important to them. ExCiteS started with the case of supporting Baka hunter-gatherer groups, local NGOs and other local indigenous partners to tackle illegal logging in the Congo basin. It quickly expanded to Namibia, Brazilian Amazon and cases in the UK to support several local communities in their aim to combine their local environmental knowledge with scientific analysis to improve environmental management. In a growing number of cases we negotiated challenging environmental conditions via the development

and use of appropriate participatory methods (from various disciplines; e.g. participatory observation, participatory mapping etc.), hardware solutions (e.g. for charging phones in places where there is no electricity), and software[54].

Management and Organisation: Who interacts how to facilitate co-creation?

The project works in partnership with the Forests Monitor, the Forest People's Programme and Independent Observatory of Congo-Brazzaville. These charities are concerned about the clash between the logging industry and indigenous people, and the way they use their land. In addition, climate activists and charities also have a stake in ensuring the forests are not cut down and the swiss government were also interested but not directly involved in the research as the logging companies were based there and they were concerned with what their actions may mean for future international relations between the two countries.

Mismatches are significant even though participants are those who pose the research questions and are involved throughout the whole research cycle. However, there are power-asymmetries between researchers and participants, and between researchers in the team in their technical and case knowledge, and then there are issues of literacy and learning of technology. Issues of disciplinary differences within the research team influence the development of the project – this project included researchers from geography, anthropology, civil engineering and GIS. Different cultural and political contexts influence how much local actors and intermediaries are willing to support the process. Communication was informal and done as and when.

As the project was funded, a contract was made through the description of works. NGOs provided statements of support.

What are the concrete processes and practices of co-creation?

The project has gone through several iterations from identification/understanding through to iteration over several loops as it has been running since 2006. Most prominent is the iteration of the software to interact with the community. In 2006, Lewis and Nelson (2006) initiated a programme together with the logging company Congolaise Industrielle des Bois (CIB), who are working towards certifying their entire operation (1,300,000 hectares) in the

northern part of RoC. With that goal in mind, the company needed to develop procedures to minimise impacts of timber extractions on both the ecosystem as well as the indigenous people inhabiting the forest. In order to achieve this, a software company was contracted to develop a mapping tool featuring an iconic UI for use by non-literate people to map their key resources. PDAs and separate GPS receivers were used, enabling forest inhabitants to record their resources and potential logging violations (see Figure 2 below). In order to make a recording, the users were navigating through an icon-based decision tree[55][56]. A similar project was set up aiming to monitor the harmful activities of commercial poachers. In addition to the issue of over-hunting, a further goal was to record harassment against local people by government-run ecoguards, supposedly responsible for controlling poachers. In 2011 the ExCiteS Research Group took up Lewis' icon-based approach and developed a mobile app, enabling non-literate, local communities to collect evidence on commercial poaching activities[57].

Fig. 2: PDA based data collection – decision tree icons

The high cost of the then outdated PDA devices (£1000 - £3000), the need for external GPS receivers as well as the limited usability of the previous platform rendered the existing system unsuitable. In late 2012, the decision was made to implement new data collection software in-house, due to the absence of an existing solution to meet the project's needs with regards to text-free, hierarchical interfaces and autonomous multi-modal synchronisation. An earlier iteration of the software was built on top of ODK, which required verbose project definition forms that were difficult to maintain. The effort to

entirely rebuild the data collection app was necessary to ensure maximal flexibility in project design as well as automatic and multi-modal data sending capabilities[58]. An important aspect for the design of the data collection software was to run on low cost, off-the-shelf mobile devices and to not require any specialised hardware. With logging companies building towns in the forest, they bring infrastructure with them, such as GSM-based networks that can serve as transmission carrier. The new data collection software was named 'Sapelli', after a tree species that hosts caterpillars. The caterpillars are a valuable protein source for the Pygmy communities but at the same time the Sapelli tree is the main commercial species extracted by logging companies.

The first iteration of the Sapelli Collector software consisted of three main components: a data collection app (with integrated data sending service) for Android devices, another Android app (called the 'Relay') to forward SMS messages, and a server application to receive and store data. This early version of Sapelli has been deployed in a project carried out in collaboration with the NGO Forests Monitor, aiming to support forest-dependent communities in the Republic of Congo that are affected by industrial forest exploitation[59]. The UI of this version was restricted to the visualisation of pictorial decision trees with the option to augment observations with photographs, audio recordings and/or GPS locations. As per the requirements of the international NGO, Forest Peoples Programme, Sapelli's features were later extended to include textual forms in order to cater for scenarios where NGO staff map resources together with forest people. In this scenario, the staff member fills out a meta-data form and then hands over the device to the locals for the actual resource mapping.

Further, more recently (post-2016) a prototype testing a scoping mission was conducted. A field visit was planned when the development of the initial Sapelli prototype was finished. This way it could be presented to the communities in order to receive feedback for both the software and the project design. Five researchers visited eight camps over a period of six weeks. Table 1 shows the communities, in the order of visit, and the different members of the ExCiteS team that were present along with their scientific background. Members of the anthropology team were present throughout the duration of the trip. While the technical team mainly focused on the usability and appropriateness of software, the anthropologists were leading the discussions with the communities. In particular Dr. Jerome Lewis has established long-term relationships with local hunter-gatherer groups, which enabled easier access to communities and gave the project legitimacy from the viewpoint of

participants. The approach for engaging with communities and introducing tools was adapted from projects conducted previously in the Congo Basin[60] but is continuously refined in response to local conditions[61]. In each of the communities, the population spoke either Lingala, or the local forest language. The translation was facilitated by our local project partners and Lewis, who speaks the local Mbendjele language.

Upon arriving at a community, the ExCiteS group followed a FPIC process, in which the first step was to introduce themselves to the local population. The Intelligent Maps project was explained followed by the question whether they were interested in testing the Sapelli collector. Consequently, everyone who had given their consent was invited to join the participatory process of introducing the decision tree icons, test the phones and eventually map nearby resources. During the scoping mission, a member of staff working for CIB outlined the procedure of carrying out local mapping consultations with forest communities. He explained that the company's social mapping group visits forest communities to have a consultation with them on which resources should be protected from commercial activities. Subsequently, these resources are marked with red paint and their location is recorded with a GPS receiver.

Community	Ethnic groups	ExCiteS delegation	Length
Bolozo	Bantu (Bakwele)	Conquest[1], Lewis[1], Stevens[2]	1 day
Komo	Pygmy (Baka)	Conquest, Lewis, Stevens	1 day
Attention	Bantu (Bakwele) and Pygmy (Mikaya & Baluma)	Conquest, Lewis, Stevens	1 day
Poulani	Bantu (Bakwele) and Pygmy (Mikaya & Baluma)	Conquest, Lewis, Stevens	1 day
Bangui Motaba	Bantu (Bomitaba & Bondongo) and Pygmy (Mbendjele & Kaka)	Conquest, Lewis, Stevens	3 days
Sembola	Pygmy (Mbendjele)	Altenbuchner[3], Conquest, Lewis, Vitos[2]	1 day
Longa	Pygmy (Mbendjele)	Altenbuchner, Conquest, Lewis, Vitos	3 days
Sembola	Pygmy (Mbendjele)	Altenbuchner, Conquest, Lewis, Vitos	1 day
Gbagbali	Pygmy (Mbendjele)	Altenbuchner, Conquest, Lewis, Vitos	1 day
Attention	Bantu (Bakwele) and Pygmy (Mikaya & Baluma)	Altenbuchner, Conquest, Lewis, Vitos	1 day

[1]Anthropology, [2]Computer Science, [3]GISc

Table 1: Scoping mission

On return to the office, these coordinates are overlaid on a map with the results being shown to the communities for validation and discussion. He further explained that these discussions allow community members to better understand the process and to learn to read the maps. When the inhabitants of Sembola were asked about the process of map consultation, it turned out that only few of them had ever seen such a map, and those who

did stated that they did not understand it. Given the inadequate scale on which single trees are portrayed, reading these maps would be difficult even for map literate societies.

The outlined procedure of the scoping trip was directly the subject of Michalis Vitos' research on the usability of the Sapelli UI. Furthermore, the field trip informed all team members of the way the project and technology were received and used by the communities. The first stage of a UCD approach is to observe the activities of potential users and identify their motives and needs. For this, it is crucial to observe the users in their natural environment, respectively the environment in which the product or service will be used. Thus, observations as well as discussions with communities and logging company employees served as the basis to form the Research Questions of this thesis.

All visited communities communicated their interest in testing whether 'machines' (as called by the translators) can help to collect and view their resources that need protection. They were specifically interested in sharing those maps with external, more powerful stakeholders. At this early stage, it was entirely unclear when and where exactly the project would proceed and therefore the researchers strictly made no promises in order to avoid false expectations.

When Vitos, Altenbuchner et al.[62] carried out experiments to evaluate the usability of the Sapelli collector interface with Pygmy communities in the Republic of the Congo, the hierarchical UI structure proved difficult to navigate for people who have never attended formal education or are completely new to digital technology. The concept of a navigable tree structure where a sequence of decisions must be made to reach a final 'leaf node' was too abstract and therefore the navigation buttons on top of the screen could not be interpreted in a meaningful way. The participants rarely used the cancel (cross) and back button (arrow) and when they were asked about the meaning of those it became clear that they had trouble to distinguish between navigation buttons and decision tree icons.

The experiments further revealed that the categorisation of icons was not always logical to the participants and often there was no generic term for a category in the local language. It became apparent that Mbendjele do not have a culture of categorising things in the same ways that are common in the western world, which makes it difficult to define a categorical structure. This confirms findings of folk biology researchers, who found that cross-cultural conceptualisations of nature tend to be misinterpreted as a lack of understanding[63] [64]. Medin and Atran[65] found that native cultures with great expertise tend to reason more at

more specific levels, which might explain the difficulties participants were facing in handling hierarchical UIs, starting at a very broad and conceptual category.

What adds to this problem is the challenge of designing intermediate, categorical icons versus node icons. Figure 3 below illustrates an example of an icon sequence to tap in a hierarchical structure in order to map a specific fruit tree. The first figure represents the category 'trees', then the category 'fruit trees' then a specific forest tree that will be mapped. Despite the design choice to represent categories by showing multiple items, this concept was not fully understood by many of the participants[66]. During the field trials it became evident that categorical icons were often interpreted literally as opposed to its intended meaning as an 'umbrella' icon for similar items.

(a) Trees   (b) Fruit trees   (c) Myrianthus arboreus fruit
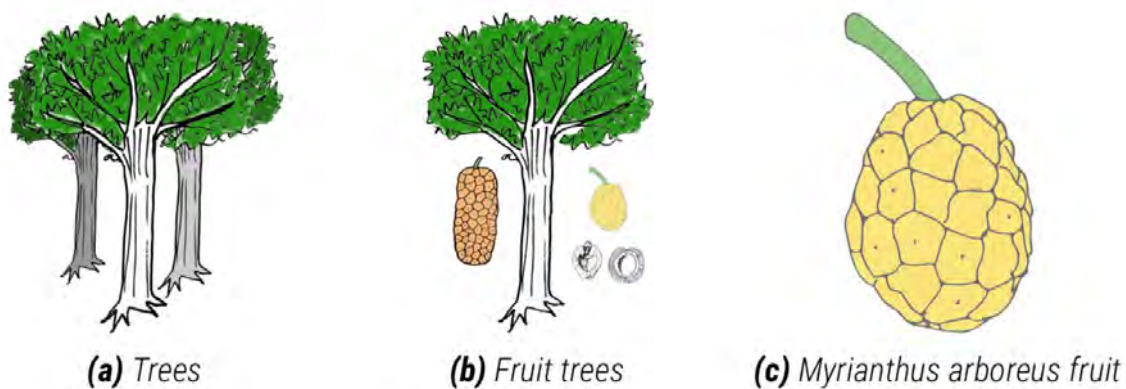
Fig. 3: Categorical versus 'leaf' icon (icons by G. Conquest)

In general, icons were interpreted very literally. During the participatory icon design phase, locals often requested to add a forest background to icons. The researchers had not pro- posed this due to the fact that all icons were based in the forest. Throughout the lifespan of Sapelli and various field trips to RoC, different designs of a medicinal tree have been tested. The drawing of a syringe, which the participants knew due to a vaccination programme, was the initial attempt to present a resource used for medicinal purposes. Later, a tree was added to present the forest resource, as well as a person in pain to further illustrate the concept of healing. The latest design, which the Mbendjele seem to prefer, is a very literal illustration of how the tree is used for turning into medicine.

In order to overcome these issues, Vitos, Altenbuchner et al.[67] explored a different mapping technique that omits all hierarchy and on-screen navigation but utilises physical objects instead. The idea was to select the object to be mapped 'in the real world' and use the digital

device for geotagging and time stamping of observation as well as for its data storage and sending capabilities[68] claims that building on users' knowledge by creating a link to the real world can improve participants' confidence.

The resulting prototype, named Tap & Map, consists of a smartphone app and a set of NFC cards with icons representing the objects to be mapped. In order to record a point of interest, the user needs to be in a specific location, identify the object according to a card from the stack and tap the card against the mobile phone. The pairing then triggers the app to read the GPS location and store it along with the selected card and the time stamp. In the absence of NFC cards while prototyping this idea, the concept was trialled with icons printed on paper and the NFC pairing was simulated. Nevertheless, it showed that the simple approach that omits all navigation achieved better results than the Sapelli interface and showed more confidence[69]. An obvious limitation of this approach is the dependency on NFC cards as extra hardware.

Specification: What tools and instruments are/were used to co-create?

The software Sapelli was described in the previous section. An issue with the software is the data transmission. Given the context of the remote rainforest, an optimised data transmission mechanism was an important aspect in the design of a new collector software. Automatic data transmission is challenging in remote areas with little network infrastructure. In regions close to logging towns, however, people tend to get occasional GSM connectivity. Sapelli offers a multi-modal data transmission mechanism that is optimised to cater for different connectivity scenarios. In order to send data via SMS, records are serialised in a binary format which is heavily optimised for space. They are grouped together in transmissions, which are further reduced in size by applying the best performing compressions algorithm on the y. Due to the large file size, the transmission of optional media attachments is not possible via SMS. These can be locally exported and later associated with their corresponding records. If there is no data carrier available in an area, records can be exported to a local memory card on the phone. In situations where internet connectivity is accessible, data is sent to a server via Hypertext Transfer Protocol (HTTP) requests.

By design, all data transmission should happen in the background and not require user interaction. Therefore, a service is set up that automatically checks for connectivity at

scheduled intervals and sends off the data when possible. Implementing this strategy, the data transmission system underwent two iterations. Initially, when GSM network connectivity was detected, text-based information, such as timestamps, decision tree selections, co-ordinates, etc.) were forwarded to a 'relay' phone, which posted the data to a central server via internet connection. The features of the server component were limited to receiving and storing data. Due to the unreliability of the SMS forwarding relay phone, this transmission system was deprecated. A new system was designed that is capable of sending data from any Sapelli app to another via SMS. This way data can be accumulated, locally exported to a file or forwarded to a server from any device. Additionally, an HTTP connection to GeoKey was added. GeoKey[70] is a web-based, open source platform that serves as a connecting point between data collection and data utilisation by providing a server-side infrastructure to receive, store and disseminate geographic data collected by citizens. This way, any Sapelli client that is connected to the internet can send data records, including file attachments to a web server.

Due to the focus on low and non-literate users, the initial priority was to make it as straight-forward as possible to build pictorial decision trees and icon-driven interfaces. The inadequacy of the survey description languages used in other platforms (e.g. the XForms-derived format used in ODK) led to the design of a new proprietary format based on Extensible Markup Language (XML). Decision trees or conditional constructs in general, are built by nesting XML nodes, where the outermost node represents the first decision that must be made. Users navigate the decision space by repeatedly selecting a child node until they reach a leaf node, which represents a final selected value. This hierarchic description makes the structure of the decision space immediately apparent by looking at the XML code. Capturing of photos, audio recordings and location (with GPS coordinates) have been supported since the release of the first prototype version. To allow for a hybrid usage of literate and non-literate people, standard digital form elements like text fields, check boxes, radio buttons, drop-down lists were added. These text-based elements can be grouped together on the same screen. Sapelli has been further extended to allow for information dissemination in addition to its information collection capabilities. Therefore, UI elements are added that support HTML websites that can be locally served from the device.

The decision tree UI of the Sapelli application is a minimalistic, entirely graphical, full-screen interface in which icons are arranged in a grid layout (see figure below). By tapping one of the icons, the consequent screen defined by the decision tree hierarchy appears

(figure 4 below). If desired, navigational buttons can be added. Typically, they are displayed at the top of the screens, consequent to the home screen and allow the user to correct unwanted actions or cancel the current observation. Once the last icon of the current record is tapped, the user either returns to the home screen or leaves the application (as specified in the XML-based project definition). Similar minimalistic UIs have been designed to add photo or audio attachments, which show a single button to execute the relevant action. After taking a photo, the user is given the option to either save or discard it. The scanning process for GPS signal starts without user interaction. If no GPS fix has been obtained by the end of the observation, a waiting screen will be shown (figure below). Sapelli projects typically end with a screen, which allows the user to save or discard the current record (figure below). All project set-up and transmission settings are configured once and do not require further user interaction.

(a) Level 1   (b) Level 2   (c) Waiting for GPS fix   (d) Confirmation
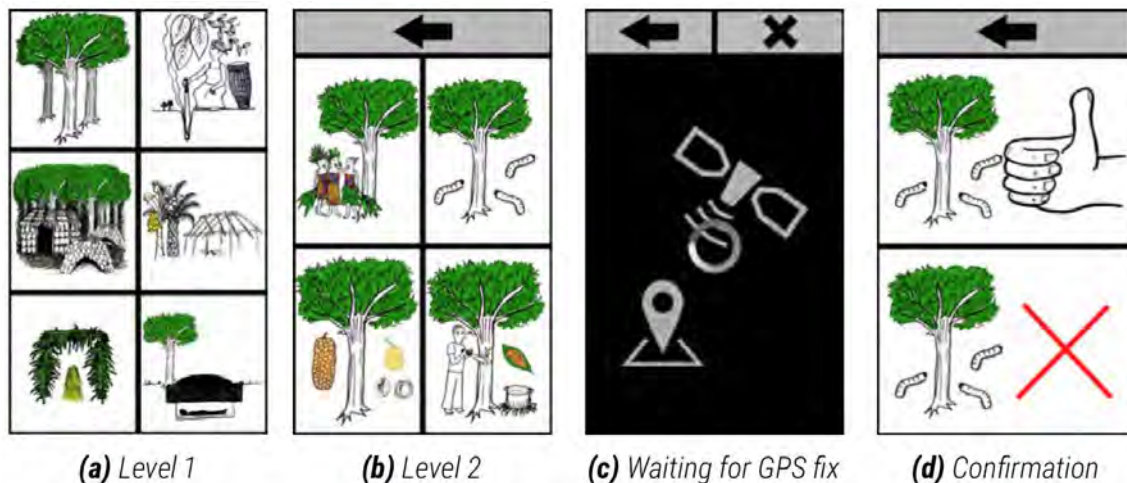
Fig. 4: Sapelli decision tree example (icons by G. Conquest)

Which learnings emerged?

The scoping visit was discussed in section 5. The insights gained from the scoping visit as well as user experiments of the Sapelli Collector UI informed the development of the research questions in multiple ways. Importantly it became evident that people had an interest in seeing and understanding the results of their mapping exercise. It is comprehensible that people, novice to digital technology, found it difficult to understand the relation between pressing images on a mobile phone and the concept of mapping

resources. Seeing the results of the 'button pressing exercise' on a map would presumably help them understand the mapping process as a whole.

The experiments further revealed that representations were preferred to be as close to reality as possible, which encourages the use natural colour aerial or satellite images as map visualisations. While the recognition of icons was not a problem, the participants struggled with the navigational element of finding the correct screen. In order to evaluate whether digital maps can be understood, it makes sense to remove the element of navigational architecture from map understanding experiments. The use of Tap & Map revealed that, instead of going through a digital hierarchy of navigation, participants preferred the use of physical cards to input their choice, which was replicated as information input method in this project.

Further important insight gained from usability experiments of the Sapelli collector UI are the specific challenges encountered when moving HCI methods from controlled lab situations into the rainforest. Specifically, cultural differences, communication barriers as well as time constraints make it difficult to follow traditional HCI test protocols, which have to be taken into consideration for this research.

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Muki Haklay (PI of the Extreme Citizen Science group)

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Será que o mar vai engolir o Bairro? | Portugal

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This project promotes the encounter of lay people and researchers for the co-creation of locally relevant open research questions related to the evolution of the sea near a precarious neighbourhood in a suburb of Lisbon. It centres around the question of how the coastline will evolve, nearby the 'slum' and focuses on the participatory documentation, study and communication of the problem. The project is hosted by the Nouveaux Commanditaires-Sciences (new decision makers sciences) platform, which was started by an NGO, and involves researchers from natural and social sciences, NGOs and residents of the targeted precarious neighbourhood near Lisbon, Portugal.

What is the project/ initiative all about?

Será que o mar vai engolir o bairro is an informal project that took place in Segundo Torrão, a slum in Almada, a Lisbon suburb (Portugal). This project (that took place between 2014 and 2017) aimed to promote interactions between the inhabitants of that specific slum (bairro) and researchers of the University of Lisbon for the co-creation of open research questions that were relevant for the community – in this case, related with the evolution of the sea near a precarious neighbourhood.

These interactions were aided by two local facilitators from the Canto do Curió association, Tatiana Arquizan and João Duarte Cão (our interviewee). The team was also composed by natural and social sciences researchers from the Geology Department of the University of Lisbon, and young adults who are residents in Segundo Torrão. These local participants were predominantly male, 16 to 30 years old, and from African Portuguese speaking countries (mostly Angola and Cape Verde). In some of the sessions, children joined. The participants were not the same in all the sessions, which led to a great variety of interventions; the sessions had a maximum of 20 participants.

This project is supported by the Nouveaux Commanditaires Sciences, a French platform within the framework of the NGO L'Atelier de Jours à Venir, with the objective of guiding and stimulating communities of non-scientists to engage in dialogue with researchers, and to co-create open questions. The NGO and platform mediate and support the facilitators.

The outcomes of the project are summaries of preliminary research (2017), a full scientific report and several posters presented at a scientific conference in Portugal (2014, 2015, and 2016). João Cão and Tatiana Arquizan have also published two scientific articles[1].

Context and environment: Where does it take place?

Segundo Torrão is an illegal and precarious slum in Almada, in the outskirts of Lisbon, the Portuguese capital. This slum is located next to the Tagus River which provides the setting and context for the development of the research question of this project: will the river 'swallow' the slum?

The first inhabitants of Segundo Torrão were Portuguese nationals that settled there from 1954 and 1974, during the Portuguese dictatorship; a second wave of relocation took place

during 1986 and 2009 with the arrival of African nationals from former Portuguese colonies. The slum also has inhabitants from Roma origins. It is now the house of 3000 people who live there illegally; there is no easy solution to legalise the constructions as these are environmentally protected due to the proximity of the river and the woods. There have been constant talks of resettling the inhabitants elsewhere, something that the locals do not want[2].

There are three types of construction:

- Small houses of bricks and concrete with tiled roofs, populated mainly by Portuguese;

- Barracks of more raw and rudimentary construction with sheet metal roofs and brick or wooden walls inhabited by both Portuguese and African immigrants;

- Tents and wooden huts, hidden in the pine forest, inhabited mostly by African immigrants.

The infrastructures of the slum are precarious, to say the least. There is electricity, but the outages are frequent; sometimes for more than 15 days. There is no regular waste collection, it is sporadic, and there is a shortage of containers for the number of inhabitants. The houses are not built according to a strategic plan making it a maze difficult to navigate; the proximity of the woods, allied to the narrow and complicated streets, might cause a huge problem if there is a fire[3].

Most of its inhabitants are not integrated in society; they are neither studying nor employed. Many also do not receive support from the government as they are in the country illegally[4]. There are some institutions present in the slum that provide support to the children and youth.

Brief outline of the project/ initiative's pathway

The implementation of this project was born from a personal connection of João Cão Duarte, who was the facilitator of the project. He was part of a popular assembly in one of Lisbon neighbourhoods (Graça) where some popular movements were created. One of those was an informal entity, association Canto do Curió, a civic movement of people who regularly visit the Segundo Torrão. Based on that, João made a connection with the French NGO L'Atelier de Jours à Venir (and its platform Nouveaux Commanditaires Sciences) that

he knew due to his master research on co-creation. The NGO had already experience in establishing co-creation activities with communities.

The project started informally, in 2014, as the association Canto do Curió carried out several workshops at Segundo Torrão with the aim of bringing the population together around a research question relevant to the neighbourhood. The French NGO was already supporting the activities through João Cão, who acted as facilitator, together with Tatiana Arquizan and other local facilitators, with the population and the researchers from the University of Lisbon. The local participants of these initial sessions were mainly young male adults who were regularly around the building of the association in the slum as well as some children who were taken by older siblings. Children supported by guiding the facilitators in the neighbourhood and following the interview process while freely manipulating a digital camera made available to them. The children took charge of the communication of the project in appropriating the media and artistic dimension (taking photos of the process, creation of posters, etc.), the younger adults, although interested, were not engaged or motivated and did not attend all the sessions or showed up for a follow-up. From these sessions came up the question of the problem of erosion and its consequences on the inhabitants and their territory. A year later, in September 2015, the mediators and facilitators organised an exhibition at one of the local cafés. On the basis of exchanges with researchers from the University of Lisbon, the exhibition presented the state of the question on the whole of Portugal and the lack of answers specifically in the territory of Segundo Torrão. The main objectives of this co-creation exercise were to better understand the territory and its population in order to maintain a stable and lasting collaboration with residents in a fragile context and to question the legitimacy of the research object that has been proposed, by the entire district.

For the researchers the problem studied was the geomorphology of the river basin in storm conditions. It was an innovative approach due to the connection with the local inhabitants and the territorial approach of Segundo Torrão. The facilitators also produced reports on the developed activities as well as some posters for scientific conferences.

Management & Organisation: Who interacts and how to facilitate co-creation?

This was an informal project, initiated by João Cão, who had contacts both with the local association Canto de Curió, the French NGO L'Atelier de Jours à Venir and the University of

Lisbon. João Cão and Tatiana Arquizin acted as facilitors between all actors; there was a local facilitator who tried to support with the local engagement which was also the role of the local association Canto de Curió. The researchers of the University of Lisbon used the co-created research questions to develop further geographical and geomorphologic research on the Tagus basin. L'Atelier de Jours à Venir, through the Nouveaux Commanditaires Sciences, supported with knowledge provision of co-creation, dissemination of the initiative, some financial resources and personnel and staff support.

The whole structure is quite informal and is not clear if there was an adequate follow-up, later engagement with the local participants, the young adults and children who participated in the initial sessions aimed at developing the research questions. There are other projects from Association Canto de Curió in Segundo Torrão, but the connection is unsure[5].

What are the concrete processes and practices of co-creation?

It seems that the process of co-creation resulted in the attempt of engaging with local inhabitants to promote interactions between them and researchers of the University of Lisbon. This process was led by the facilitators who were supported by the French NGO, experts on developing such activities. From the interview with João Cão, it was possible to assess that the engagement with children was good, however, it was not totally clear to them what the results were and what was the aim of the 'game' where questions were asked. For the younger adults the engagement was more difficult as there was no motivation to conduct 'intellectual' work that had no physical, tangible outcome. The participants were not the same in all the sessions, and mostly boys and men (up to 30 years old) attended, which might be explained by the cultural norms and expected gender roles.

Despite the exhibitions of the work that were done after the initial stages, the process and practice of co-creation seemed to be superficial, as it was done only in the initial phases, with no clear follow-up, no efficient engagement and a lack of sense of appropriation by the local participants.

Moreover, it is unclear from the data collected and the interview held, if the local association integrated co-creation processes and practices in their work as a result of this initiative.

Specification: What tools and instruments are/were used to co-create?

The co-creation exercise developed was a set of sessions with questions and answers with local young adults and children that took place in the slum Segundo Torrão. The participants were the ones who usually visited the association Canto de Curió in the slum; facilitators also visited some of the cafés to recruit participants. The children were usually accompanying older siblings and that is how they also participated. The groups had between ten to twenty participants, with different people from session to session; some attended just one, others attended more.

The facilitators held seven sessions in different periods with registration of all the questions formulated and subsequent discussion. The discussion included the classification of the questions (relevant or not, among other criteria) and the reflection upon it.

After that reflection, there was a second stage of consultations with other set of inhabitants (group of children from 6 to 13/ 14 years old, both girls and boys from mixed ethnicities). The process followed the same structure of the one with the younger boys, with the objective to map if the questions were relevant or not. These groups were the bridge between the facilitators and the older inhabitants of the slum.

During the sessions, the focus was also on specific experiences they had, for example, when someone mentioned that they found a shell on the ground, that led to the question whether the sea has already been in that place before.

This stage was important for the data collection that was useful for the researchers. However, there was a sense of mistrust from the inhabitants who wanted to know exactly who the facilitators were, why were they asking questions, what for, what is their motivation. As mentioned above, some of the direct participants were unmotivated as the exercise was too theoretical and it did not a tangible outcome, a proof of their work, something concrete rather than an academic paper or report.

Which learnings emerged?

One of the lessons learned was that it is important to have a direct connection between a community that is directly affected by a problem and the researchers. According to João Cão, this approach will certainly be used in other future projects, not only as a way of

designing the workflow, but also of collecting more accurate data as the population is in close contact with the situation and problem at hand.

There were, indeed, several challenges in developing this initiative, namely the commitment with the local participants, who had other priorities in the slum, but also the commitment with the association's workers who were voluntary, and not paid for this work. There was also a lack of trust from the researchers due to the choice of the target group as it is quite unusual. More importantly, there was a huge mistrust by the inhabitants as they did not see clear benefits in participating in merely theoretical activities. The initial group of the young male adults was dispersed due to the lack of interest and trust. The specific context of the slum, which is illegal, with precarious conditions, was, indeed, a major constraint for that specific challenge of mistrust. Even with the presence of a local facilitator, the mistrust and lack of engagement is something that should have been strengthened, especially considering the importance of personal relationships/ personal trust in a co-creation process (as opposed to both the authority and neutrality that recognisable institution can provide, neither of which are recognized in difficult social settings).

João Cão mentioned several points that should have been better planned including:

- Activities should have been more practical, aligned with the target group's needs, and interests.

- Participants should be asked to build something tangible, rather than an academic paper, report or poster than means nothing for the inhabitants (it is only theory, not used in their daily lives).

- Benefits of the participation in the project should have been clearer especially connecting more with the neighbourhood and the environment.

- Other inhabitants and local decision makers should have been included in the co-creation processes.

- Follow-up should have been made clearer form the start.

- Facilitators' role should have been assigned to non-experts too to pass on knowledge of co-creation.

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Interview

João Cão Duarte (Canto do Curió, Facilitator)

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Mirrorable | Italy

Carla Sedini (POLIMI)

Mirrorable is a domestic interactive rehabilitation platform from Italy that stimulates families to collaborate with caregivers and healthcare operators, in order to play a more active role in the rehabilitation therapy of children in a post-ictal state. The project includes the role of the healthcare operators and was developed in 2016 by the founders of FightTheStroke© with the CNR Neuroscience of the Università di Parma. It represents a unique model of home rehabilitation therapy based on the activation of mirror neurons, through gamification and peer-learning processes.

What is the project/ initiative all about?

Mirrorable is a domestic interactive rehabilitation platform based on the activation of mirror neurons; the process which led to Mirrorable development involved families of children in a post-ictal state in a collaboration with caregivers and healthcare operators, in order to play a more active role in the rehabilitation therapy of kids.

Mirrorable is a project located in Italy and developed in 2016 by the founders of the association FightTheStroke (FtS), in collaboration with the CNR Neuroscience of the Università di Parma, chaired by Prof. Giacomo Rizzolatti, whose team discovered in 1995 the existence and the function of Mirror Neurons in human beings.

The scientific principle on which Mirrorable is based is the ability to stimulate the plasticity of the motor system by activating the mechanism of mirror neurons; the process is activated by watching video-stories and practicing with other children with similar needs.

Mirrorable enables the collection of data in a unique register which works as a tool for elaborating statistical evidence to study different brain injuries and developing new rehabilitation strategies.

In the development of Mirrorable rehabilitation ecosystem to build a bottom-up community, to share needs, questions and knowledge were fundamental. The community was initially created as a closed group on Facebook that progressively grew.

The clinical trial developed with a sample of patients was based on training for magicians with specific activities and movements to daily (45-minute session) stimulate children's motor skills for a month. Each patient received a kit composed of a computer, a 3D video camera and a selection of manuals and magic tricks; children had to imitate the activities proposed by a magician via video on the cloud platform. Children trained in pairs via video connection in order to exercise together and learn from each other. The platform uses an algorithm to ensure the best possible match in terms of motor skills, cognitive abilities, and emotions. In the commercial version, which is under development, the 3D camera has been replaced by a technology based on Artificial Intelligence, which tracks and records children's movements and emotions so that progress can be measured by the child himself/herself, by family members and by health professionals.

The project was mainly self-financed and received private grants funds from Vodafone Foundation, Only the Brave, etc. for the development phase. Microsoft had an important role for technological support.

This project is continuously evolving thanks to the involvement of parents (caregivers) and their kids. Apart from the technological aspects, it is very interesting the fact that the project clearly states the importance of empathy and engagement in the rehabilitation processes.

Within Mirrorable project several moments of face to face encounter have been developed, organising several activities (e.g. *Mirrorable Summer Camp*, *(Kinda) ugly drawing workshop*, etc.) which work systematically together with the online platform.

Context and environment: Where does it all take place?

Mirrorable has it's headquarter in Milan, but the trial was conducted with Italian families from other cities than Milan as well.

Milan can be described as one of the most innovative contexts in Italy. Milanese makerspaces and creative communities, for example, have been carrying out projects that deal with healthcare, patients' innovation, and policymaking such as *FabCare* and *MakeToCare* (Polifactory); *Made4You*, *Hackability Milano* (OpenDot); *OpenCare* (WeMake); *Smart-Map* research has repeatedly involved Italian fablabs (Polifactory, Fablab Milano, WeMake, OpenDot, FabLab Pisa).

Looking instead at data on Cerebral Palsy:

- 2 to 2.5 per 1,000 new-born and children are affected by cerebral palsy; esteem of 3 per 1,000 in Milan;

- 17 million people across the world live with cerebral palsy (CP);

- 350 million people are closely connected to a child or adult with CP.

The availability of Mirrorable 'In the Cloud' allows the geographic diffusion with broad-spectrum, lowering the costs and time of distribution. Diagnosis and therapies are indeed the same both hall over Italy and the rest of the world. For this reason, Mirrorable online supports international interactions.

The initiator of Mirrorable, Francesca Fedeli, considers the Milanese local context as innovative but very much depending on political turnovers. In addition to that, in general, neuro-motor rehabilitation often is managed within mental institutions instead of other cure institutions and hospitals and this is evidence for the lack of attention towards a target that might be small compared to others. '*Scientific research and the territorial system of healthcare forgot these children; indeed, they can have only a couple of hours per week of rehabilitation guaranteed by the welfare state*'.

Francesca Fedeli identified two main restrictions for the development and implementation of Mirrorable:

1) In Italy, families of children with CP are not used to pay for rehabilitation and medical treatments. This causes a lack of perception of healthcare real costs. For this reason, it is difficult for them to accept the proposal of something that they have to pay for;

2) Timing and costs of the economic drug analysis, which has been conducted with Sanofi; this is needed to support the recognition of Mirrorable as a solution for therapy. Mirrorable want to be recognized and sold as a drug. In addition to that, the participation in a Horizon 2020 call was oriented, in case of victory, to provide the resources to go to the market.

It is important to stress that Mirrorable does not exclude the role of healthcare professionals. Indeed, the continued communication and collaboration with them is a win-win relationship because it gives scientific support to the solution and, vice-versa, therapists, doctors, researchers can acquire new sets of data useful to measure and establish incremental objectives.

Instead, the relationship and conversation with policymakers has been the least developed since now, because FtS team preferred to have economic and impacts evaluations, which would allow them to bring pieces of evidence based on real data. Till now they preferred the private sectors, because, according to Francesca Fedeli, is more open to co-creation processes has more resources and it is more oriented towards innovation.

Brief outline of the project/ initiative's pathway

The initial motivation and 'kick-off-moment' dates back to the year 2011 when Mario, the son of Mirrorable initiators, Francesca Fedeli and Roberto D'Angelo, was born. 10 days later after Mario was born, they discovered that he had a stroke that affected the right part of his brain.

'Nobody taught us how to deal with such kinds of disabilities, and as many questions as possible started to come to our minds. And that has been tough time. We started physiotherapy, we started the rehabilitation process, and one of the paths that we were following in terms of rehabilitation was the mirror neurons pilot. But Mario was not improving!'

Francesca Fedeli and Roberto D'Angelo were worried about the future life of their son and frustrated because of the fact therapies were not working; however, they noticed that in free-time moments, when he was playing, he actually showed some improvements. For this reason, they connected play and mirror neurons approach together with the technological background of Roberto, Mario's father.

In addition to that, also their personal approach changed: *'We stopped looking at him as a problem, and we started to look at him as an opportunity to improve'.*

They started from the idea of answering Mario's needs, without taking into consideration of the entrepreneurial aspects of the solution. Lately, they understood that they shared the same needs with other families and their children who had a CP. Thanks to Francesca Fedeli and Roberto D'Angelo participation in a TED Global Event, in June 2013[1], they understood that solving their own personal need could mean to solve a shared need.

From this experience, they decided to give life to a collective movement. In 2014 they founded the social enterprise FightTheStroke, which till then was an association; this change allowed them to develop Mirrorable, an online platform to support the rehabilitation of young stroke survivors or diagnosed with unilateral CP. The 3 pillars on which Mirrorable is based are:

1) A strong partnership whit advanced scientific research;

2) The use of innovative technologies;

3) The crucial role of children who were at the center of the design of the solution.

They started the process developing a very strong partnership with the research group of Professor Giacomo Rizzolati who was a pioneer in the study of mirror neurons at the Università di Pavia. Looking at technology, they exploited the possibilities given by the Internet and Artificial Intelligence in order to build a supporting net for the families and the process of rehabilitation of children. Then, as we are going to discuss later, the co-creation process was strongly based on children' and families' needs. The co-design lasted one month and was composed of three different workshops which lasted about one and a half week each; the workshops were attended by different stakeholders, including doctors and experts, who varied according to the workshop focus. After the development phase, there was the testing and clinical trial phases carried out with 20 families.

Management & Organisation: Who interacts how to facilitate co-creation?

To develop Mirrorable they have been always organised in an agile way both in terms of work and recruiting.

In order to arrive at the first prototype, they looked for the best professionals available on the market because they thought that the development of a product such as Mirrorable cannot be carried out only with volunteers: you need skilled people who dedicate their time and efforts to the project.

The agile approach was represented also within the operational working methods; indeed, for example, they selected the IT developer in New Zealand and in that way the different time zones allowed them to save time working 24 hours a day. They developed a fellowship network with Ashoka; they had several technical partners, such as KPMG; they had several financial partners such as Vodafone and Only the Brave. However, one of the most important collaboration was developed with a scientific partner: the National Research Council (CNR).

In addition to that, frog, a global design and strategy firm, was appointed for managing and carrying out the co-design process, which was conducted as a continuous learning process '*from the colors of the logo, to the technical assistance, etc*'. Everything was based on test and validation iterative phases.

Institutions, instead, were always hard to involve. Before doing that, they preferred to have pieces of evidence about Mirrorable scientific and territorial impacts. However, in the future, they would like to have a physical district on the territory which was connected with a healthcare institution. At this moment, in fact, they are trying to develop a register of CP cases in collaboration with the Milanese ATS (Agency for Healthcare Protection) in order to evaluate drivers and barriers. Social investors are desired partners but according to Francesca Fedeli '*in Italy impact investors are very few*'.

The biggest investment has been the constitution of an Ltd in order to be able to apply in European calls and to have access to funding available for innovative startups. However, the Ltd has not a structured team yet and the application in a Horizon 2020 call has been the most demanding activity that they recently carried out. In the meantime, they developed parallel projects, such as Mirror HR[2].

What are the concrete processes and practices of co-creation?

It is important to highlight the fact that FtS already collaborated with frog during TEDMED live events, which the association has been organizing in Milan in collaboration with

Call4Brain[3]. In 2015, during the event, a workshop, which can be seen as a preliminary step to arrive at Mirrorable ideation and development, was conducted in collaboration with frog. The workshop DesignAbility, based on Human Centered Design (HCD) and Visual Thinking approaches, had the goal of envisioning everyday objects to develop capabilities and rehabilitation for hemikids, in order to help them in developing their skills in a simple and engaging manner. Designing inclusively the basic concept of the group's work, which developed hypotheses of daily life objects that could also improve children' movements and general wellbeing. Ideas of objects for enhanced symmetry, games that are at the same time monitoring tools, etc. were proposed.

After this experience, in mid-2016 a small team of frog joined Mirrorable project to shape the best possible user experience for affected children and their families. In July the team structured a lean approach, prototyping the minimum elements required to act out the experience, testing them and then rapidly iterating on the experience.

Since the user test, frog has supported the FightTheStroke team in designing Mirrorable user experience, from the user interface to a family diary used to record progress and collect feedback.

The co-creation process involved families which were already members of FightTheStroke community. The process was lean and was based on Design Sprint[4] approach, which is focused on solving problems through designing, prototyping, and testing ideas with users. Small goals and deliverables have to be clear in order to align as fast as possible the vision among the participants in the co-creation process.

According to this method, the co-creation phase lasted one month. Every week was dedicated to a specific topic.

Participants in the different co-creation tables (sprints) varied according to the section of the project taken into consideration: technical development, user experience (based on focus groups), etc. Each working table collected about 15 participants among children, caregivers, parents, scientists, neuropsychiatrists, technicians, etc.

The most important driver in this process was the strongness and the commitment of the community and the fact of having a tight relationship with the final target was for sure an element of the success of the whole process.

Talking about barriers, instead, the fact of having groups composed by very different people for competences and backgrounds were not always easy to manage because they did not share the same language and objectives. Doctors sometimes were skeptical and 'shocked' for the use of these methods and for the fact that they were asked to work side by side with different typology of actors. Bureaucracy was another barrier: *'No one had ever decoded the process for an association to request access to an ethics committee from, or to activate an insurance procedure...being a pioneer is not an easy task!'*

To some up, limits can in general be found in mental, methodological, bureaucratic and economic constraints, because, for example, no one was paid (apart from frog and the university which attained a fellowship) to participate and in most of the cases they already had their own daily job.

Then there was the phase of testing with the children: 14 males and 6 females; mean age 6 years and 7 months old; with unilateral CP. They underwent 20 sessions where they had to observe and then imitate a wizard performing dexterity-demanding magic tricks; a child-to-child live video-session to practice the same exercise then took place. Doctors observed an improvement in global hand-motor and bimanual skills and a significant correlation between motor improvement and a difference in hand motor skills relative to the peer[5]. This was the longest process to carry out.

Specification: What tools and instruments are/ were used to co-create?

The workshops carried out by frog were based on a Human Centered Design approach that is putting the person at the center to find new answers to wicked problems. Together with the HCD approach also methods from Visual Thinking and Sprint Design were used. This last one, in particular, was changed and improved for the specific area of interest since the Design Sprint approach was developed by Google in order to design more simple solutions than the one here proposed. In addition to that, previous confrontations and collaboration with the Centre for Evidence-Based Medicine at Oxford University were crucial.

The co-creation process lasted one month and was divided into sessions of one to two weeks each.

The core team was composed of about six to seven people to which in different moments other experts were involved in (about seven more people).

The co-creation process was lean and fast. It started with users listening phase, which was followed by a clear definition of the objectives based on the impacts that the client (FtS) wanted to achieve. Two main outcomes were identified: a functional outcome based on the clinical improvement of the kid to use his/ her hand and an engagement outcome based on an increase of the involvement of families (measured before and after the use of Mirrorable).

After the ideation phase, followed a prototyping phase of the service which underwent a refinement phase and a consequent improvement of the prototype.

The design tools used were:

- Onliness Statement[6]: this tool was one of the most effective because it helped to understand the position of the solution on the market, its value proposition, and its competitors;

- Service Design tools:

    o A simplified Business Model Canvas;

    o Personas: this tool was not very useful because the users' segment was already very specific;

    o User scenarios.

According to the designer who led the process, Stefania Marcoli, the initial definition of the outcome was fundamental. The testing phases carried out during the co-creation process were very important as well. An element of interest is that these tests were conducted both with kids diagnosed with CP and kids who did not have motor impairments.

A weak point that emerged was the absence of the typical passage from design to develop which could not be carried out immediately after the co-creation phase because of economic reasons. Therefore, there was not the possibility to co-design with the developers which would have to be another important phase of the process.

After the co-design workshops and the development phase, the test and clinical trial phases were carried out. These moments as well were very much focused on the 20 participant families. Each of them, for example, could choose the most suitable moment for them to make the screening visit. This visit is very important in order to standardize the sample. After this, the test began; during the execution of the exercises proposed by the guiding magician, the children were monitored both for their motor and emotional responses. As

the neurophysiopathologist Arturo Nuara (Neuroscience Institute, CNR, Università di Parma) declared, the data collected during this month of testing, registered a discrete improvement of the motor capabilities of the children, as said before. It is important to stress the fact that this result was mainly due to the level of engagement which led to very high compliance with the treatment. All sessions were conducted correctly, kids were very involved, and families participated to the process as well.

Which learnings emerged?

We sum up here the principal lessons learned from the co-creation process of Mirrorable. These lessons can be looked both from the perspective of the co-creation design process and from the perspective of Mirrorable solution.

1) Users at the center; a human-centered design approach, put the person at the center of the design process to find new answers to wicked problems. HCD approach has been used for a long time now, however, it is less common in case of healthcare issues and, in particular, when children are the main users. In Mirrorable case, was very important to look at children both as subject and protagonists in rehabilitation processes.

2) Play for peer learning; both parents and kids were involved in gaming processes. Play can be applied also to important and critical issues, such as impairments due to CP. In addition to that, in socialisation processes peers have an important boosting role which is comparable (or even greater) that the role of parents and teachers.

3) Change of perspective; impairments and difficulties have to be seen as opportunities for growing not as disabilities. The change of perspective made by parents can deeply influence how children see themselves, their own skills and capabilities.

4) Step by step learning; identifying (apparently) easy tasks is the best way to attain and recognise signs of progress and therefore increase self-esteem.

5) From one to many (scalability); designing having in mind a specific target allows being focused. However, the ideas envisioned might be extended to other users who do not face (the same) issues.

As the role of the association FtS, leading the project Mirrorable, we can identify several key factors:

1) Networks; pre-existing networks together with the capacity to acquire new ones constitute a very important condition for the success;

2) Storytelling; communication skills and strategies are very important in developing knowledge and trust in what you are doing;

3) Experts; notwithstanding the scarcity of resources, involving experts is crucial in order to be positively evaluated and to gain recognition within different communities.

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Interview

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The BrainHack Project | Ireland

Mairéad Hurley (Science Gallery Dublin)

The BrainHack Project aimed to connect scientists, artists and stakeholders from the public population who are interested in human-brain-generated signals. It was an international initiative by the BrainHack Consortium, funded by the European Commission and deployed in Amsterdam (The Waag Society), Prague (T.S.R. Act) and Dublin (the Science Gallery.) Hackathons brought together scientists, artists, technology providers and entrepreneurs to work collaboratively on innovative brain-related projects using BCI (Brain-Computer Interface) technology to share opinions and expertise on the potential and limitations of this technology in society.

What is the project/ initiative all about?

Project BrainHack was an international coordination and support act by the BrainHack
consortium, funded by the European Commission under the Horizon 2020 FET Open
programme as part of the STARTS-initiative. The project ran between January 2016 and
December 2017. As a key feature within the project, three hackathon-events were deployed
in three European host cities. The purpose of the project was to bring interdisciplinary
groups together, generate new insights that are relevant to EU policy, to catalyse cross-
disciplinary (art/ science) collaborations, to go beyond traditional use of neurotechnology,
to discuss and reflect on ethical issues, interlink diverse communities and finally to
aggregate open source software.

Thus, the project was aimed toward facilitating mutual awareness, cooperation and cross-
pollination between artists, researchers, entrepreneurs and the general public on the topic
of Brain-Computer-Interfaces (BCI's). Participants were invited to work together on creative
BCI-projects and encouraged to share opinions and expertise on the potential and
limitations of this technology in society.

The Hackathons were offered in appropriate faciliatory spaces, specifically the Science
Gallery in Dublin (Ireland), The Waag Society in Amsterdam (the Netherlands) and T.S.R.
Act in Prague (Czech Republic). Organisational strategies were shared, developed and
deployed from The Brainhack Consortium and preliminary events were organised to
inform participants and stakeholders of the current state of the art and the Hackathon
events as such. Each location provided a unique working environment and experts, but also
shared the same commercially available BCI-equipment (G-Tech, SmartBCI and OpenBCI).
BRAINHACK acts in five areas: gathering, creating, probing, mentoring and fostering, with
the aim of inter-connecting expertise and diverse points of view to broaden general
awareness as well as to inspire (societal) purpose of BCI-innovation. Furthermore, ongoing
reporting and analysis of the project was performed and made available online to the
benefit of the general public, policy making and hosts of future Hackathon events. Beyond
creating, all participants were encouraged to learn and extend as well as question each
other's perspective. Lectures and presentations were provided to share and deepen
common knowledge and extensive reporting and (social) media coverage was generated to
encourage general awareness of the topic.

During the events participants were clustered together in smaller groups and paired with a
mentor with expertise in the field and challenged to work together to create a project that

features a novel purpose for BCI. This resulted in several digital art-pieces and a jury decided on winning projects which, in Dublin were encouraged to join a residency accelerator programme. Beyond stronger, better informed communities, the project was able to generate results in the form of several art projects, the algorithms of which are made available on the open-source GitHub platform.

Context and environment: Where does it all take place?

Three European cities each hosted one hackathon directed by the BrainHack consortium. The consortium was comprised of a diverse set of professional stakeholders (the Neuroelectrical Imaging and BCI lab, Fondazione Santa Lucia, Roma, the School of Digital Technologies, Tallinn University, Waag Society, Amsterdam, Delft University of Technology, Delft, T.S.R.ACT, Prague, Science Gallery, Dublin, Artshare, Aveiro and Sapienza University of Rome).

All stakeholders were incentivised by a need for diversity in communication in order to broaden their perspective, to share their expertise in order to facilitate innovation of the technology. Beyond their hands-on creative purpose, an important property of the Hackathons was to facilitate a forum for networking, and to discuss concerns and ideas about the potential application of the technology.

The first event took place in Amsterdam (Medieval Waag Society building), between the 24th and the 26th of June 2016, and hosted 62 participants including mentors. The second was held in Prague, between the 2nd and the 4th of December 2016 and hosted 47 participants. The third was held in Dublin, between the 9th and 11th of June 2017 and hosted 55 participants.

The availability of several mutual and unique environmental features and diverse participant-qualities operating under the same strategic agenda (directed by the BrainHack consortium) generated a well-coordinated, measurable effort toward the defined objectives. The Waag Society in Amsterdam was able to provide access to their FabLab (for access to digital manufacturing technology) as well as their Wetlab (which provides an environment for bio-art and design). During the Prague-event, participants were put in a more artistic context, with access to digital and audio/ video technology in addition to the BCI-

equipment. Finally, these two events were used to strategically inform the Hackathon in Dublin, which was able to provide a basic maker-space, audio/ video equipment and acquired simple hardware components specific to the expertise of stakeholders. The event was embedded in an ongoing summer programme entitled 'SOUND CHECK', directed at DIY music. Though this created a thematic backdrop for the event, it was decided not to promote it as limited to acoustics. This event was particularly successful due to its ability to organise according to the reports and analyses delivered from the two prior events.

Co-creation within the project was based around responsible research and innovation in a non-profit environment. The societal benefits of the project are directed at art, demographic change and wellbeing. Cross-cutting issues were based around Open Access & Datamanagement and Innovation procurement. In spite of project limitations, mostly caused by lack of time, manpower, knowledge or expectation management, the project is considered quite successful. The BrainHack approach has significantly nurtured the emergence of BNCI technologies by integrating artistic experimentation within a general public context and created potential for small scale entrepreneurship, as well as provided a practical framework for the introduction of co-development and co-creation in novel technologies. Contextual qualities that proved most instrumental to the success of the project were communication and promotion, the availability of physical resources (partially through commercial sponsorships) as well as a particularly diverse knowledge base. This is fundamentally important because tangible innovation can only take place within a framework in which possibilities as well as the limitations and the ethical implications of the technology at hand are understood. Of a less-pressing importance is the theme of the event. Though employing an overall guiding-theme is important in providing a starting point, groups are often creative enough to be directed by their own curiosity and the availability of (knowledge) resources. An overall theme ideally guides, but does not necessarily predict the outcome of a Hackathon. Finally, it is due to the ongoing efforts and communication of the Brainhack consortium, that stakeholders have expressed clear interest in continuing the exploration of BCI-technology in the Hackathon-format.

Brief outline of the project/ initiative's pathway

The project was founded by several expert stakeholders, who shared the perspective of a need for dissemination and co-creation between scientists and artists in the novel field of BCI. Initial project leaders were from Waag in Amsterdam and TRSACT with the later addition of ARTSHARE. Because Waag and TRSACT were experienced in facilitating communication between different BCI-stakeholders, they decided to solidify their network and efforts into a European consortium.

Co-creation in the field of BCI's is particularly relevant because the diversity of opinions and ideas available on the topic, whilst applications are still relatively minimal. Since the possibilities for real-time capture, processing and potential manipulation of human brain signals are emerging beyond the fringes of experimental neuroscience and into commercial availability, it is of vital importance that a broader community, particularly artists and non-experts and non-professional stakeholders are made aware of BCI-technology. The STARTS-initiative within the Horizon 2020 programme is perfect to facilitate this environment. Because the applications for this novel and potentially impactful tech are outgrowing the lab, it is natural that stakeholders in the academic/ high-tech environment should be encouraged to engage in conversation and co-creation with artists and non-experts. After all, the true value of cultural innovation can only be measured by its ability to further the best interests of society, be it scientifically, artistically or technologically.

In order to nurture a well-informed base for creative, practical as well as ethical development of a new technological frontier, each progressing development within the BrainHack consortium was informed by extensive reports from all previous efforts. Thus, results of each Hackathon fuelled the next both organisationally and practically. For the Dublin-event, this led to the availability of 'Spinal' projects, which were exceptional products from previous Hackathons. These are still available as open-source repositories on GitHub. Furthermore, the Dublin event employed the expertise of several outside advisors (Prof. Tomás Ward, David McKeown, and Zack Denfeld) to aid the quality of the project, and facilitate additional leadership-perspective outside of the consortium. Beyond communication and cooperation, results of the projects created during the Dublin-Hackathon were also presented to a jury of three experts (Marco Donnarumma, Stephen Dunne and Angela Riccio), who rated products on the criteria of artistic/ scientific value,

level of maturity and novelty. This created a separate point of evaluation of the tangible products of the event.

The ongoing small and large-scale evaluative efforts of the consortium led to the Hack the Brain Handbook, which provides a roadmap and vision to organising future BCI-related Hackathons. Finally, the consortium has been able to create and engage a unique network that is able to bridge the gap between art, science and the community.

Management & Organisation: Who interacts how to facilitate co-creation?

Project organisers for the Dublin Hackathon were both sourced locally and from within the consortium network. From around six months before the event was set to take place, an open call was sent out to attract stakeholders and participants. Recruitment was extended through the mailing list of the Museum and their website, social media announcements as well as promotion within Ireland's visual arts opportunities network. Speakers and experts were gathered similarly, as well as through the consortium network.

To ensure commitment to the project, participants were not only encouraged to subscribe to the event, but also to develop a project proposal which could be taken up for development during the event under the guidance of a mentor. Participants were encouraged to contribute to GitHub ahead of the event, and to already get to know other participants. A pre-event was held, which had the purpose of raising awareness about the upcoming hackathon, to announce the winners of the Open Call process, and to offer inspiration to already registered attendees. This created a sense of community leading up to the Hackathon, which helped the groups focused on a shared objective.

Co-creation during the event was further enabled by a mentor, who would work closely together with an assigned sub-group to guide the development, using their expertise to manage curiosity and practical limitations. Mentoring proved of great importance in previous editions, because they help teams to maintain perspective and direction. A total of ten mentors from international scientific, artistic or entrepreneurial backgrounds were assigned a sub-group set to develop their own idea, leading to 10 projects during the event. Finally, the Hackathon projects and the event itself were judged by a jury of selected experts, who were able to point out the strengths and weaknesses of the results from their unique perspective. This provided additional insight in the state of the art, and a more

concrete point of view on its potential and future directions of the technology. The Dublin Hackathon has reported that a clear benefit was established from the involvement of outside-consortium stakeholders and it is believed that commercial partners in particular will be instrumental in continuing innovative efforts. As such, there is no 'ideal' set of partners that is currently missing from the network. A generally diverse baseline is already well-established as a result of the events. Instead, it is important to keep the community active, inviting and open to opportunity. Notably, it seems communication and diversity-maintenance are more important than the addition of any specific stakeholder.

What are the concrete processes and practices of co-creation?

Co-creation happened throughout almost every phase of the BrainHack project, from the organisation of the consortium (which features mainly problem identification and ideation) to the first Hackathon event (prototyping, verifying, testing) and continued development in the second and third editions (feedback, and partially re-starting the co-creation cycle). The same cycle applies to the organisation of each separate event, requiring ongoing co-creative communication, generating themes, sourcing creative requests and requirements and locating guest-speakers. The collaborative effort of academic, creative and commercial stakeholders is what founded the consortium and the events.

During the events, co-creation was mainly observable in the ideation and prototyping phase. Participants from all sectors were sourced from the consortium and the Science Gallery network. This resulted in participants from academia, civil society and the public sector. An open call for proposals as well as the preliminary event created a pool of ideas ahead of the event. The process of communicating and setting up appropriate teams enabled stakeholders and participants to get to know one another and create a common project goal.

Co-creation during the Hackathons came from cooperation from the teams on a similar goal, the implementation of a BCI in an artistic or non-scientific goal. During the creation, participants worked together under the guidance of a team-mentor, and fuelled by presentations as well as repository information, accessible online. Teams were incentivised

to keep artistic and scientific value as well as maturity and novelty in mind, by being able to earn an award at the end of the event, which came with the encouragement of the team to join an accelerator programme. The effect of all these efforts can be observed in the diversity of the final products of the teams. From social-media integrated wearables to a VR-game, potential applications for BCIs have been turned into practical pieces of (artistic) output. Finally, the desire of participants to continue taking part in Hackathon-events and BCI-related experimentation shows the value of the projects.

The process of co-creation was obstructed by insufficient methods or strategies. Because of the currently limited knowledge of the possible purposes of BCI's it is particularly complicated to bring the right stakeholders in to direct a truly innovative process. The state of the art is such that the implementation of the technology outside of the laboratory environment is defined as an opportunity, but a vision on a directive is not yet available.

From an organisational point of view, the organisation of an event such as the Dublin Hackathon require considerable amount of communication, and (local) manpower. The quality of the event could have been improved by having a larger organisational network to facilitate the project-networking and practical support during the event.
An ongoing limitation of any new technology is expectation management. Although BCI's can abstract and translate neural signals, and this is inspiring to artists and non-scientists alike, an understanding of how to practically capture and apply these signals, as well as which purposes they can be used to fulfil are not inherently obvious. To the eye of the non-expert, this can lead to unrealistic expectations of the technology which can lead to disappointment. It is however due to this same un-assuming eye that innovation and novel application can be formulated. Management of expectations is important to maintain a creative atmosphere, and as a directive to imagine applications from a realistic background.
Evaluation from the jury members on the Dublin Hackathon delivered valuable criticism and points of improvement for future events. First off, even though the event was promoted, and participants were actively engaged months before the actual event, the three-day setup is too short for an actual product to come to fruition. Several applications showed potential, but do not have the maturity to deliver intrinsic artistic value. This is possible, but will require additional time and in some cases additional resources.

Because end-users are not defined, it is difficult to maintain an active network without the consortium to generate and maintain the innovative environment. Exploration of the technology is not yet at a stage where co-creation is completely self-inspiring and independently sustaining.

Specification: What tools and instruments are/ were used to co-create?

The consortium set out to host each Hackathon in a creatively suitable environment. In the case of the event at the Dublin Science Gallery, the organising team was able to provide access to basic Maker-spaces for product development, as well as BCI-equipment that was facilitated in part by commercial sponsors. This created a unique set of available resources for each Hackathon event that would still allow innovation around the same technology. This elemental, ongoing change in backgrounds and resources is very important to the current state of the art of BCI, as it must be observed from many perspectives in order to ascertain definition and purpose in society.

BCI-resources at the Dublin Science Gallery were as follows:

- G-Tec g.Nautilus (g.tec medical engineering GmbH, Austria);

- SmartBCI (Novatech EEG);

- Open BCI (http://openbci.com/);

- Neurosky Mindwave http://store.neurosky.com/pages/mindwave);

- TMSI Mobita (http://www.tmsi.com/products/systems/item/mobita);

- Emotive Epoc (http://emotiv.com/epoc/);

- Necomimi(http://www.necomimi.com/);

- Muse(www.choosemuse.com).

Furthermore, after requesting the preferences of participants, LED's, additional maker equipment, several Arduino's, speakers and projectors were provided to the event.
In terms on manpower and expertise, the Science Gallery was able to deliver a team of ten BCI-experts to guide participants and stakeholders to work out their projects. In addition to the knowledge provided by the mentors, several presentations and lectures were provided throughout the day to increase shared general knowledge amongst stakeholders. Reflecting

on previous events, particular care was taken not to have the presentations interrupt the working teams, which facilitated an optimal workflow to it the preferences of all teams. Furthermore, participants were encouraged to familiarise themselves with the open source online repository system GitHub, which provided additional online resources to aid projects. They, in turn, have made their projects freely available to the community (and indeed anyone), continuing the spirit of transparent innovation and open-source co-creation.

Finally, all records of the two previous events were used to inform the Dublin Hackathon, the dedication to on-going reporting, interviewing and reviewing has enabled quality improvements from event to event, provided a structure from which future events can be organised and created transparently available documentation of each organisational step, which can be used to inform European Policy making.

Which learnings emerged?

A strong observation that emerged throughout the Hackathon events was that all stakeholders and experts were quite positive about the project, in spite of time constraints and technical limitations. The potential for development of BCIs beyond the research-context is not doubted, but at the same time the consortium and the hackathons did not have enough time and resources to define a directive that puts BCI technology onto the path of societal integration. However, the innovative efforts of the technology have been introduced deeper into the artistic community, facilitating the cornerstones for trans-disciplinary creation. Although the technology may not have been lifted out of its initial phase, interviewees seem to be in general agreement that multi or trans-disciplinary approaches will continue to result in successful experiments and innovations.

Although limitations on time are a bottleneck, to the event and the development of the co-creation for hosts and participants alike, Hackathons are considered quite valuable in fostering a trans-disciplinary environment, as the learning curve for non-experts is quite steep and they are able to provide valuable perspectives in a relatively short amount of time. The diversity of expertise was considered complimentary rather than a hinderance. Perhaps it is indeed partially due to the novel introduction of the technology within a broader context that makes experts particularly receptive to diverse interaction. It seems the infancy of the technology directs an environment that is geared toward mutual curiosity

and communication, perspective and mutual learning. It might be that only after a mutually agreed upon set of definitions and functional directives has been created around the technology, is it going to become possible to actualise the innovative potential of BCI.

Furthermore, stakeholders turned out to share a need to discuss the ethics of BCIs in modern society. In part, ethical concerns can be ascribed to an over-estimation of the capabilities of the technology. These concerns are easily altered through knowledge dissemination, an important quality of the events. Nevertheless, it is important for all stakeholders to be aware of that a review of current ethical considerations is appropriate if the technology is going to be introduced into a new societal context. The discussion was therefore particularly open to the topics of privacy, intellectual autonomy, free will, personal identity, and technological determinism.

A surprising new observation was that the main interest in continuing the organisation of Hackathons came from commercial stakeholders. Initially, it was not expected that private businesses would be willing to invest in these events, but they are likely to be of particular value to future events.

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MARINA - Marine Knowledge Sharing Platform for Federating Responsible Research and Innovation Communities | World-wide

Margot Bezzi (APRE)

MARINA is an open collaborative platform that involves societal actors in marine research & innovation. They share information & best practice, co-create solutions to marine societal challenges, generate action plans & put forth policy recommendations based on Responsible Research & Innovation. MARINA is a digital platform supported by 45 local and international mobilisation & mutual learning workshops and policy & RRI practitioner meetings in 13 countries in Europe.

What is the project/ initiative all about?

MARINA – Marine Knowledge Sharing Platform for Federating Responsible Research and Innovation Communities is a Horizon 2020 project funded under the *Science with and for Society* (SWAFS) programme, and ran from May 2016 to October 2018, for 30 months. It involved fourteen partners from eleven different countries: Italy, Belgium, Cyprus, Denmark, Estonia, France, Ireland, Portugal, Romania, Spain, and Turkey.

As the name suggests, MARINA's first objective was to reach out to and federate a RRI community around the issue of marine environment sustainability and of marine research through the organisation of mobilisation and mutual learning workshops, policy workshops, spill-over activities, dissemination activities, and the curation and trial of an all-inclusive Knowledge Sharing Platform (KSP) where stakeholders are invited to work together.

The final objective of MARINA is to increase the quality, relevance, social acceptability and sustainability of research and innovation outcomes in various domains, but especially in marine research, allowing the direct engagement of citizens and society at large in a co-creative and co-creating research and innovation process. Co-creation activities are intended in this context as a way to realise the objectives as set by the European Commission of strengthening the community of practice around RRI, with a EU wide scope and approach, as well as of providing tools to support the implementation of RRI principle at the policy level (see section 2 of this case study). By testing the project activities and analysing their outcomes, the project defined a systematic approach to RRI, which can be

transferable and reproducible to any RRI thematic domain, beyond marine research and innovation.

MARINA's specific objectives can be summarised as follows:

1) Engage citizens and stakeholders in a highly participatory debate/ consultation/ process for federating Responsible Research and Innovation (RRI) communities and initiatives. To this aim, the target of the project is to involve at least 400 different organisations (e.g. stakeholders groups, citizens, organised in CSOs or as single persons, research institutes, enterprises, administrations) by means of mobilising the participation of existing (RRI) communities.

2) Create and validate a comprehensive networking and knowledge sharing platform (KSP) for relevant projects, service contracts, marine actors, educational institutions and citizens, to support and enable discussion, mobilisation and mutual learning (MML), knowledge exchange and co-production by different communities related with the MARINA key strategic issues (environmental issues, sustainable development, policies and educational challenges) in the perspectives of the societal challenges and the RRI topics.

3) Establish a RRI capacity building process by facilitating the dialogue among stakeholders through the KSP.

4) Deliver guidelines based on good practice and lessons learnt for RRI assessment and promote them amongst CSOs, industry stakeholders, policy and decision makers, research funders, educational institutions, to ultimately foster their adoption as a potential benchmark in setting up RRI processes.

5) Provide recommendations and policy options for RRI relating to marine issues at EU, national and sub- national levels.

6) Communicate and disseminate broadly in Europe the activities and achievements of the project, to create awareness, engage and mobilise, and promote the uptake of results.

Context and environment: Where does it all take place?

MARINA was a Coordination and Support Action project funded under topic 'ISSI-3-2015 – Knowledge Sharing Platform' of the work programme 'Science with and for Society' (SWAFS).

The topic focuses on the creation of a knowledge sharing platform, based on evidences resulting from the Sixth Framework Programme Science and Society (S&S) and Seventh Framework Programme Science in Society (SiS), which showed that more consistent policy development in Science and Technology would require systematic cooperation and a shared knowledge base on which European, national and sub-national research and innovation policy decisions can be drawn from.

Final objective of such action was to foster the sharing of experience, consolidation and advancement of know-how on science in society in Europe, and beyond, making RRI and its key dimensions more effective as research and innovation policy support tools, reducing institutional costs and efforts of in applying RRI principles. Another objective concerns the strengthening of European leadership in the governance of Responsible Research and Innovation in both policy relevant and thematic European and global fora corresponding to the Horizon 2020 Societal Challenges. The context where these objectives were conceived by the European Commission are those of a Research and Innovation (R&I) policy creation and scientific orientation landscape still very much dominated by technology-driven criteria, which do not take into account with sufficiently spread and homogeneous approach the claims conceived under the RRI framework, which calls for a better consideration of a number of society related issues.

In this context, the platform was considering instruments which improved access to existing knowledge, know-how and experience, and federating Responsible Research and Innovation existing communities. Modalities suggested and expected were different, such as face-to-face meetings, participatory processes, social media and modern ICT and multimedia tools. The use of Mobilisation and Mutual Learning workshops was explicitly required in the topic, as a means 'to provide a platform for researchers, practitioners, national Science with and for Society-related programme managers and policy-makers and other stakeholders to reflect upon, share, assess, consolidate and transfer experiences and lessons learnt from Sixth and Seventh Framework Programmes projects, activities, methodologies and outcomes'. The facilitation of good practice sharing, as well as 'new and

lasting partnerships, fostering joint visions and positions amongst constituencies' was another requirement of the topic.

The project, together with other projects in similar domains and challenges of the Science with and for Society work programme, contributed in creating a cluster of projects which have successfully cooperated and acted in synergy through collective social media account on Twitter, Facebook and Linkedin (RRI_EU). These projects are organizing conferences, events, and in particular policy manifestos related to the way the legacy of the SWAFS programme shall be reflected into R&I methodology requirements in the Horizon Europe programme.

Brief outline of the project/ initiative's pathway

The topic called for 'strengthening European leadership in the governance of Responsible Research and Innovation in both policy-relevant and thematic European and global fora corresponding to the Horizon 2020 Societal Challenges'. MARINA directed its effort towards the issue of marine ecosystem sustainability.

During the whole process, the project facilitated new partnerships, cultivated joint visions and scenarios that connect societal needs with future expected advances in science related to marine issues and their impact on Societal Challenges. The co-creation features of this project are based in part on the requirements of the topic itself, which asked for a federation of communities through various means, as well as to use MMLs methodologies. Moreover, co-creation is intended as the most suitable way to address the complexity of marine sustainability, through collecting the variety of interests, needs, proposals and points of view of a varied combination of stakeholders (see if in proposal there a hint to this). Moreover, co-creation was subsequently interpreted as an appropriate way to counterbalance the fact that, as of an experiment conducted at the beginning of the project, it resulted that very few marine projects had engaged publicly in their work.

Co-creation happened cross-cuttingly in different moments of the projects, and across a wider and complex process composed by activities aimed at raising awareness, engaging, collecting feedback and creating capacities. Here we outline the whole project's activity setting, to be interpreted as parallel inter-related activity flows, and not in a sequence:

- **Organisation of Mobilisation and Mutual Learning Workshops** – using participatory and interactive activities, the project gathered everyone who was interested in developing and applying promising solutions for the marine environment hot topics and creates active, local and international, fora for exchange of knowledge and opinions for the advancement of marine environmental sustainability.

- **MARINA Knowledge Sharing Platform** – an online platform to facilitate the cooperation between any actor concerned by the future of the marine environment and its usage and wants to be involved in Responsible Research and Innovation. The KSP ultimately catalysed and organised the convergence of already existing networks, communities, online platforms and services, providing an online sociotechnical environment that facilitates and stimulates the direct engagement of researchers, Civil Society Organisations (CSOs), citizens, industry stakeholders, policy and decision makers, research funders and communicators for improving Responsible Research and Innovation. In particular, the online platform also facilitates the organisation, sharing and impacting maximisation of the results between the different local communities previously engaged through the MML workshops, promoting an exchange of experiences also with other communities federated in the platform. The platform was entirely developed by the project coordinator (CNR – Italian National Council for Research) and based on a deep ontology and systematisation work in matter of marine issue.

- **Engagement through the Knowledge Sharing Platform** has been investigated as well, and a specific activity has been organised to explore good practices in engaging stakeholders in the platform: Co-laboratory on Structured Democratic Dialogue (SDD) methodology.

The WKSP was considered the key tool for knowledge sharing and co-construction, contributing to enlarging the community of users, and improving the typology and quality of documents and resources available for the community, including the ones resulting from the MML workshops and events (videos, interviews, podcasts, photos, minutes, hot topic presentations, roadmaps, reports, etc. before, during and after each the MML workshop). The ultimate objective was to create a RRI community composed of all actors on the WKSP, to make it last and grow while solving new emerging challenges with RRI solutions and other.

- **Creation of Guidelines and Best Practices for RRI** – to enable active and successfull engagement in RRI, to apply RRI in organisations and in the research and innovation processes, as well as to foster policy making on marine sustainability.

- **MARINA exhibitions** – creation of an interactive, participatory and mobile exhibition to inform all interested parties about the current challenges related to the marine environment, and to engage people in marine related discussions.

- **Active communication, dissemination and spillover activities** for spreading the ideas of RRI and MARINA results, lessons learnt, best practices and policy recommendations. This included engagement and clustering of activities in social media.

In the case of the MARINA project, the engagement strategy had two different aims: 1) to involve individual people; 2) to federate already existing communities of scientists, citizens, or communities that had formed through other projects.

The project coordinators explain how 'the idea of federating communities that have an interest in a shared virtual space that allows them to get in touch with other communities has proved to be a winning idea. To date, eight communities are federated in MARINA. We are currently in contact with other realities that intend to be federated. A key aspect for all communities to decide to join the community federation is to provide each community with a customized access to the common virtual space with the brand of the community itself. The different communities welcome the idea of being federated as long as they don't lose their identity. Also, a fundamental aspect to consider in the process of building a community is that mutual knowledge and trust are fundamental elements on which the community is built, both online and offline'.

Partnerships development during the project lifecycle was based upon different means and levels:

- The Knowledge Sharing Platform had an initiator role in bringing together the community and facilitating the mutual knowledge of actors, belonging to different projects and initiatives in EU. Some actors, e.g. the project BlueMed, led by the Italian CNR, used the platform to internally organise thematic subgroups, structuring its own community. The platform certainly served as an aggregator, reflection and systematisation of things that existed beforehand and took place elsewhere. However, it

did not act as a real place for co-creation, since often cooperation moments between different projects took off independently and outside the platform.

- A pool of existing initiatives and projects was created, named 'RRI_EU', and reflected into a number of social media accounts (Twitter, LinkedIn, Facebook), playing an important role in exploiting the knowledge and contents created through the MARINA process. In particular, this project's network exchanged contents, acted as amplified dissemination platform on relevant results and messages, and made effort to mainstream conclusions and results that were relevant for everybody. This sharing of results could boost the entire extended community at a higher level, through organised access to resources, an optimised and shared communication efforts counting on extended networks, and amplified and coordinated voice towards policy makers.

In various cases the MML workshops have had some important consequences beyond engagement activities. For example, in the aforementioned case of the workshop in Puglia, there was greater attention from local policy makers towards the organisation of civil society that organised the workshop to its results of. In other cases, the effect of the workshop was to start new collaborations and projects such as in the case of workshops organised in Boulogne sur Mer, or ideas of new activities such as in the case of conferences in San Sebastian.

Management & Organisation: Who interacts how to facilitate co-creation?

The network where the case study took place was created in occasion of the project, gathering basically three types of organisations: organisations with direct interest in environmental or marine/ sea related issues; research oriented or research supporting organisations; organisation experts on engagement processes. The management and organisation context of the project is formed by the specific partnership:

	Participant organisation name	Country	Organisation Type
1	Consiglio Nazionale delle Ricerche (CNR) www.cnr.it	Italy	Public Research
2	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) www.isprambiente.gov.it/en	Italy	Public Research
3	XPRO Consulting Limited (XPRO) www.xpro-	Cyprus	SME

consulting.com

4	FundaçãoEurOcean (EurOcean) www.eurocean.org/	Portugal	NGO
5	Organizatia Ecologista Neguvernamentala Mare Nostrum (Mare Nostrum) marenostrum.ro	Romania	CSO
6	ShitasutusTeaduskeskus AHHAA (Science Center AHHAA Foundation) http://www.ahhaa.ee	Estonia	Science Center
7	SmartBay Ireland, Limited (SmartBay) www.smartbay.ie	Ireland	SME
8	Cyprus Neuroscience & Technology Institute (CNTI) http://www.cyberethics.info	Cyprus	Non-Profit NGO
9	Agenzia per la Promozione della Ricerca Europea (APRE) www.apre.it	Italy	Non profit Research Association
10	Societe d'exploitation du centre national de la mer (Nausicaa) http://www.nausicaa.fr	France	Science Center
11	Reseau Ocean Mondial AISBL (ROM WON) www.worldoceannetwork.org	Belgium	NGO
12	Associacion – Centro de Investigacion Cooperativa en Nanociencias CIC-NANOGUNE (nanoGUNE) www.nanegune.eu	Spain	Public Research
13	Aalborg University (AAU) www.aau.dk	Denmark	University
14	Istambul University (IU) www.istanbul.edu.tr	Turkey	University

Co-creation activities were managed following the responsibility distribution planned:

1) Mobilisation and Mutual Learning workshops (local and international) were organised in all partners' Member States. A task force (WP3 Leader, ISPRA, XPRO and EurOcean) reviewed all workshop hot topics in detail. Partner Nausica coordinated the overall process.

2) Two international RRI Practitioner and Policy maker workshops have been organised by ISPRA with the help of the partners, in particular SmartBay. The outcomes of these workshops have been elaborated by ISPRA with the support of the partners also in preparation of the final Policy Workshop in Brussels in 2019.

A Final Policy Workshop was organised by ISPRA in Brussels. This Final workshop was anticipated by an additional two-day event, organised together with the H2020 project ResponSEAble and in cooperation with the SEARICA European Parliament intergroup, IOC-UNESCO and DG RTD, DG MARE, DG ENVIRONMENT, was held in Brussels on the 18th and19th of March 2019 (2019 Ocean Dialogues).This joint actions was not foreseen and emerged after contacts established during the European Maritime Days 2018 in Burgas (Bulgaria), where the two projects discovered to pursue common objectives.

An additional unexpected cooperation emerged at the end of the end of the project, when a cluster of projects teamed up for communication purposes under the 'RRI_EU' accounts (see section 2 of this case study).

However, it is to be noted that, once the grant comes to an end, the network has somehow loosen, as it is the case for most of contingency-created partnerships. As recognised by the project itself in one of its deliverable, 'the engagement is usually limited to the period of the project duration, except if the project continues its activities or the community built continue to share discussions, knowledge etc., of other projects or other federated communities'[1]. Also, mobilisation on the Web Platform, due to lack of dedicated facilitation and community engagement, grew dim.

What are the concrete processes and practices of co-creation?

MARINA built a complex process comprising three different face-to-face engagement and co-creation moments, conceived in a sequence and mutually feeding each other: 1) MML workshops series (local and international); 2) RRI practitioner and policy maker workshops series. Each stage addressed different stakeholders and had different co-creation objectives. A more detailed description of both follows:
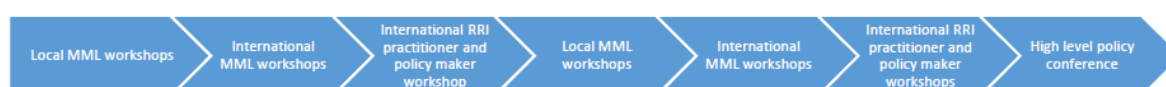
The MARINA Knowledge Sharing Platform cross-cuttingly supported all stages, and progressively integrated any result, content, document realised.

1) Mobilisation and Mutual Learning (MML) workshops

Two types of MML workshop – at local and international levels – were organised by MARINA partners and associate partners, in two rounds, for a total of four bunches of MMLs (two rounds for local, and two rounds for international), of the duration of one day at the least. Every MML round contributed to feed the following one, and altogether were part of a bigger process, which included also other types of events, such as the *Practitioners and Policy Makers Workshops*. The second round built on the outputs of the first round, with the intention to make them more suitable for policy makers' use. In such sense, we can speak about iteration and improvement.

- First round: 17 local MML workshops in 12 countries from 1st November 2016 to 1st March 2017, and four international MML workshops held from 4th April to 5th October 2017;

- Second round: 20 local MML workshops in 12 countries, from 29th January 2018 to 15th March 2018, and four international MML workshops held from 1st of April 2018 to 29th May 2018.

The MMLs had two main objectives: co-create with stakeholders, and federating communities.

MML workshops – local and international – contributed to the general objective of engaging European citizens and stakeholders in highly participatory debates, consultation and co-creation activities with regards to marine societal challenges, to build common understanding and integrate their visions, needs and desires into research and innovation processes, co-creating solutions to marine societal challenges and suggesting policy options for embedding the RRI in the marine sectors at EU, national and subnational levels. MMLs were aimed at producing a roadmap with proposals of actions, to identify the role that RRI can play in putting forth solutions to marine and societal challenges. This will be done by the process called 'learning by doing', i.e. by creating roadmaps for concrete commitment and involvement and by assessing them in the second round of MMLs.

Federating communities. The involvement of stakeholders contributes to the objective of federating the existing communities and networks in the marine sector. Indeed, the second purpose of MMLs activities was to populate the WKSP with people and the content they will generate. Communities addressed regard researchers, Civil Society Organisations (CSOs),

citizens, industry, policy makers, research funders and communicators on the Web Knowledge Sharing Platform, sharing knowledge and best practice.
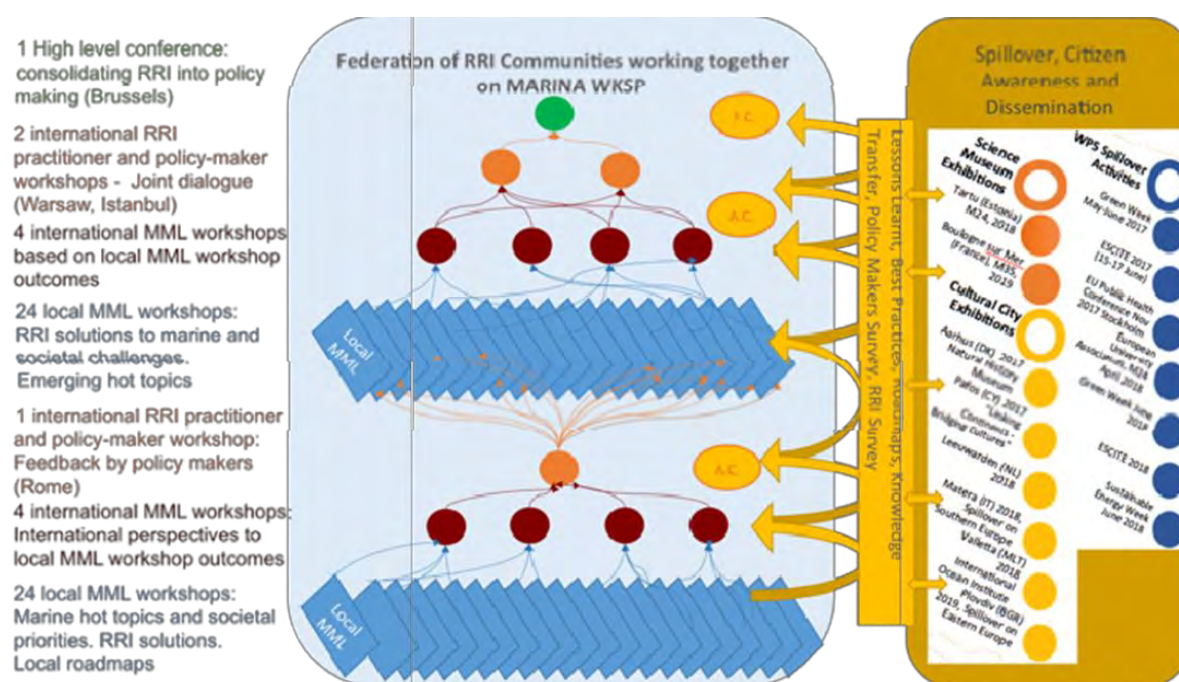
Figure 1 - MML process in the framework of the MARINA project. Source: Deliverable 3.1

Local MMLs topics were chosen depending on territorial specific needs in relation to marine and societal challenge(s) and Responsible Research and Innovation (RRI). Then, the results of similar or related topics of the local MML workshops were channeled into the international MML workshop focusing on a related theme.

The process explored and reported results with respect to three different content dimensions: 1) specific topic related to marine issue; 2) societal challenge dimension; 3) RRI dimension. The specific marine issue were chosen by partners depending on what was more relevant in their country to be tackled, choosing among the following: Tourism and coastal cities; Pollution caused by human land and sea pressures; Fishing and aquaculture; Renewable energy (wave, wind, tidal); Marine changes caused by climate. Issues chosen had to be different in round 1 and round 2 of the MMLs.

An overarching theme for the first round of the international MML workshops: *How can Responsible Research and Innovation contribute towards making tourism in EU coastal and marine areas a driver for sustainability?*

Before the first round of local MML workshops, each partner was required to register on the WKSP, upload reference material, invite participants to register on the WKSP and encourage them to get them familiar with the hot topic and the workshop material.

A hot topic template was prepared to harmonise and facilitate the preparation of Mobilisation and Mutual Learning (MML) workshops that MARINA partners were in charge of organising. Once the local hot topic identified, partner organisations completed the hot topic template. Hot topic description documenting the necessity of responding to the identified marine challenge was developed and circulated among them electronically before the day of the workshop.

MARINA Local MML Workshops, Round 1

TOURISM AND COASTAL CITIES		
1.	Tourism provides income but also destroys the values that brought it to Cyprus – How can we preserve both?	CYPRUS
2.	Live the sea with those who live off the sea	ITALY
3.	Marine protection in the shadow of urbanisation: Prince's Islands Case	TURKEY
4.	Sun, sand... and safety. How long will we have beaches?	PORTUGAL
5.	Connecting harbour and the city – strategy, collaboration and growth	DENMARK
6.	Crowded city at the pristine coast	POLAND
POLLUTION CAUSED BY HUMAN AND SEA PRESSURES		
7.	Marine litter: from the land to the sea and then back to us in our seafood?	ITALY
8.	What actions are needed to keep minimising the contamination of water and how to implement them?	SPAIN
9.	Pollution by human pressure with a special focus on marine litter	ROMANIA
10.	Marine litter and plastic pollution: toward a comprehensive and inclusive set of solutions	BELGIUM
11.	Baltic Sea anatomy	ESTONIA
FISHING AND AQUACULTURE		
12.	Aquaculture, what are the stakes for the future?	FRANCE
13.	Will Italian fish products disappear from our dishes?	ITALY
14.	Responsible Research and Innovation for sustainable fishery and aquaculture	PORTUGAL
RENEWABLE ENERGY (WAVE, WIND, TIDAL)		
15.	Wave energy in Ireland: Considering the future – an industry perspective	IRELAND
16.	Wave Energy in Ireland: Considering the future –perspectives on policy	IRELAND
MARINE CHANGES CAUSED BY CLIMATE		
17.	To adapt and survive or to die. How to maintain and enhance the quality of the Black Sea NW coastal ecosystems under the pressures of climate change and human interventions?	ROMANIA

Each local MML workshop focused on one triggering question in relation to the hot topic that was selected for its main theme. The question was intended to spark discussions, facilitate building a common vision of the issue, inspire RRI-driven solutions to the marine challenge and societal challenge related to the hot topic, and put forth a roadmap of concrete actions. Also, participants at the beginning of each workshop were briefed regarding the RRI concepts.

The first round of local MML workshops succeeded in bringing together 418 stakeholders in 12 countries, engaging interdisciplinary groups of stakeholders. The second round of local MML workshops assembled a total of 443 participants in 20 participatory workshops, an average number of 22 participants per workshop, which contributed with 485 specific actions in response to the Triggering Questions of the workshops.

The participants to the MML process will be citizens, representatives of Civil Society Organisations, policy makers, policy implementers, scientists, research organisations, educational organisations, students, industry, SMEs, local administration and municipalities. MARINA stakeholders may be divided into four main groups, as showed by the table below.

The target number of each workshop was set to 25 to 30, with a gender balance target of 50 % ratio, and the recommendation to involve both young and retired people. The suggested composition of multi-stakeholder MML workshop groups was as follows: Researchers and scientists 25 %; Local policy makers (including representatives of local authorities, and municipalities) 1 5%; Citizens and CSOs 44 %; Business representatives 20 %; Other 1 %.

Government/ Authorities	Research Organisations	Businesses	Communities
Local Authorities	Universities	National Business Associations (i.e. Fisheries, Maritime, Tourism, Farmers, etc.)	Citizens
Ministries	Private Research Institutions	EU Business Associations	CSOs
Regional Government	Public Research Institutions	SMEs	NGOs
Coastal Policies	Foundations	International Businesses	Science Museums
Municipalities		National Businesses	
Policy Makers		Individual Professionals	
Policy Implementers			
Port Authorities			
European Union			

The identification of stakeholders to engage in the MML workshops was considered to be the key to the overall success of the MML workshop and suggestions were provided from the partner coordinating the process, such as:

- Analyse the needs and potential contribution of various stakeholder groups to the hot topic. Be inclusive and involve participants who live on the coast and in the hinterland and who represent the activity sectors linked to the hot topic in direct in indirect ways. Do not just reach the usual 'suspects'. Do not exclude opponent groups.

- Involving them creates ownership and greater commitment. Make use of the MARINA stakeholder database.

- Identify keynote speakers. Well-chosen keynote speakers are important to the success of the workshop. Moreover, their presence may motivate and attract others.

- Contact the keynote speakers by telephone or in person to invite them and obtain their commitment. If you do not know them personally, ask people in your network and staff to connect you to them.

- Send the stakeholders an official invitation message and supporting readings (if relevant).

- Respect of person: voluntary participation and informed consent will be the base of recruitment.

- The message of recruitment will include the informed consent form (Appendix IV) that each participant will sign digitally or in handwriting and return to the organiser. The form will include the explicit intention to participate in the MML workshop and/ or in the WKSP.

The level of engagement, in relation to Arnstein ladder, is quite high, foreseeing the possibility to actively elaborate a roadmap and to selforganise discussions through the Web Knowledge Sharing Platform. However, MMLs involved actors in the phase of Problem identification/ Understanding and Ideation. This means that there is not a real possibility to co-produce and co-implement together with implementing authorities or stakeholders. Indeed, there was a connection with policy making: MARINA partners acted as mediators with policy makers conveying the results of MML workshops into two dedicated *Practitioners and Policy Makers Workshops* (one after each MML round).

2) Practitioner and Policy Makers Workshops

The general aim of the Policy Makers Workshops was to actively connect policy makers with the RRI community, to create awareness and involve, to create capacities related to stakeholder engagement and to contribute to create strategies for the institutionalisation of RRI. Two half-day Practitioners and Policy Makers Workshops were organised after each round of MML, followed by a final event, including a forerunning event. To summarise:

1) 23rd May 2018, Brussels, Belgium: 'Disclosing the potential of Responsible Research and Innovation in the Marine Sector and Blue Growth', to present the activities of the MARINA project on policy mobilisation and institutionalisation of the RRI approach and

discuss from a policy perspectives how to ease a better implementation of the RRI concept.

2) 18th September 2018, Tartu, Estonia: 'Institutionalization of Responsible Research and Inovation: what, how and who', as part of the conference 'Towards RRI Practices and Policies. How to Institutionalise the RRI approach: from Theory to reality (TRRIPP)'. It was aimed at 'showing the actual value of engagement to co-construct knowledge to support policy decisions and to explore needs and modalities for the institutionalization of RRI in conjunction with evidence based policy-making'[2].

3) A Final and third Policy Workshop held at the European Parliament on 20th March 2019, Brussels, Belgium: 'Let's strengthen Ocean governance! How to engage citizens, stakeholders and scientists in maritime affairs', whose first objective was to discuss how policy could support the application of key principles that underlie Responsible Research & Innovation and Ocean Literacy.

4) The final event was forerun by a two-day event 'Ocean Dialogue', where a Manifesto was prepared, and presented to the Final Event at the European Parliament.

We will summarise the most relevant components that characterised the series of policy workshops, drawing from the conclusions elaborated by the project itself in its Deliverable 6.2 'Round table guide for institutional use across Europe'.

Co-creation concerned especially the creation of the whole setting and path towards the event (e.g. planning of Ocean Dialogues events, and meeting with MEPs), and partially the creation of ideas and topics that were then reflected in the *Manifesto*, jointly written by the MARINA project and the ResponSEAble project, on the basis of co-created materials.

The use of primary and secondary contacts to policy makers in order to reach out to policy makers is essential to reach out and for the invitations to participate to stand out and receive the needed attention from policy makers.

At this regard, the project coordinator provided some useful insights:

• 'The involvement of policy makers during the various workshops has always represented a big challenge, since participation always takes a long time and for policy makers this aspect is a criticality (given their numerous institutional commitments). Their involvement can be obtained by trying to reconcile the organization of workshops

in conjunction with other initiatives that already foresee their participation. In this way, the required effort can be minimized, maximizing the effect of communication and cooperation. This was also the case at the policy workshop organized with the "2019 Ocean Dialogues', which saw two projects cooperating (MARINA and ResponSEABLE). The initiative was planned to be held in conjunction with the 'high level conference on the oceans' organised by the European Parliament. The '2019 Ocean Dialogues' saw the constructive presence of some MEPs, who were also very active by participating in the initiative and supporting the organization of a meeting at the European Parliament which saw the participation of DG RTD in collaboration with IOC -UNESCO and the SEARICA Intergroup of the Parliament. During this meeting it was possible to present and share the 'Manifesto for the construction of an effective ocean knowledge system'. (http://www.oceandialogues.eu/wp-content/uploads/2019/03/Manifesto-2019-Ocean - Dialogues.pdf)

- Making an effort for promoting actions aiming to get media cover and social media presence to influence policy and decision makers.

- Building networks of researchers and innovators in various STEPS What of Their activity put in place a process of involvement of the different actors (Triple Helix) and therefore also policy makers.

Methodologies chosen:

- *R*In the second Policy workshop, a 'role game' was especially conceived for the workshop, based on a real (simplified) Maritime Spatial Planning case study in Estonia. Each of them received a 'stakeholder role card' (for instance Energy Companies, Fishery associations, Environmental NGOs, Citizens and CSOs, etc.) and were asked to act a stakeholder role (different from their own actual role/ work) in relation to the issues brought for reflection. They were asked to advocate for their 'vision' and reflect on what conditions would allow their knowledge to be shared and used for taking decisions. This step allowed the group to touch with hand the role of co-creating knowledge to support policies before collectively answer to the triggering question: 'Which actions should be taken to ensure that all the voices are considered on the use of the sea?' (2nd Policy Workshop)

- Collecting work of different stakeholders to identify mechanisms for effective implementation of some key principles essential to RRI and Ocean Literacy, and make

them reality. Approximately 100 participants, including 40 policymakers worked for 1 hour and 20 Minutes in groups of six to eight. The working tables were moderated by rapporteur previously identified, and A3 reporting sheets and a guideline for self-facilitation in five steps was present (Ocean Dialogue).

- *Panel* with two policy makers and three RRI experts. Two questions were raised to the panellists to investigate their opinion about the inclusion and application of RRI to the policy practices: 1) 'How can RRI become a reality and not a burden?'; 2) 'How can RRI become more practical and operational?' (Ocean Dialgoue)

Setting the scene and capturing the attention:

- The organisers opened the day providing insights to inspire the speakers. This was done through a 5m-long pictogram with the key messages of the conference and a short video made during the Ocean Dialogues (Third Policy workshop).

- The workshop started with a short presentation on the outcomes of the Mobilisation and Mutual Learning (MML) workshops, including the draft RRI Roadmap; moreover, the outcomes were presented of the survey investigating the degree of familiarity with the RRI concept among representatives of public institutions (First Policy Workshops).

- Participants were given a form to fill in with concrete actions, answering the following triggering question: 'How can the MARINA results contribute to current policies, cross-cutting priorities and Research &Innovation agenda?' (1st Policy workshop)

All events aimed at producing actions focused on easing the institutionalisation of RRI principles, as well as ensuring that dialogue and participation approaches are pursued. The main output of the Ocean Dialogues was the 'Manifesto for building an effective Ocean Knowledge System - The role of Responsible Research and Innovation (RRI) and Ocean Literacy (OL)', which was presented at the European Parliament (EP) in the Final Policy workshop. Such activities can be classified in the phase of ideation of solution – we are not aware, at the moment, of any activity having reached the phase of prototyping.

The coordinators of the project highlight how 'The collaborative participation methods used had the aim of reducing conflicts between participants by promoting convergence towards the solution of the problems discussed. Only on very divisive subjects it was difficult to manage the conflicts between the participants, as in the case of the workshop on *Deep Sea Mining* in Puglia Region. In this case, obviously, it was difficult to manage the

misalignment between the companies directly interested in the oil and mining exploitation of some marine areas and the civil society and the companies of the tourism and fishing sector interested instead in avoiding the oil and mining exploitation. However, even in this case, the policy makers were able to draw important ideas for their strategies'.

Specification: What tools and instruments are/ were used to co-create?

In MARINA interaction comprises a series of steps: a) enabling social interactions; b) enhancing mutual understanding; c) changing individual stakeholder perspectives; d) creating a common consensus; and e) thus, establishing a (RRI) community.

Co-creation on Web Knowledge Sharing Platform: The participants were expected to upload their roadmaps on the WKSP in their native language and continue to refine their roadmap identifying emerging hot topics and inviting new stakeholders and users to the WKSP. The work was then supposed to continue the WKSP in specific *local hot topic groups*, facilitated by a moderator chosen among the participants to the MML workshop.

Each organisation responsible for organising a local MML could choose among the following facilitation modalities: 1) Focus Group; 2) World Café; 3) Science Café; 4) Delphi; 5) Future Search (available after M9); and 6) Structured Democratic Dialogue Process (SDDP). The Structured Democratic Dialogue Process (SDDP) was the methodology for all international MML workshops, and specific training was provided to partners to conduct it. Criteria taken into account to choose a modality were:

- *Objectives*: the reasons for involvement and expected outcomes;

- *Hot topic*: the nature and scope of the issue;

- *Participants*: who is affected, interested or can contribute to solutions;

- *Time*: amount of time available;

- *Budget*: availability of resources.

In the first round of local MML workshops participants are expected to get introduced to the RRI concepts, fine-tune the hot topic and develop a common, holistic vision of the marine and societal challenges relating to the hot topic, and produce a joint roadmap based on the MML objectives, which they are expected to carry out and commit themselves. The roadmap will include needs and solutions in terms of RRI, governance, access,

competences, financial resources, knowledge needs, human resources, technological, material, etc. The second round of MMLs generated a total of 485 proposed actions. Actions were associated to RRI dimensions as well as to the seven societal challenges.

MARINA project aims at implementing Change Management approach in order to initiate institutional change of mind sets towards the perception of the RRI and Citizen Science and facilitate spill-over. In order to do this, the reports about MML workshops shall stimulate and include reflections on institutional needs for consolidating RRI into EU policy. Thus, the MML workshops and their outputs had to be shaped following the Change Management model by Kotter:

- Create urgency for RRI Change towards Societal Challenges.

- Build a Coalition to start the RRI Change: enlist volunteers to push the RRI Change.

- Create a powerful vision to guide the change.

- Communicate about the vision by every possible vehicle and communication channel.

- Empower action. Empower other people. Enable the RRI Change by removing barriers through communication and dissemination, change systems and structures that undermine the vision. Plan for, create and communicate about the short term RRI advances and wins, (plan visible quick wins, implement and reward).

- Consolidate, accelerate and sustain the RRI Change through wider communication of lessons learned by using the MARINA KSP and social learning experiences from the MML workshops. Use credibility to change policies and procedures that don't share the vision, recruit people who can implement the vision.

- Create a new culture by continually updating the connections between new way of thinking and success. Provide input to institutionalise the RRI Change. Make it stick.

The feedback received by the coordinators concerning the stakeholders experience has been very positive: 'We distributed questionnaires to the participants and about 90% found the MML workshops positive or very positive and, thanks to the participation of stakeholders with different points of view, it was considered very important for a better understanding of the problems discussed'.

Which learnings emerged?

Lessons learnt for Mobilisation Mutual Learning

The MARINA project dedicated a deliverable, 'D5.2 Lessons Learned Report and RRI Roadmap', to the learning gained from the process of mobilising marine stakeholders and citizens in marine societal issues, such as overfishing, the need of clean energy, overdevelopment of coasts due to urbanisation and tourism, marine litter etc. The aim is to reflect on lessons learnt of the project that can be applied to public and stakeholder engagement in the governance of science and innovation, so as to support a more participatory development for addressing marine issues in all marine sectors as well as non-marine sectors, as for example in bioeconomy, circular economy, information technology, nanotechnology, etc.

The project stresses how increasing citizen engagement into research and innovation processes is linked to the recognition, from researcher and practitioner, of a democratic responsibility linked to engagement. This is because engagement enhances research and innovation inputs and allows to have a more complete understanding of societal issues from the citizens' points of view.

We provide a selection of identified lessons learnt and relative good practices regarding the methodologies used for building a common vision and action plan for marine societal challenges, and to improve the whole Public Engagement process.

The communication and cultural dimension of engagement:

- Adapt the workshop methodology to the local culture.

- Use common words so that non-scientist participants can understand.

- Make a clear presentation of the debated issue and its current status.

- Stimulate and ensure open dialogue among the attendees.

- Establish transparent, efficient and effective democratic mechanisms amongst all involved and throughout all the phases to create trust.

- Explain the workshop methodology and how the outputs will be used at the beginning of the workshop and include some warm-up activity.

- Dedicate the needed time to discuss and clarify the methodology and the agenda with the facilitator and among the organising group.

- Provide a synthetic, maximum of five pages, info pack about the topic before the workshop.

- Have a discussion phase that is long enough for all participants to be fully aware of all the implications of the proposed ideas, without extending the duration of the workshop.

Relationship with and engagement of the community:

- Importance to engage local communities in awareness raising events.

- Engage stakeholders from different sectors of activity.

- Involve students when possible. Engage young potential 'citizen scientists' in schools to promote the issue at hand.

- Adapt the workshop schedule and structure according to the specifics and programme of the stakeholders you want to attend. Consider having virtual discussions to help some stakeholder groups (e.g. citizens) to attend participatory workshops and events.

- Empower citizens beyond data collection through involvement in decision-making and governance.

- Define a clear plan for the future engagement of the workshop's participants to keep the community active. Also, translate workshop results in something short and friendly in short time, and disseminate among the participants and others, not to lose momentum.

Important supporting details that the Focus Group shall implement:

- Having a coherent national monitoring programme.

- Develop an action plan with a narrower focus, combining milestones and follow-up workshops.

- Focus not only on high-level ideas, but also on required research and innovation actions needed to execute them.

- Ensure that all participants stay until the end of the workshop to have coherent results.

Factors helpful for engagement:

- *A web platform is important to reach out widely* and overcome physical and time barriers or the lack of familiarity and trust some may feel to join an event in person. Indeed, supporting participation through online platform mitigates the difficulties many stakeholders may have to physically take part to the exchange, due to distance issue, lack of time or low level of knowledge about a specific topic.

- *Participation to face-to-face events* such as the MML workshops improves the level of knowledge and trust, facilitating the engagement process in the community.

- *Trust and reputation, and sense of belonging*, often derived from past experiences of collaboration among the stakeholders, confirm to be a key factor for engaging people in the community. For this reason, it was particularly effective when already registered members asked to their professional networks to get registered in the MARINA platform.

- *Continuous engagement is necessary*. One of the way of doing it is to give participants a follow up for their participation, sharing results in a common virtual space, providing (virtual) spaces to independently continue the discussion, as well as a blueprint of future actions. Also, the projection towards different governance level (e.g. from local to European level) is a strong stimulus for engagement and active participation.

The MARINA project also elaborated a comprehensive Roadmap for RRI, as a tool collecting their learning and to appropriately support engagement processes. The RRI Roadmap is the distillation of all the conclusions from the MARINA project, the lessons learnt from the many MARINA mobilisation and mutual learning workshops other relevant EU projects' experiences (D5.1), change management and modern project management approaches and design-thinking concepts into eight clearly defined milestones with steps. Each milestone relates to two or more RRI dimensions. The aim of the RRI Roadmap is to provide an approach for addressing a challenge through the application of RRI and by involving diverse stakeholders such as citizens, civil society, researchers and scientists, policy makers, policy implementers, business and industry people. The RRI Roadmap provides clear milestones and steps to guide the process to engage, co-design, co-construct and implement solutions for addressing a specific challenge by considering stakeholders' perspective, experience and knowledge.

Lessons Learnt from Policy Workshops

- The successful engagement of policy makers relies on the consideration of a number of factors.

- The choice of the location shall be convenient for then to reach the event; the event shall be brought where policy makers are.

- Good time management is key, and this include the preparation of to-the-point, clearly understandable communication (messages, descriptions, reports), aware that a

'translation' from the research world to the public-policy and public-value world is to be done.

- It is important to foresee the presence of facilitators and 'knowledge brokers', persons able to make knowledge accessible from different types of stakeholders, with different knowledge backgrounds.

- Cross-sectorial or cross-regional events organised in collaboration with (e.g.) other projects, institutions, policy or political entities increase the interest of policymakers. A cooperated effort sounds naturally as a more solid and relevant offer, since it addresses the needs of a larger public.

- Clear statement about the purpose of the event (what do we ask them) and the benefits coming from the participation (what is in it for me?) is key. This includes referring to useful tools and ideas.

- Decision-making processes are always very complex, sometimes controversial and divisive for the different actors of society. However, sharing the objectives and the different points of view facilitates the achievement of an effective and efficient solution to the problems. It is also particularly useful to identify roadmaps that allow you to define partial objectives, and monitor them, to make corrections and improvements before proceeding with the following objectives.

General lessons learnt on the entire process

The project coordinators report the experience of the MML and policy workshops as positive and constructive, highlighting the following main considerations:

- Participants raised two apparently conflicting needs: on the one hand, participants expressed the need for more discussion, and on the other hand, the need for shorter and more agile workshops. Our solution to address these needs, while continuing to expand the number of participants (which in MARINA has reached 1,000 people) was to organise shorter and repeated participatory events. These would encourage the participation of people who have long hours of work, as well as policy makers, allowing the development of a concrete and constructive dialogue.

- Project initiatives, such as the ones conducted in MARINA, could and should be integrated within existing initiatives and moments of community participations, and with initiatives organized by other actors, in order to maximise the relevance of each action.

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Fine Feathers Make Fine Birds | Netherlands

Lisa Wisse and Danielle Ooms (Cube design)

The aim of this project is to develop a clothing concept that allows peoples own clothing to be adapted so that it becomes suitable when they become dependent on care or nursing and thus allowing them to keep their own identity. It is a design challenge organized by Cube design museum in Kerkrade (Netherlands), initiated by a Dutch medical doctor. In its course, a multidisciplinary student team used design thinking methods to find solutions in co-creation with museum visitors and different stakeholders.

What is the project/ initiative all about?

The Fine Feathers Make Fine Birds project is aimed at developing a new clothing concept that allows people's own clothing to be adapted into suitable clothing once they become

care dependent. This supports the maintenance of their personal identity, style and (where possible) can help to maintain independence in dressing/ undressing.

The project was entirely developed and run in the Netherlands and between Dutch stakeholders, with a special focus on research and innovation in the quality of life of people in (advanced) physical care. The project was initiated by an inspired Dutch primary care physician and Professor at Maastricht University (Yvonne van Leeuwen, 1951-2019) and developed in cooperation with a multi-disciplinary project leaders Lisa Wisse and Danielle Ooms (Cube residents), expert designer Reggie Flippo, advanced carers and care-recipients in Limburg, students of MaFad (the Maastricht Academy of Fine Arts and Design), as well as volunteers visiting Cube Design. Fine Feathers was presented as a design challenge facilitated by Cube Design museum Kerkrade, in the south of the Netherlands. Co-creation and Design Thinking structure were utilised to enable the co-creators to indicate the key project issues (e.g. style/ identity maintenance through clothing in varying levels of disability, form-fitting/ adapting solutions, practical comfort in wearing and dressing) and their most viable and appropriate solutions.

Fine Feathers is a non-government project related to the healthcare industry. Several care-recipients, carers and a large group of non-disabled volunteers were interviewed as to their needs for clothing adaptations and their opinion on the value of personal style in clothing. Advice on wearability and manufacturing possibilities came from the input of 'wardrobe doctor' and theatrical costume designer Reggie Flippo. His personal dedication and unique expert input proved to be of instrumental value due to his skills in personalized fashion for care dependent people.

The societal challenges taken on in the project are related to health, wellbeing and an inclusive, innovative society - assessing the particular clothing needs of people in varying stages care-dependence, and researching the conceptual possibilities of adaptable, wearable, comfortable, functional and fashionable clothing for people requiring advanced physical care. Cross-cutting issues include social science, inclusion, and intellectual property, taking on nearly uncharted territory between adjustable clothing (fashion), personal identity and the health care sector. As experienced by Yvonne van Leeuwen and other stakeholders - in both practise and private life, several forms of clothing are inaccessible to people with limited mobility. From a practical perspective, innovation possibility was indicated to arise mainly from lack of mobility in the head and torso, in

addition to comfort issues with patients spending extended amounts of time in one position.

After five months, the final prototype was presented in the form of a shirt based on the input of all stakeholders in the co-creation process, this is considered the conclusion of the project. The final result is on display at Cube Design, and the process and methods of the project will be adopted in future Cube Design-projects as 'Design maps' - process templates that provide guidance based on the SISCODE method.

Market research as well as additional stakeholders and funding are currently not sought but would be required to extend this prototype into several prototypes and finally into a commercially available product or a system of alteration methods that can be packaged and offered to the healthcare sector, in particular specialised clothing manufacturers, this will be further explained in later sections of the document.

Context and environment: Where does it all take place?

The Cube design labs are part of the Cube design museum and have more than three years of experience in developing and coordinating design challenges that address human needs and ambitions and in which museum visitors and other stakeholders play a key role in the co-creation process. This has resulted in 30 projects, involving over 100 national and international design students and alumni (primarily bachelor, but also vocational and master studies) from different disciplines.

Within the labs they work together with a team of experienced coaches in the fields of design thinking, design research, graphic design and product design. It has also built (and keeps on building) a network of professionals, researchers, and local/ regional policy makers to continuously strengthen its knowledge base and regional anchoring.

Cube has an extensive experience in the management of complex projects, in particular developing and designing new venues/ museums, and creating exhibitions around topics such as science, design, innovation and sustainability. This includes developing activities and events in which visitor participation is the central aim. The organisation behind Cube – Stichting Museumplein Limburg – is a network organisation. For every project, activity and event it is crucial to build a network of stakeholders and partners with whom we can work together and cooperate in the research, design and realisation of all projects.

At Cube, a co-creating initiative usually starts with a Cube Call – a design challenge that is either related to one of Cube's exhibitions, based on a (societal) question posed by an external party/ organisation/ company or derives from a student's interest.

For every Cube Call, Cube builds a multidisciplinary team of maximum five students (and occasionally alumni) who work on this design challenge as part of an internship or graduation project. This takes usually five months. The design process, inspired by Guido Stompff (Lecturer Design Thinking/ Author DT books), is based on design thinking and co-creation and composed by the following phases:

ASK, IMAGINE, CREATE and EVALUATE in an iterative manner. Co-creation with museum visitors is facilitated and encouraged within every phase and on a daily basis.

The Cube design are part of the Cube design museum and offer spaces and materials for brainstorms, creative sessions, presentations, and interactive discussions with different stakeholders and museum visitors. Rapid prototyping facilities include 3D printers, a large format printer, a plotter, laser cutters and basic tools and materials.

The project and its stakeholders were all gathered locally, in the Limburg-province of the Netherlands. 'Fine Feathers' is a project aimed at conceptual innovation in health care sector, specifically at quality of life and identity of care-recipients. The co-creation process took place between local (non-profit) stakeholders (Prof. Yvonne van Leeuwen, Reggie Flippo, Lisa Wisse, Danielle Ooms & Cube Design museum), students of MaFaD and care facilities: Valkheim (Valkenburg) and 24-hour assisted living arrangements in Limburg. The process of development was segmented into three stages: Ask, Imagine & Create. Each stage builds on the next in order to develop a final prototype, marking the end of the project. This prototype would then serve as in inspiration with possible commercial value. The prototype features the possibilities of comfortable, personal clothing for care-dependent people, as well as an assessment of key issues that remain limiting to either comfort, style or production beyond a conceptual stage.

Co-creation was applied in each phase. In the Ask-phase, interviews were conducted with care-recipients, carers, healthy museum-visitors, as well as brainstorm sessions with students of MaFaD. Information from stakeholders was gathered throughout project in order to develop an insight into the personal connection between clothing and identity, to ascertain the needs and wants of care recipients (as well as carers – who sometimes care for non-responsive patients), as well as the shortcomings of conventional clothing. After all

preliminary information was gathered, Design Thinking was implemented to indicate the key priorities for the Imagine-phase.

Six 'frames' (key perspectives on design) were spearheaded (adaptability, identity in clothing and care-applications and care-space, DIY-dressing and innovative clothing). Each of these frames was put through the design-thinking process, incorporating as many stakeholders as possible through interviews, context analyses and brainstorming.
A wide range of practical solutions was explored, from fabric to fit and environmental possibilities, including feasibility for innovation and potential drawbacks. Additional possibilities in personal identity-maintenance beyond clothing were explored, including environmental adaptation (for instance - personalized wheelchair design and room-layout alternatives). After exhaustive exploration the decision was made to focus on clothing solutions. Context enquiries were performed, consisting of in-depth interviews of people performing a task of key-interest, in this case – witnessing the dressing of care-dependent and healthy participants (the project leaders). Again, all stakeholders were local, which enabled in-person visits by the project leaders to several advanced care facilities in Limburg. This led to the indication of several key targets for clothing innovation.
To conclude additional research in the Imagine-phase, an assessment was made of the target market. Public records (CBS Gezondheidsenquete 2008-2011) estimate that 800,000 Dutch people (age 12-79) have a moderate to severe form of physical disability that feasibly limits their ability to dress to their preference. This further highlights the scope of clear and present need for innovative solutions.

In the third and final phase - 'Create', a prototype was built that answered to the key targets developed in the previous phase. Under the expert guidance of designer Reggie Flippo, the project leaders decided to deliver the prototype in the form of an adjustable shirt, and to focus innovation in the area of textile patterning. This was considered optimal in terms of co-creation, available stakeholder expertise, innovative potential, time- and financial efficiency.

The prototype was tested and reviewed by the project leaders, and is currently on display in Cube Design. Due to time constraints (the project duration was five months), the prototype has not been reviewed by target users. Furthermore, the project process of Fine Feathers has been adopted into Cube Design in order to inform future projects on co-creation, Design Thinking and the ambitions outlined within SISCODE. It was also presented at Get Out of the Building (Brightlands, 2018). Project Fine Feathers, as it currently stands is

considered to have completed the full cycle of development and project leaders are exploring additional funding to continue the development and implementation of care-dependent clothing.

In terms of facilitation, project- and network-support, Cube Design provides an excellent space and services for experimentation, prototyping, co-design, co-creation, Design Thinking as well as interaction and brainstorming with volunteer participants (citizens). An ideal incubator for the implementation of SISCODE-methods. An ongoing challenge is found in collecting the appropriately diverse set of disciplines, expertise, backgrounds as well as allocating financial resources for research, exploration and presentation.

Brief outline of the project/ initiative's pathway

The primary initiation of the project came from Professor Yvonne van Leeuwen, an inspired and dedicated primary care physician who's private and professional experience in advanced care-dependence led to a persistent observation that in modern healthcare, identity-maintenance is considered an afterthought to care-dependent people. This presents a serious problem in the context of a modern, inclusive society. It is through the tireless efforts of professor van Leeuwen in communication, experience as well as personal financial support that the project was brought to fruition.
Wardrobe Doctor Reggie Flippo is considered the second key-stakeholder in the project. His exceptional expertise in design, patterning and customisation of clothing for patients was used to optimise the viability of the prototype. His background as a designer for the international red carpet, theatre, television, combined with his personal commitment to identity-maintenance in clothing for the care dependent community made him a perfect match to Fine Feathers.

Though compromises are necessary to ensure practicality in the dressing process and comfort in wearing, it is of inherent importance to the dignity of care-recipients that they, like everyone, have the possibility for identity-consideration, -expression, -maintenance and -diversity. The subject of personal identity is woefully overlooked in the development of environments suited to care-recipients. This lack of attention quietly invites both the care-recipient and their social environment to confuse their personality with their physical limitations.

Once the number of advanced care-recipients and the social integrity and impact of the project become clear, it is easy to empathise with the ambitions of Fine Feathers Make Fine Birds. This is further supported by the hundreds of interviews that were voluntarily conducted with visitors at Cube Design. The museum also facilitated the required lab-space throughout the project phases. The overt, glaring need for solutions, the originality of the question as well as the uncharted territory of the project make it a perfect candidate for co-creation/ co-design and Design Thinking methods as recommended in the SISCODE-environment.

As described in section 2, co-creation, key-target definition, brainstorming and reflection happened in each of the three phases, with varying as well as continuing sets of stakeholders in each phase. Recruitment of stakeholders happened by personal invitations of the project leaders, through the network of Yvonne van Leeuwen, Cube Design, as well as direct appeals to the target group by the project leaders (being care facilities and recipients).

Going by segment, in the preliminary 'Ask'-phase, co-creation was achieved with care-recipients, carers, design students, visitors of Cube Design and the project leaders. The 'Imagine'-phase was characterised by a Design Thinking analysis, including contextual enquiry by the project leaders supported by Cube Design and preliminary input from Reggie Flippo, further zooming in on key points of innovation and needs of patients in diverse levels of care, as well as an analysis of the overall size of the target audience (people with moderate to severe care requirements in the Netherlands). Finally, in the 'Create'-phase, design and patterning input was gathered from Reggie Flippo, thus enabling the project leaders to generate three preliminary and one final prototype.

The project leaders consider co-creation as presented by Cube Design within SISCODE to be an optimal method to research and define necessary innovations in identity-maintenance within the care-dependent community. The key issues observed, researched and conceptualised in this project cannot be subject to innovation without input, inspiration, co-operation and evaluation by design experts, end-users, as well as healthcare and innovation sectors. SISCODE, as presented by Cube Design provides an optimal breeding ground for hands-on design experiments and prototyping design in uncharted territory. Because of the diversity in needs and changes in both mental and physical fitness of the wearer, providing clothing that is both practical, durable and indicative of personal style is

an ongoing, but important challenge. A co-creation equilibrium creates a nourishing environment for both problem indication, research and prototyping.

In developing the prototype, it became clear that solutions in the form of clothing adjustments are not limited to fit, but to the 'dress-ability' of the wearer. This means that the clothing must be able to change shape in a wider range than regular clothing, and still move back into its fitted form. Not all researched solutions were equally viable. For instance, 3D printing would be a great solution to customized shapes that could, by folded design, still allow a wide range of adjustability, but cost as well as appropriate material options were found to be too limited. Furthermore, the project leaders had limited experience in textiles, especially in the context of 3D printing.

Similarly, smart-fabrics (in which digital circuits are incorporated into the fabric) could be programmed to change shape on-demand. However, designing them into an appropriate solution for the prototype was not deemed viable within the set timeframe, and therefore not adopted into the final phase. Furthermore, more specialised lab-environments and additional expertise would be required to fully develop smart-fabrics into a prototype. Instead, the project leaders settled on a prototype based on a specially designed pattern, which could be worked out on a sewing machine.

Due to the non-profit, majority student/ citizen-based nature of Fine Feathers, there is no legislative involvement. A network was created based around the availability and interest of the stakeholders. Communicating, involving and inter-connecting the stakeholders throughout all development phases have proved challenging and not always necessary, as the expertise of each stakeholder is limited. Nevertheless, facilitating network communication, project updates and review-moments could be presented through – for instance social media solutions.

Though the project is currently considered completed, the start-up environment is the ideal growth-environment for the future of Fine Feathers Make Fine Birds. In the future, it is advised that co-creation projects with obvious market viability are introduced and embedded in the (local) start-up ecosystem from an early phase. This would foster the co-creation and co-design method and facilitate a natural transition from concept to an actual Minimal Viable Product.

Management & Organisation: Who interacts how to facilitate co-creation?

Much effort was put into gathering information from all different stakeholders on all levels of development. Particular attention was paid to gathering expertise from care-dependents, carers and design experts. The project leaders generated a network of volunteers, students, care-dependent people, care providers and designers, based on availability, personal commitment and expertise. All input was reviewed by the project leaders and used to inform each phase of the project. The Cube Design Museum has provided instrumental access to volunteers, resources, SISCODE-methods of innovation and lab space. Going step-by-step: in the 'Ask'-phase, care-recipients, carers, design students and healthy participants were interviewed and (when possible) invited to brainstorm to formulate a base-focus of key innovation. This generated a broad spectrum of insight into both problems and potential solutions.

In the 'Imagine'-phase, Design Thinking as presented by Guido Stompff, was utilised to focus the next steps in the project, and to facilitate co-creation. Several context enquiries were performed with care-dependent people, informed by the six developed frames. This steered the process toward the viable solutions for a prototype and lead to a focal point for a final round of research. Various solutions to the adjustability of clothing were researched, and the most viable solution – patterning was adopted as the focus of the prototype. Co-design and co-creation with designer Reggie Flippo made the prototype come to life.

Designer Reggie Flippo is considered a particularly valuable asset to Fine Feathers Make Fine Birds, as he is the only project partner to have prior experience in manufacturing clothing for care recipients. Additional access to his network would have been helpful, as well as co-creative efforts from commercial manufacturers. Beyond manufacturing stakeholders, involvement of the start-up-ecosystem (such as Brightlands Innovations) could lift the project from a concept toward implementation-stage. Involving these additional stakeholders early in the project could facilitate their involvement and enthusiasm about the viability of the project. Beyond additional co-creation and design inspiration, additional manufacturing and start-up stakeholders would deliver expertise on future product development, marketing, visibility and investment opportunities. Especially local care-providers as well as care-manufacturers (e.g. Easy-Life, MediReva) should have a very low threshold to participate.

In addition to this, project leaders could have utilised social media resources to provide updates and call on reviews/ feedback from stakeholders involved in earlier stages could have provided additional reflection insight, which is currently not available. Streamlining visibility of the process could be extremely helpful in the co-creation process and facilitate communication in both directions. Stakeholders, especially volunteers, should be allowed to choose when and how they wish to participate by the project as much as possible. Finally, stronger (online) project visibility can serve as a 'tangible' example to communicate general awareness, as well as the urgency of the need toward legislative effort, as well as policy and platform development. As care-providers, manufacturers and facilities are often inter-connected with local and national health policies, awareness of the project in public and private corners of care-sectors would be instrumental in continuation of development.

What are the concrete processes and practices of co-creation?

Co-creation was utilised in each phase of the project. All key-stakeholders were introduced during a preliminary kick-off-session. In the 'Ask'-phase (analogous to Problem Identificaction/ Understanding), interviews were conducted with citizen-stakeholders, students and care-recipients. Brainstorming sessions in this phase invited design students of MaFaD, working on similar subject matter. These brainstorms generated the first prototypes in the second phase. Care-recipients and carers were contacted either through the network of Yvonne van Leeuwen, or by open invitation of the project leaders.

Inclusion of stakeholders happened on a semi-structured base, with active invitation of care-providing institutions, local design education (Maastricht) and visitors to Cube Design museum who agreed to an interview. In total, a few hundred people were interviewed, to varying levels of depth. The enthusiasm and commitment of volunteer participation is not only valuable in quality, but also indicates the societal relevance of the project. Interviews and context enquiries with care-recipients are the most valuable to the project, as they represent the end-user of the prototype. However, contacting, organising and taking interviews with care-dependent volunteers proved to be very time consuming. In a (potential) second iteration of Fine Feathers, more time should be assumed in order to yield as much useful information as possible.

In the second phase 'Imagine', brainstorming with volunteers continued, and co-creation

was represented by adoption of the Design Thinking structure, provided by Guido Stompff, who is an associate of Cube Design. This resulted in a set of 'frames' that provided perspective on how to focus research toward an optimally innovative prototype. Brainstorm-summaries and images gathered in the initial phase were integrated into problem statements, mood-boards and early prototyping. The subsequent in-depth research was guided by the problem statements. Feasibility of solutions to be incorporated into the final prototype were discussed under the guidance of Reggie Flippo, who's expertise and manufacturing assistance represents the co-creation of the 'Create'-phase, which delivered the final prototype – a shirt created around patterning innovation. To conclude the final project phase, verification and testing of the final prototype happened in the form of an analysis by the project leaders. Time did not permit a review by care providers, which is considered a limitation of the project. No stakeholder is considered irrelevant in the Fine Feathers-project, if anything the project leaders would have preferred a more intense interaction with stakeholders from different industries. Unfortunately, clothing-design expertise specific to care-dependent consumers is quite uncommon. Furthermore, earning the trust of care-recipients proved quite difficult. Because of the nature of the project, it is of vital interest that the project leaders are able to create context enquiries based around a very intimate part of the life of care-recipients. This requires a considerable level of mutual trust between project leaders and care-dependent stakeholders. This trust is ideally achieved before the context enquiry. It would be helpful for future project leaders to receive some preliminary training in communication and interview technique with the disabled community.

One of the biggest challenges of this, and indeed any conceptual project, is appropriate expectation management. Because the outcome of the project is by its nature unknown, it invites key stakeholders to base their outcome expectations around their personal context. An able-bodied design student can be expected to have a different perspective on necessary innovations than a stakeholder in permanent care. In turn, care stakeholders will have little perspective on assessing the practical constraints on design and manufacturing.
In order to contain and unify project focus and possibilities it is important for all stakeholders to be aware of the value, but also the unique-ness of their desires and expectations. Expectation management is recommended as part of the ongoing maintenance of innovation.

Specification: What tools and instruments are/ were used to co-create?

As detailed in previous sections, several tools were utilised depending on the expertise of the stakeholder. Brainstorming, ideation and interview techniques were used to facilitate co-creation between the project leaders, the volunteer visitors, students, carers and care-dependents. Design Thinking was applied in the second phase to guide the formulation of key points of innovation, and focus research toward initial prototyping and practical solutions.

Project presentation was used in the second and third phases to communicate research to stakeholders, and to generate feedback from volunteers. Experimentation, research and testing during these phases were performed at Cube Design. Context enquiries were done during the second phase in the form of visits to several care-dependents and interview them as well as observe their process of dressing. These reports were then used to refine the research focus.

 Finally, testing and review of the final prototype was done by the project leaders, as time and funding did not permit additional review by care-recipients. Furthermore, the project process was communicated to Cube Design as 'Design Maps' in order to inspire and inform future co-creation projects.

Finally, additional attention to the visibility of conceptual co-creation endeavours would be worthwhile in order to extend public interest, create public and legislative traction, and attract additional stakeholders from care-recipients to start-up environments. Visibility is instrumental in the continuation of concept-projects to end-products.

Which learnings emerged?

When working on a conceptual project with various stakeholders and no set outcome, communication is the only point of reference.

 Effective, efficient and encouraging communication can be considered both a science and an art. Looking back on the development of Fine Feathers, what stands out in learnings are expectation management and the level of trust required in building rapport with care-dependent stakeholders. Both of these reference back to effective communication. However, even if all the preliminary factors are in place, friction between stakeholders can

still arise. This was observed in connecting to the design students at MaFaD. Though they were working on a similar project with the same interest and commitment, the physical distance from these stakeholders to the project location in Kerkrade proved too challenging for this group, which prohibited extended co-creation efforts. This caused this group to discontinue their participation in the second and third stage of the project.

Furthermore, given the instrumental value of insight into the diversity of needs and requirements, a strong care-dependent base with varying levels of dependency is necessary and there is a lot of valuable additional research left to be done. Connecting to this target-group requires a larger-than-average investment of attention and communication. As mentioned, additional education of project leaders in patient-communication would benefit the quality of information yielded form the context enquiries.

The value of the co-creation environment has proved to be of significant value, as it accepts 'failure' as a natural part of the process. Project leaders have been able to adapt their vision to suit the needs of the project, and indeed adapt their creative thinking to different sections in the process. Critical points of view for instance, are not as helpful in the 'Ask'-phase, as they are in the 'Create'-phase. Beyond strong communicative integrity, leaders must be well equipped and well aware of their required flexibility of thought.
Finally, the project leaders would like to stipulate the value, but also challenge of on-going communication and networking with relevant stakeholders in later phases of the project, especially those connected to manufacturing and health care. Their reflective input and involvement can provide additional solution-oriented knowledge, but also provide additional options for funding, which is instrumental in order for Fine Feathers to continue.

Providing an on-going and lively involvement is especially useful for financial stakeholders, to be able to comment on whether the project is still in alignment with their aim and to remain excited about their involvement in an innovative, meaningful process.

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<u>Project Leaders</u>
Professor Yvonne van Leeuwen (1951 – 2019)
Lisa Wisse
Danielle Ooms
Reggie Flippo
Cube Design

<u>Additional Stakeholders</u>
Visitors of Cube Design during the project period,
Students of MafaD,
Caretakers and recipients at Verpleeghuis Valkheim (Valkenburg)
Caretakers and recipients at an assisted living facility (Helmond)

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Instituut

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REMODEL | Denmark

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*REMODEL is an initiative from Denmark to explore how manufacturing businesses can use
open source methodology and principles to develop environmentally sustainable and
economically sound business models in the manufacturing of physical products. Together
with international and Danish experts, the Danish Design Centre has explored how to
design competitive business models for manufacturing companies based on open source
principles.*

What is the project/ initiative all about?

In 2015, the Danish Design Centre (DDC) hosted a workshop in Copenhagen investigating
the future of fabrication for manufacturing companies. The workshop resulted in the
REMODEL programme, initiated by DDC, with the main objective to explore how
manufacturing businesses can use open source methodology and principles to develop
environmentally sustainable and economically sound business models in the
manufacturing of physical products. As Denmark's national design centre, it is DDC's
mission to promote the use of design in business and industry, to help professionalise the
design industry and to document, promote and brand Danish design in Denmark and
abroad. DDC do this by teaching companies how to use design to develop innovative
products and services that contribute to growth and welfare. DDC matches the companies

with the right people, and train them in design methods and tools. Finally, DDC collect and share knowledge about design and the value it creates in Denmark and the world.

DDC works on a number of initiatives for public and private actors in areas such as health, innovation, cities, business transformation, policy and much more, with an objective to promote the value of design for Danish businesses and industry. The main way they do this is by giving companies and organisations an opportunity to test how design practices can boost innovation and development. This case is an exemplification of one of these initiatives. DDC's top leadership is a board comprised of up to eight members with specific personal qualifications from business, industry and design (including industrial design, communication design and service design) that contributes actively to the DDC's mission. Day-to-day leadership is handled by the chief executive.

REMODEL was initiated, funded and organised by DDC. During the project, several open source experts as well as manufacturing companies were involved in the development of a final toolkit. This was done through several user tests with companies (the end user), as well as co-creation sessions with open source experts such as Diderik Van Wingerden from Think Innovation and Jaime Arredondo from Bold & Open. Hence, co-creation has been an essential driver for the development of the REMODEL project, as well as the conceptualisation of the final toolkit. Co-creation is by default an overall working principle for DDC when creating new projects. In the REMODEL programme, these over-all working principles are supported with several organised and planned co-creation approaches (see above) ensuring that the final toolkit is created in line with the emerging trends and needs of the end user.

The toolkit is an eight week design-driven process that gives companies a strategic understanding of the concept of open source and the business potentials in the specific industry. Through design methods, the toolkit helps companies envision and ideate a new business model, based on a value creating eco-system supported by a platform. It contains guides, video tutorials and a peer to peer support forum which allows a company to not only fully direct their own transformation journey, but also to do so from their own location. Moreover, it contains business cases of the ten companies that went through the original REMODEL programme.

The societal challenges addressed in the REMODEL project relates to intellectual property rights and the change of society into a more inclusive, innovative and reflective society.

With the growth of new global platforms and digital communities, new potentials for broad knowledge sharing and new ways to develop and distribute products and services appear. Open source is an important prerequisite for collaborative development and sharing of knowledge. By embedding open source principles into the development of new business models, companies can find ways to drastically minimise development costs, by drawing on crowdsourcing, creating powerful user-driven communities, securing funding in new ways, outsourcing distribution or maturing a new market. Using open source as a steppingstone for business model innovation, REMODEL addresses the cross-cutting issues of open access and data management and intellectual property rights.

Context and environment: Where does it all take place?

REMODEL was initiated by DDC and eventually funded by the organisation. DDC is primarily funded by the Ministry of Industry, Business and Financial Affairs meaning that funds being appropriated to specific projects is subject to an MRP (measurement and result plan). The MRP exists to ensure the most efficient use of taxpayer money. As one of these projects, the frame and objectives of REMODEL was thus measured against the probability of reaching the predefined goals of the project. Combined with the results from the final test, this pose the data basis for assessing the success of the programme.

The main mission of the Ministry of Industry, Business and Financial Affairs is to create competitive and innovative conditions for growth. In this context, REMODEL acts as a programme that helps Danish companies create a competitive and innovative business model through open source principles enabling them to grow their business.

In line with the ministries focus on growth through innovation, the background of the REMODEL programme is an extensive focus on the possibilities of open and inclusive ways of conducting business. The open source label comes from the software development world and refers to a more decentralised model of production, in contrast with more centralised models of development such as those typically used in commercial software companies. A main principle of open source software development is peer production, with products such as source code, blueprints, and documentation available to the public at no cost. This model has proved increasingly powerful in producing software products that not only manage to compete with proprietary software in quality, design and functionality, while at the same time creating economically sustainable companies and hundreds of thousands of

jobs. Thus, by applying open source principles, it is the hypothesis of REMODEL that Danish companies will be increasingly competitive and able to accelerate the innovation within the firm.

In order to provide the best possible match between companies and innovation and design agencies, one of the core values of the projects initiated by DDC is collaboration. Collaboration serves as the cornerstone of every project both in the creation and execution of the initiatives. Thus, one of the main focuses of the REMODEL programme is to secure the best possible outcome by working together with companies and experts to co-create the final toolkit.

Brief outline of the project/ initiative's pathway

The REMODEL project was kicked off with an ideation and research phase, stretching from January until May 2016. During this phase, DDC reached out to experts in the field to gather knowledge about current trends and relevant initiatives in the open source hardware field, as well as to learn about existing/ ongoing work around the same topics. Most importantly, this phase sought to identify leading actors in the field in order to put together a working group of experts, who was interested in contributing and potentially becoming part of the project as partners or collaborators.

Furthermore, DDC identified and liaised with a quantity of Danish manufacturing businesses that was interested in amending open source principles in their business model. These companies where recruited through DDC's extended network within the maker movement. The ideation and research phase were concluded with the formation of the conceptualisation expert working group and informal and nonbinding agreements with Danish manufacturing businesses.

The next phase of the programme was a conceptualisation phase, stretching from June to October 2016. In this phase, the working group committed and conceptualised the structure of the project in order to establish the ideal foundation for running a pilot as well as to create an outline of what resources were needed, and to set roles of an executive working group. Members of the working group were naturally offered the opportunity to join this group. During this phase, DDC furthermore researched fundraising options and prepared applications for funding with help from the expert group.

The third phase of the programme was the fundraising phase where a number of applications were made and sent out to relevant funding bodies. This was a tipping point for the REMODEL programme, as no funding bodies accepted the applications resulting in DDC becoming the only financial contributor. This furthermore resulted in DDC becoming the project coordinator and only executive organisation with the initial working group acting as providers of expert knowledge in the development of the programme, as well as taking the role of being open source mentors for companies testing the final toolkit.

After the project funding was secured, a preparation phase was initiated to develop a new design toolkit, focusing on open source business model innovation. Beside the creation of the toolkit, this phase also included multiple tests of the format in collaboration with manufacturing companies. These companies were recruited through DDC's network within the fablab and maker movement. Each of these tests provided crucial insights on weaknesses and faults that helped the project team iterate and refine the toolkit.

In line with the focus on end user inclusion, the final toolkit was tested with ten Danish manufacturing companies. This test where to provide insights and learnings on the effect of the toolkit for different markets and businesses. Because of the focus on open source, the recruitment of the ten companies turned out to be challenging. For many companies, open source business models pose a radical shift in the way they do business. Thus, open source is often considered to be a major challenge and is consequently viewed as irrelevant in the particular business context. The challenge was to convince the companies, that open source business models could potentially be a tremendous business opportunity.

The final part of the REMODEL programme was to share the test insights and launch the toolkit at a conclusive conference. The work in all phases, including the actual executive work in the pilot phase as well as the following implementation, was documented extensively and made available to the public under an open license to ensure that the learnings can be applied broadly by any company worldwide wanting to test the principles for themselves. By applying such transparency, the intention is to enable the project to scale massively beyond the stakeholders directly involved.

Management & Organisation: Who interacts how to facilitate co-creation?

As already mentioned, DDC acted as the coordinator of the initiative as well as the only financial contributor. This had excessive influence of the management procedures of the project, as the project management was entirely organised by DDC. The initial aim of the project was to create an eco-system of partners collaborating and contributing to the project. As the project did not succeed in getting external funding, the only financial support came from DDC's MRP. Consequently, there was no funding for potential partners to take an active and managerial role in the initiative.

With DDC as official and operative project manager, the collaboration with external stakeholders was primarily focused on gathering expertise knowledge within the field of open source to co-create the REMODEL toolkit. This was done through several events organised by DDC, including initial research and scoping workshops and co-creation sessions. Other than that, an essential role of the external stakeholders was to act as mentors during the test of the final REMODEL toolkit. The stakeholders were paid for this contribution by DDC. During the test pilot, DDC managed the contact between companies and mentors as well as combining the ideal expertise with the right businesses.

REMODEL was managed by a programme manager from DDC, responsible for the progress of the project. The development of the final toolkit was planned and created by the programme manager in collaboration with a project assistant, as well as several different employees from DDC with an expertise in video and graphics. As mentioned, two key actors where invited in the early stages of developing the toolkit, in order to secure a thorough implementation of the different elements of open source.

Ten companies took part in testing the final toolkit. These companies applied for the test through an open call and were then selected by DDC. The open call was managed through DDC's own website, as a blogpost. However, the recruitment of companies turned out to be challenging, hence, the open call was supported with manual phone calls, telling companies about the initiative and how their business would benefit from participating in the programme. After the initial recruitment process, a selection process was conducted based on the criteria stated in the open call. The selected companies then signed a formal contract with DDC, in order to ensure that the results and insights from the test was publicly available. Sharing the insights from the test was a crucial part of REMODEL, as the

initiative seeks to uncover the potential of applying design methods in developing new open source business models for manufacturing companies.

What are the concrete processes and practices of co-creation?

Before the REMODEL initiative was launched, DDC hosted a workshop inviting a broad array of professionals stretching across areas such as sharing economy, circular economy, business development, business counselling and technological research. They were furthermore joined by one of the biggest international experts in the field, Dr. Peter Troxler from Rotterdam University of Applied Sciences, who has been researching open business models for several years and who also has a practical background from several production companies. The aim of this co-creation workshop was to identify new possibilities for projects to be formed by and with DDC. Hence, this workshop can be seen as the key practice of establishing and understanding the problem of the initiative.

Through discussion during the workshop, it became clear that the participants in each of their networks are experiencing lots of curiosity towards open source principles in business contexts, but also that there is a lot of insecurity and scepticism towards the sustainability of basing your business on open source principles.

Through a series of design practices, the participants were taken through a brainstorming phase where they were asked to write down their thoughts, visions and ideas around open source business models. More specifically, they were asked to come up with concepts for concrete projects which they would like to see taken into action and which they could imagine being feasible through the combined efforts of the participants, DDC and other interested parties. The result ended up being REMODEL. The final project proposal and the funding application was formed by the DDC based on the inputs and knowledge gained through the initial workshops.

After the initiative was formulated, a series of co-creation sessions happened over the next year. The ideation and creation of the early prototype of the REMODEL toolkit was conducted internally by DDC and afterwards tested by the Danish stereo company Bang & Olufsen and the Danish tool manufacture Thürmer Tools. These tests acted as the verification and invalidation of different early hypothesis and created the empirical foundation for the later ideation and prototyping of the next versions of the toolkit. During

the test, companies were asked to give feedback on the different methods and tools used in the programme. After each test, DDC executed another ideation and prototyping phase, focusing on implementing new insights into the toolkit.

Two of these iterations where conducted before the creation of the final toolkit was initiated. The final toolkit took all the feedback and insights into account and was developed in collaboration with Diderik Van Wingerden from Think Innovation and Jaime Arredondo from Bold & Open. To test the final toolkit before the pilot launch, DDC hosted a one-day event inviting relevant students and companies to try the toolkit. Based on the test, minor details were changed as well as two new tools implemented.

Specification: What tools and instruments are/ were used to co-create?

DDC invited two external stakeholders to co-create the final toolkit. This happened in a two-day workshop, hosted and facilitated by DDC. During these two days, several different tools where used to facilitate co-creation.

The first tool that was used was user journey mapping. A user journey map seeks to answer one fundamental question: How do people actually use our product? It is a fundamental question that every product creator must answer. In order to answer this question, one need to understand the essence of the whole experience from the user's perspective. User journey mapping is an excellent exercise that can shed light on that. A user journey map is a visualisation of an individual's relationships with a product over time and across different channels. While user journey maps come in all shapes and formats, commonly it's represented as a timeline of all touch points between a user and a product. This timeline contains information about all channels that users use to interact with a product. Normally, a user journey map is used to shed light on a service/ product that already exists. In this initiative, DDC used user journey mapping as a tool for developing a new toolkit. The method was used to envision a process where a company went from having no prior knowledge about open source, to having a tested prototype of an open source business model. This became the starting point of deciding the structure and elements of the REMODEL toolkit.

After deciding on the different touchpoints of the toolkit, DDC used a method called reverse engineering to concretise the different tools that should be implemented in the final toolkit.

Reverse engineering is normally referred to as the process of examining an existing product in order to copy it. In this initiative, the method was used to examine the existing prototypes of the toolkit, in order to decide which methods should be implemented in the final toolkit, as well deciding the structure of the programme.

An essential part of the test pilot of the final toolkit was the collection of insights about the effect of the initiative. Several methods where used to collect data, including qualitative interviews with each company after they finished the toolkit and observations of the companies working with the toolkit.

The insights from this enquiry where used by DDC to establish the outcome for the test companies, as well as creating a knowledge foundation on how to use design methods to create open source business models.

Which learnings emerged?

In the case of REMODEL, a key learning is that the stakeholders of the initial framing workshop have a significant strategic role influencing the entire co-creation process. By inviting a broad array of professionals, REMODEL concretised a radical and innovative focus for the initiative. This is one of the project's greatest strengths but also serves as one of the barriers. During the development of the initiative, REMODEL faced significant challenges in securing funding. Moreover, only highly innovative companies showed interest in being a part of the REMODEL test pilot. It is not possible to give any conclusive remarks, but there is reason to believe that many of these challenges could have been anticipated by inviting companies and fundraising experts in as key actors in the framing of the initiative and writing of the funding application.

The development of the REMODEL initiative further shows the significant power of co-creation, particularly in the development of a radically new approach to business model innovation. By inviting key experts to co-create not only the focus of the initiative, but also the structure, methods and tools, one can achieve a highly successful framework with the end user as turning point.

References

Interview

Mads Ohland-Andersen (Danish Design Centre, project assistant)

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Eva Wascher (TU Dortmund University)

Sliperiet is a cross-disciplinary, collaborative and experimental platform at the Umeå Arts Campus of Sweden. It is a place, where researchers, businesses, students, entrepreneurs and otherwise creative people meet to develop and realize ideas. At Sliperiet boundaries are crossed; between art and science, between academia and businesses, and between the now and the future.

What is the project/ initiative all about?

Sliperiet has been an organisational unit of Umeå University (2014-2019)[1] functioning as a cross-disciplinary, collaborative and experimental platform located at Umeå Arts Campus. It was a space where inter- and transdisciplinary projects were developed and conducted. Furthermore, it provided a shared working space for students and employees of the University in the area of creative industries, and was also open to non-university organisations that could rent offices as well as workshop rooms and studios. Among other things, a cultural workspace of the city of Umeå was located there. Sliperiet was located on the Arts campus of the University in a building that could be rehabilitated by a generous endowment and was given to the University to create a place that allows for 'cross-border experimentation and collaborative work'. The target groups were mainly scientists who want to work more interdisciplinary as well as young entrepreneurs, students and creative people. Sliperiet offered various programmes for networking and cooperation that support collaborative work. There were several labs and studios for media production, textile design and also a workshop with 3D printers that could be used publicly. The venue and spaces were designed to promote sharing of project ideas and joint events (including

workshops, lounges, kitchens, cafes). Sliperiet followed an 'open innovation' approach by promoting a culture of mutual exchange of knowledge and experience and, in principle, was open to all interested parties.

In 2019, Sliperiet merged with Umevatoriet, a science education centre of the University and the Municipality of Umeå. Since 2020, the new organisation is called Curiosum. It is a science centre and makerspace dedicated to increase interest in and knowledge of science and technology in children, young people and the general public.

Context and environment: Where does it all take place?

Umeå is a city located roughly 400 kilometers south of the Arctic circle and 600 kilometers north of Stockholm in region Västerbotten. It is the province capital of region Västerbotten (Västerbotten County). The region is part of northern Sweden (also known as Norrland), a rather sparsely populated area. There are around 123,000 people living in Umeå and the city ambitions to have more than 200,000 residents by 2050.[2] Over the past decades, Umeå as a city and Umeå University have both been growing and their development is closely related. Today, there are 34,759 enrolled students in the university, with a variety of more than 60 nationalities. Umeå University is a comprehensive university covering research and education in medicine, science and technology, social sciences, arts and humanities, and educational sciences. Furthermore, the University Hospital of Umeå (Norrlands Universitetssjukhus) is an important organisation for the city and the region. It is governed by Region Västerbotten and responsible for providing specialist health care for almost 900,000 inhabitants in an area covering roughly 59 percent of Sweden's total area (Norrland)[3].

The land where Campus Umeå is today had long been used for winter grazing by local Sami reindeer-herders. Back in the 1950s Umeå established a dental school that led the way to higher education in the city which was followed by launching a teaching hospital. After decades of national parliamentary debates about the need for a university in northern Sweden, Umeå University was finally inaugurated in 1965 and started with about 2,000 students[4]. The decisions for opening up a university changed the course of the city's history and eventually transformed Umeå into northern Sweden's largest urban community. In the early years, the geographical and cultural distance to the traditional universities of central and southern Sweden was more evident than today. At Umeå University, a distinctly non-

hierarchical and collaborative culture evolved. The university has also been characterised as 'the left-wing university' [5] Today, the cohesive campus environment enables a dynamic and open culture with a strong sense of community, providing students and staff with unique opportunities for learning and development and with a third mission to simultaneously serve society with new knowledge and creative citizens[6].

As part of the long-term development of the city – both culturally and socially – to create new meeting-places, networks and international collaborations the municipality decided in a long and participative process starting in 2010 to apply for European Capital of Culture. With a co-creative strategy of programme planning with many stakeholders all over the city and region, Umeå was successful and became European Capital of Culture in 2014[7] All activities in 2014 were arranged by associations, organisations, cultural institutions and other players who received support from Umeå2014 but also contributed on their own account. This ensured that many of the capital of culture projects would continue after 2014. Furthermore, the success in Europe boosted Umeå's recognition as an attractive and innovative city. As one of many follow-ups the city decided to apply for European Capital of Innovation (ECoI) 2018. On the Innovation Capital campaign website the city emphasises that Umeå is often described as a progressive, aware and gender equal city. For decades, gender equality has played a central role in the development of Umeå not only as a politically adopted goal. For example, the city is working innovatively with gender equality in its city planning. Finally, Umeå did not win ECoI 2018, but finished as runners-up joint with the finalist cities of Århus, Hamburg, Leuven and Toulouse.[8]

Following this, Umeå decided to focus and promote 'social progress in cities' and developed a call for a European Capital of Social Progress Award. This award will acknowledge progressive cities with inclusive strategies for fairer, healthier and more balanced societies. Innovative cities should harness diversity and embrace the young, the old, women, men, differing ethnicities and origins, abilities and lifestyles. The Call for a European Capital of Social Progress Award was signed by ten cities and organisations in connection with the 1st Social Progress Cities Summit, held in Umeå on 16th and 17th of September 2019. It is open for any city and organisation that supports the cause to sign[9].

Brief outline of the project/ initiative's pathway

Besides the main campus area, Umeå Arts Campus has been developed as the second campus site. It is a highly creative environment that brings together the university's art colleges (Umeå School of Architecture, Umeå Institute of Design and Umeå Academy of Fine Arts) and Bildmuseet which is the university museum of contemporary art and visual culture. The campus site has been established in 2010 and is located close to the city centre by Umeå River. Arts Campus is a unique environment for research, education and events within architecture, design and art. Sliperiet has been founded in 2014 in this environment[10]. Although Arts Campus consists of new buildings, there was one old building from 1909 which used to be one of the first large industrial businesses in Umeå, for mechanical paper pulp production. The manufacturing shut down in the 1950s, after which the building was used by other industries. In 1986 it was refurbished to host Umeå Academy of Fine Arts. With the extension of Umeå Arts Campus, the building was newly refurbished and became 'Sliperiet', a space for collaboration and innovation in 2013/ 2014.

Sliperiet was meant to be a cross-disciplinary, collaborative and experimental platform at the Umeå Arts Campus but for the whole city. It is was a space where researchers, businesses, students, entrepreneurs and creatives met to develop and realise ideas. At Sliperiet boundaries were crossed between art and science, between academia and businesses. Sliperiet initiated, supported and facilitated innovation, collaboration and research projects. Prototyping labs and studios for visualisation and media production equipped with powerful digital production technologies were made available to academia and business. 'eXpression Umeå', a business incubator for creative industries, was located on the top floor along with office spaces available to rent for researchers, students, creatives and entrepreneurs. The spaces were designed to stimulate exchange of ideas and collaboration and the workshop spaces and studios were based on open innovation and a culture of sharing knowledge and experience. In effect, Sliperiet wanted to create a unique environment with norm critical perspectives, supporting diversity and equal opportunities.

Since 2014, Sliperiet started a couple of projects and initiatives of which some are still ongoing. Sliperiet acted both as a site and as a catalyst for research and innovation. The team developed research areas and projects together with all faculties at Umeå University, and initiated and ran collaborative projects with a large number of industries, as well as public and third sector partners. Altogether, four PhD students had been employed through projects, in the areas of Business, Informatics, Applied Physics and Engineering as well as a

number of post docs. Sliperiet had been very active in initiating new cross disciplinary collaborations. During 2016 they either initiated or participated as key partner in fifteen larger applications, with more than thirty partners in academia and industry. Sliperiet has been working on the topics of sustainable city development and sustainable consumption, open innovation and related processes, digital fabrication, software for future customised fashion design, disruptive and norm creative innovation, co-creation in design, making and makers' movement, digital and sustainable business models, industrial digitalisation and big data.

Sliperiet has been a virtual and a physical place for collaboration offering a workplace with a mix of different competences and a well-designed infrastructure for co-working. The aim was to be a breeding ground for new constellations and collaborations. To this end, Sliperiet offered office space to companies, organisations, researchers, creatives, thinkers and makers. This included: eXpression Umeå as well as Kulturverket among others. 'Kulturverket' is a municipal institution of the city of Umeå and is additionally funded by the Swedish National Heritage Fund. The aim is to promote the creativity of children and adolescents. On the one hand, there are programmes in which children and young people plan joint exhibitions, concerts and shows together with professional artists of various disciplines (including music, theatre, film, animation and photography). On the other hand, there is a programme in which the students learn to express scientific findings in an artistic way in order to develop a new approach to their own learning processes. In doing so, Kulturverket cooperates with scientists from the university who give lectures about their research and then discuss with the children and adolescents the larger social context of research. This is followed by the creative visualisation phase, supported by employees of the Arts Campus. Another project example is 'eXpression Umeå', a programme that supports artists, designers and other creative people in the realisation of their project ideas. It is a start-up programme specially developed for the creative industry, which promotes the creation of distinct profiles of young artists through repeated tests and further development of their project ideas as well as continuous advice. 'eXpression Umeå' is a member of the national association SISP - Swedish Incubators & Science Parks.

Innovation+ was an ERDF funded project for creating long term sustainable structures for innovation in health care. The participating public and academic partners developed support systems for innovation within healthcare, resulting in more products and services through a faster and more effective path from research to market. The aim was to make

relevant networks, knowledge and technology more readily available to healthcare workers, academics and companies active in the sector. Sliperiet's prototyping facilities were used for testing ideas at an early stage through visualisation, model making and product prototyping. Partners in this project included Västerbottens läns landsting, Regionförbundet i Västerbotten, Umeå University, the three largest municipalities in the region and a number of commercial partners.

The aim of the project Innovation Park North was to develop a unique online Makerspace with virtual and physical nodes in the countryside and with Sliperiet as the main node. In addition, an open demonstrator, prototype and development laboratory was developed for the purpose of bridging geographical, technical and social distances that may exist between sparsely populated and urban areas. Innovation park North was a close cooperation between Sliperiet and Region Västerbotten (project lead). The project is part of a development of methods for open innovation and co-creation at Sliperiet together with the Innovation Loop, an innovation system that Region Västerbotten has successfully developed and operated since 2013 (see case study Innovation Loop Västerbotten). In the Innovation Loop annual cycle, entrepreneurs, students, decision makers, other community actors and citizens engage in a series of workshops and events with everyone's contribution of creativity, participation and learning. Similarly, the concept of Innovation Park North[11] consists of the following three main parts:

1) Pre-workshops where citizens gather locally, in villages and smaller communities, to be inspired by the possibilities of digital technology, as well as to formulate experienced challenges and ideas for solutions for local community building (including pilot villages Norsjö, Storuman and Vilhelmina in the county of Västerbotten). The results of the workshops, in the form of 'engaged' and interested individuals and ideas, are taken further into the proven process of the Innovation Loop.

2) Makerspace online is a distributed laboratory environment online, allowing citizens to take the needs and ideas that emerged at the pre-workshops to demonstrators that help to visualise the solution ideas. The Makerspace, which is gradually built up, includes a mobile FabLab.

3) Mobile FabLab has a basic infrastructure for small-scale digital manufacturing - 3D printers, some hand tools, electronics, soft electronics, sewing machine, knitting

machine, smart materials, vinyl cutter, plotter cutter, smaller CNC machine, etc., which can be moved on wheels to the three pilot villages.

In late 2018 the university and the city decided to merge Sliperiet with Umevatoriet in order to become a new organisation called 'Curiosum'. Curiosum is a science centre and maker space for children and adults to get inspired by and to explore science and technology[12]. It aims to create unique learning opportunities so that children and young people have the opportunity to identify and develop their interests. Furthermore, Curiosum wants to stimulate interest in science, technology, innovation and entrepreneurship to help society meet future challenges. Furthermore, it wants to offer a meeting place for collaborations between the public, school, business and academic research that creates reflection and new perspectives, thereby focussing on 'technology and science at the forefront' as well as societal challenges and a creative environment.

Management & Organisation: Who interacts how to facilitate co-creation?

The operation of Sliperiet was mainly funded by the University for the rent for premises and core staff (about two and a half staff for management and assistance). An external financing for the realisation of projects was necessary, whereby the acquisition was task of the management. Its third-party funding mainly came from Tillväxtverket (Swedish growth association), EU (ERDF), Vinnova (Swedish innovation agency), Hakon Swensons Foundation, Umeå Municipality, Region of Västerbotten, Stiftelsen Marcus och Amalia Wallenbergs Minnesfond and the Balticgruppens donationsstiftelse. Furthermore, the organisation leased parts of its working spaces to members of the university (small fee) and external actors (higher fee).

Between 2014 and 2019 Sliperiet had a growing team consisting of a Research Leader, a Process Coordinator, a Communication Officer, a Facilities & Community Manager, a Project leader, Research Engineers, a Computer technician, a Creative Director and a Director for both organisations Umevatoriet/ Sliperiet. The Steering Committee was designated by the principal of Umeå University. It had the following composition in 2018:

- Pro-vice-chancellor Umeå university (Chair);
- a manager from the External Relations Unit;
- President, Pre- and compulsory school board, Umeå municipality;

- Growth director, Umeå municipality;

- Researcher, Department of Historical, Philosophical and Religious Studies, Faculty of Arts;

- Professor, Department of Psychology, Faculty of Social Sciences;

- Professor, Department of Clinical Microbiology, Faculty of Medicine;

- Professor, Department of Chemistry, Faculty of Science and Technology;

- Associate professor, Department of Science and Mathematics Education, Umeå School of Education.

In 2020, Sliperiet merged with Umevatoriet into Curiosum, a new science centre and maker space[13]. Curiosum is a unit at Umeå University that is funded by Umeå University in collaboration with Umeå Municipality. The Curiosum initiative is made possible by a donation from the Knut and Alice Wallenberg Foundation, which through the Wisdome project makes a national investment in scientific visualization[14]. The science centre is led by a manager who is responsible for day-to-day operations, and a steering group responsible for the direction of the business, business plan and budget[15].

What are the concrete processes and practices of co-creation?

One of Sliperiet's major projects was 'Den koldioxidsnåla platsen' (the low-carbon place). The project was implemented in a collaboration between Umeå municipality and Umeå University. It started in late 2016 and ended in autumn 2019. Den koldioxidsnåla platsen was funded with an overall budget of 24 million Swedish kronor (about 2.2 million Euro). The European Regional Development Fund provided the main funding. The project was co-financed by Umeå municipality, Umeå University, Region Västerbotten, UPAB (company owned by the municipality) and Umeå energy. Furthermore, the project had collaborative agreements with a number of other organisations (Energikontor Norr, Trafikverket, Naturvårdsverket, Visit Umeå, Kompetensspridning i Umeå AB, Bostaden). The project's aim was to reduce the CO_2 footprint of Umeå. On the one hand, the project focused on measures that the municipality could take to reduce the footprint. On the other, the project also examined the climate effects of the citizens of Umeå in terms of travelling, housing and consumption. This meant to develop methods and tools to improve carbon sensitive city planning and development, to create better statistics and information regarding

greenhouse gas emissions of Umeå's population, to spread knowledge about sustainable consumption and lifestyle and in effect, change habits of consumption, travelling and housing.

Sliperiet was involved in the project to coordinate a competence platform. In that way, Sliperiet organised and channelled relevant actors and knowledge from multiple disciplines into the project's activities. Umeå municipality was applying for the project and approached Sliperiet as the university's innovation department to become part of the project. Initially, it was planned that other departments of the university would be involved as well, but as funding from the European Regional Development Fund is for innovation actions (and not for research actions), other departments stepped back. Therefore, Sliperiet became partner in the application to coordinate activities that involved Umeå University without primarily doing research but providing access to scientific knowledge to the project were necessary. The project was successful in getting funding and it started up in autumn 2016.

As a collaborative project between Umeå Municipality and Umeå University the low-carbon place needed a platform for knowledge development. To this end, Sliperiet became a provider of space for collaboratively developing new knowledge together. As this requires people to come together in an environment where they can exchange ideas and take time to reflect, as well as listen, discuss and ask questions Sliperiet created means for co-creation. Main tasks included to set up meetings, establish contacts and ensure that collaborations could grow. This included to arrange workshops, information meetings, climate breakfasts and panel discussions. In these collaborations stakeholders could interact regardless of their profession, sector, municipal department or university institution, be they researchers or civil servants, in the public or private sector. The competence platform created spaces and occasions for dialogue and discussions to build competences and produce knowledge. Each year, the project organised a national conference, often with international elements, in collaboration with other stakeholders. In May 2019, the project organised a conference that summarised the experience and results of the project. On September 19 to 21 in 2018, Umeå hosted the Civitas Forum mobility conference. In November 2017, the project organised the year-long National Workshop for Sustainable Lifestyle in collaboration with the Swedish Environmental Protection Agency[16]. At the project start in autumn 2016, Sliperiet was already planning for an international conference with the scientific council of the Swedish government and the university. The conference was hosted by the university and was part of the project's kick-off. The project team used

the conference to start informing and communicating about the project's intent – even in that very early stage. But this turned out to create a good reputation. The conference involved people from UN and the Nordic council as well as people from the region of Västerbotten, both from authorities but also from smaller businesses, and also politicians, which was important.

It took some time to set up a governance model for the project. The municipality need to find a project manager and the very open formulation of project goals needed to be rewritten into a more specified way. The team met for work meetings every week to discuss and further plan is activities. Furthermore, there were specific meetings in different sort of constellations depending on the context. All team members took the content of discussions back to their departments. In the beginning, it was a bit problematic to sort of identify what kind of competences was needed. Furthermore, connecting staff from the municipality with staff from the university and vice versa became a challenging task (e.g. because of different logics, language and sometimes even prejudices). Being a provider of knowledge for the project sometimes meant to go beyond Umeå University. Because even if it is a rather big university it does not cover all specific competences that were needed for specific project tasks. Therefore, Sliperiet also contacted other universities to find researchers or research institutes outside universities to find the right competences. With this it was sometimes very difficult to explain to researchers outside the Umeå project context what the project was about and how and why they are asked for help. People needed to be willing to be open towards the project goals and to spent time of working in the competence platform. On the one hand, this meant for Sliperiet to ask researchers to voluntarily engage with some time in a project that does not result in a scientific article. On the other hand, Sliperiet needed to communicate and explain this difficulty of getting the right competences to the other non-academic project partners. This resulted also from the fact that work at the municipality is in some respect faster than work at the university, for example in terms of available money for strategic actions and the set up of task forces/ working groups. Overall, the role of Katrin Holmquist-Sten (Sliperiet project manager) was to explain in both directions, to be a facilitator and also a translator.

Specification: What tools and instruments were used to co-create?

In a way, the competence platform within the low carbon place project served as a testbed for methods of co-creation. It was a testbed for methods of meetings, the joint development of skills, challenging one's own and others' perspectives and not least for discovering and testing the issues that were uncovered. The team used various methods and formats for meetings.

For other programmes that Sliperiet provided certain other technical tools and instruments were used. Sliperiet offered skills development for researchers and teachers at Umeå University, to strengthen research and education and they were continuously developing educational methods, contributing to the enrichment of education at Umeå University. The Sliperiet environment was based on open innovation and a culture of sharing knowledge and experience. Its workshops were resources for education and applied research at Umeå University and an arena for collaboration. They were also available to entrepreneurs, creatives and businesses, and were frequently used by other tenants. Sliperiet held prototyping workshops equipped with a variety of digital production technologies. Regarding the workshop courses, Sliperiet provided technical introductions to their prototyping workshops SoftLab and 3DLab. These introductions were free-of-charge for staff within Umeå University in case the acquired skills were planned to be used in research, education or collaboration. After the course members of the university were granted access to book and use the workshop independently for teaching or other purposes. Furthermore, they provided technical tuition on other equipment and facilities, such as the sound studio, media studio or motion capture equipment.

SoftLab is an innovation and prototyping space where researchers, students, entrepreneurs, creatives and artists meet to explore ideas and can experiment with textile production using digital fashion and wearable technology[17]. The development of 'smart materials' and interactive textiles is rapid and offers huge potential for new innovations with integration of computers and soft circuits into clothes, interiors, accessories and more. Digital manufacturing enables new aesthetics and new business models, with new feasibility for small collections, local production and tailor-made garments at considerably lower cost. SoftLab is a specialised workshop for innovation and prototyping in these fields and a resource for applied research and utilisation of research. Furthermore, it was available for rent to businesses looking to do prototyping and small scale/ test production. Sliperiet offered non-university members to help develop their competence in the field of

wearable technology and to provide contact with research and student groups as a link for collaboration with the university.

Another important workshop programme was the 3DLab. The 3DLab was a prototyping workshop for idea development and visualisation in education, research and collaboration between businesses and Umeå University. Together with researchers, teachers and creatives Sliperiet developed methods and tools to use 'rapid prototyping' and digital manufacturing in education, research, idea development and strategic work. The research engineers at Sliperiet provided technical support so that the lab could be used as a resource for applied research and utilization of research, for example in prototyping and visualisation, or as an arena for collaboration with other researchers or with organisations and businesses. The 3DLab was also available for rent for businesses looking to do prototyping and small scale/ test production.

All of Sliperiet's workshop resources were also available in a FabLab Umeå concept. This has now been transferred to Curiosum. At Sliperiet, the FabLab opened every Wednesday afternoon/ evening and welcomed everyone to work on ideas and projects. Citizens could bring their own material or buy it at Sliperiet. Using the workshop space was free of charge. It offered the usage of a range of digital manufacturing and prototyping tools, for example 3D printers, digital textile printer, laser cutter and software for drawings and patterns. FabLab was supported by volunteers that helped people to get started with the tools. Working as a volunteer at the FabLab offered the volunteer staff to work on their own projects at the lab on Sundays. FabLab Umeå is part of the Fab Foundation[18]. As a member of the international network, FabLab Umeå shares ideas and knowledge with its users. All Fab labs work with similar tools and processes making it possible to reproduce things that are made in one lab (if the documentation is shared). Lab users learn by designing and building things they are interested in and share their knowledge with each other, thereby gaining competences for machines, materials and design process.

Which learnings emerged?

Even though Sliperiet started with great support by the university it was often difficult to convince and involve academic staff in its 'third mission approach'. For researchers, impact in journal publications is often more valuable than to engage in innovation actions and projects that involve non-academic partners. As all of Sliperiets projects were inter– and

transdisciplinary this made it difficult for the Sliperiet team to find researchers to work with. Furthermore, on the other hand non-academic partners were not always sensitive towards the logic of rewards in science. Generally, mindsets of university members and civil servants working for the municipality or region had to be aligned in order to achieve collaboration. Therefore, a lot of understanding needed to be built on all sides. This included to establish a good project management structure for all single projects that Sliperiet was conducting. Sometimes resulting in an overload of successful applications for third-party funding and the challenges of hiring project-based staff on temporary contracts within the Swedish university system.

With the transfer from Sliperiet to Curiosum the university decided to switch from a very open, multidisciplinary innovation approach to one which is centred around advancing 'interest in and knowledge of science and technology'. Therefore, this new approach might be likely more 'technocentric' than the innovation approach that Sliperiet was working with.

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<u>Interview</u>

Katrin Holmqvist-Sten (Umeå University, Head of Department at Umeå Academy of Fine Arts and former project leader at Sliperiet)

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LTsER Montado | Portugal

Tanvir Singh Badwal (Sociedade Portuguesa de Inovação - SPI)

The project combines practical, productive, ecological as well as cultural aspects of socio-ecological systems to promote improved management of cork trees forests to facilitate wellbeing of the montado region in the long term. To achieve these aims, the project worked with owners and managers of Montado to develop scenarios and design ecosystems service maps. Workshops with different stakeholders (companies, policy makers, ENGOs) helped understanding their perceptions and visions for the region's future.

What is the project/ initiative all about?

Cork oak trees are an important aspect of the cultural landscape of Portugal. These autochthonous forest species are distributed in the Mediterranean region where the Atlantic influence is felt. The geographical location provides adequate climatic conditions such as high thermal amplitudes and the summer dryness characteristics. These also occur in some regions of Portugal (although not part of the Mediterranean) ecologically more favourable for the cork oak, except at high altitudes and areas with very low temperatures in winter. In Portugal, the cork trees forests are known by the name 'Montado'.

According to an article[1] published by the National Nature Conservation Association, Montado - derived from the term mount, which, in the Middle Ages, meant using the common hills for pasture and wood, is a unique, multifunctional, agro-sylvo-pastoral system endemic to the Mediterranean basin that is centred around the cork tree. It represents savannah-like landscapes, dominated by cork (Quercus suber) or holm (Q. rotundifolia) oaks, with understory vegetation ranging from shrubs to grasslands and combines forest production, pastoralism in an extensive system, and the cultivation of cereals and other traditional land use practices in one space. Montado as a complex, productive system has high ecological and socio-economic relevance and as a system is a

key contributor to employment in Portugal.

Given the cultural and also the economic significance of cork oak trees to Portugal, preservation of these species is of equal relevance and importance. The community surrounding the areas where these are found is aware of the challenges and the socio-economic implications. The need to preserve these species has been stressed leading to the introduction of multidisciplinary community practices. One of such practices/ platforms is LTsER Montado.

LTsER (Long Term socio-Ecological Research) Montado (http://www.ltsermontado.pt/) is a platform that combines the practical, productive, ecological as well as cultural aspects of socio-ecological systems to promote improved management of montado. The prime objective of LTsER is to facilitate the successful development of montado in the long term.

LTsER platform is a part of the LTER network that works towards the conservation of cultural landscape of Portugal around two levels: the LTsER platforms and the LTER sites. The cultural landscape is subject to threats such as rural abandonment, increasing tree mortality, reduced natural regeneration, unsuitable management practices, pests and diseases, depreciation of cork market value, overgrazing, air pollution and climate change. The Centre for Ecology, Evolution and Environmental Changes (cE3c) develops research to contribute to promote an improved management that reconciles the use of biological resources with conservation goals. Projects such as LTsER Montado and OPERA[2] are some good examples.

LTsER works with owners and managers of these systems to develop scenarios and design ecosystems service maps. This is done through workshops with stakeholders (companies, policy makers, non-governmental organisations) with the objective to understand their perceptions on montado and support the development of a roadmap with their vision for the future. LTER is determinant to study long-term ecological processes (climate change impacts) and the impact of rare or episodic events (pollution), impossible to detect in short term. The three main objectives of the LTER are as follows:

- Storage and monitoring of relevant data in ecology;

- Establishment of links between institutions and researchers;

- Promotion of knowledge exchange and know-how development.

Context and environment: Where does it take place?

Cork started to be used as a seal in the 18ᵗʰ century, soon becoming economically significant in Portugal. It marked the birth of agro-silvo-pastoral systems (the so-called montados) in Portugal, which can be considered as an example of sustainable forest management at the global level. Although subject to several challenges and threats, Montado is legally protected, cutting trees is prohibited and its sustainable exploration is encouraged.

As described in an article[3] published by CE3C, the Montado extends over more than 5,800,000 ha in Spain and more than 1,070,000 ha in Portugal. Currently, cork oak range is of approximately 2.3 million hectares, half of which are located in the western Mediterranean. Distribution is quite fragmented including areas in North Africa (Morocco, Algeria, Tunisia), south of France, west coast of Italy, a few islands in the Mediterranean (Corsica, Sardinia and Sicily), and the southwest of the Iberian Peninsula (Portugal and Spain). According to the World Heritage Convention (UNESCO)[4], the Montado system currently occupies, in the South of Portugal, a significant part of the Alentejo region, large areas of the Tagus Valley and of Beira Baixa interior, as well as and the mountain ranges of the Algarve (Serra Algarvia). *Figure 2* shows that Portugal leads the percentage of world area in Montado.
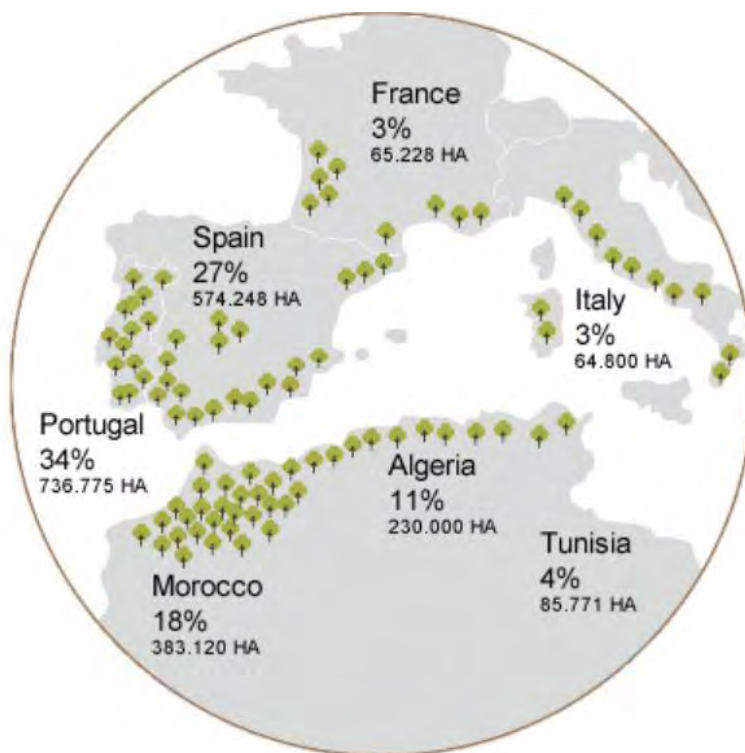

Figure 2: Map of the location of Montado

Source: APCOR (The Portuguese Cork Association)

Alentejo, where the majority of Montado is located, is the largest Portuguese region with a territorial area equivalent to about 31,500 km^2 (Eurostat 2019)[5], which is approximately one third of the national territory. In 2019, the region had 705,478 inhabitants (Eurostat, 2019) and an average population density of 22.8 people per km^2 (Eurostat 2018). The population density is lowest among the regions in Portugal. Over the past decades, the region has undergone an average negative population growth rate, which is largely due to rural exodus (as there are less infrastructures, jobs and opportunities) and ageing population. The political culture of the region can be understood as progressive, but slightly more conservative than the largest cities in coastal areas. For the five mainland regions there are members of the central government with responsibility for regional development through regional administrations. These administrations manage several financing instruments intended to promote regional development. On grounds of innovation, the Regional Innovation Scoreboard 2019 (RIS 2019)[6], classified Alentejo as a 'Moderate Innovator' region with an increase of the regional innovation performance over time.

The LTER network working towards the conservation of cultural landscape of Portugal and especially the Montado system of Alentejo operates at two levels: the LTsER platforms and the LTER Sites. In total there are 41 LTER national networks of scientists which develop long term research and are included in [the international LTER network](#) (ILTER). The LTER Sites are facilities of limited size (about 1 to 10 km^2), mainly of one habitat type and form of land use, and can be part of [LTsER platforms](#). The research activities are concentrated at small scale ecosystem processes and structures. The LTsER platforms represent entire regions in cultural, land-use, historical, natural, administrative and economic units, comprising all relevant agents. It is an infrastructure with monitoring networks and *in-situ* research sites, technical supporting structures, laboratories, collections, museums, visitor centres, databases etc. It is an assumption of the LTsER platforms that there is an involvement of the research community, regional population, key stakeholders, decision makers and all potential beneficiaries of the knowledge produced.

LTsER Montado network has five main research and monitoring stations [(R&M)](#) covering the range of climate and soil types of montado ecosystem. These conceptualize a socio-economic platform by representing different land-use regimes and desertification scenarios, therefore, involving different pressures.

Brief outline of the project/ initiative's pathway

LTER Portugal network (http://www.lterportugal.net) was formalised in 2011, in a process led by the Sociedade Portuguesa de Ecologia (SPECO). This organised network of LTER sites first appeared in the United States of America in the 1980s. In 1993, an international network – ILTER, was developed and in 2015, the European network of LTER sites was created. The LTER sites can be accessed through these networks with different levels of integration as mentioned below:

- ILTER[7] (The International LTER network);
- LTER-Europe[8] (European LTER the network);
- LTER US[9] (United States LTER network).

Funded by the Fundação Ciência e Tecnologia (FCT) and the Fundação Luso-Americana (FLAD), LTER Portugal currently includes two platforms and two sites in different types of key ecosystems: a Mediterranean forest system for multifunctional use (Platform LTsER Montado), estuaries (Platform LTsER Estuários), freshwater (Site LTER Sabor), and transition waters (Site LTER Ria de Aveiro). *Figure 3* shows a representation of these networks. The criteria leading to the choice of these sites are:

- Ecological significance;
- Social relevance;
- Range of data available;
- Cooperation between the public and private sectors;
- Ability to generate complementary funds.

Figure 3: LTER Network in Portugal

Source: LTER Network Portugal

LTER Montado site was officially created in 2011 after being selected under the framework of a competitive call opened by FCT Portugal and having an international evaluation panel. Located in the Alentejo province of Portugal, it represents savannah-like landscapes, dominated by cork (Quercus suber) or holm (Q. rotundifolia) oaks, with understory vegetation ranging from shrubs to grasslands, were shaped over millennia of traditional land use practices, and have high socio-economic and conservation value. Due to the variability in montado landscapes resulting from different climate-soil interactions, main tree species and land-use patterns, LTER Montado was established as a macro-site with six core research and monitoring (R&M) stations distributed in the Alentejo province to cover the range of climate and soil types.

Management & Organisation: Who interacts and how to facilitate co-creation?

LTsER Montado focuses on improving understanding on the long-term consequences of land use practices and management options, and how their interactions with other socio-economic and environmental drivers operating at scales from local (e.g., agriculture intensification, cattle pressure) to global (e.g. climate change, desertification). The consortium led by the Centre for Ecology, Evolution and Environmental Changes (CE3C) includes the following institutions:

- Higher Institute of Agronomy, University of Lisbon (CEF);

- Faculty of Science and Technology, University of New Lisbon (CENSE);

- Natural Resources and Environment Centre (CERENA);

- Centre for Exploitation of Mineral Resources (CVRM);

- Institute for the Conservation of Nature and Forests (ICNF).

Besides the individual scientific capabilities of the research teams joined in the consortium, and the accumulated data on the Montado system, the strength of this site relies on the logistics and interest made available by the study case-sites and other stakeholders, such as the biggest world cork industry (Corticeira Amorim S.A.), local municipalities and forestry and development state departments[10]. LTsER readily encourages active participation of these actors in the activities of the project, strongly oriented to strategise and co-create tools and methodologies to envision and ensure a long-term sustainable conservation of Montado. This is done mainly through workshops involving focus groups and interviews with end-users and other actors. Another strength of the site is the existence of logging facilities in the majority of the research and development (R&D) stations with emphasis in the field station of the University of Lisbon located in the core area of the Montado range and representing the LTER Montado site headquarters. LTsER Montado platform collects, analyses and stores time series of environmental, social and economic data, to develop research on all phenomena and processes that affect the montado.

The work of LTsER Montado for the past eight years has been of significance and is now recognized by the ILTER network and regarded internationally as the 'Most Striking Case' Award[11]. This award was created by the ILTER network in order to distinguish the platform with the most striking results, which could only be obtained through teamwork and a transdisciplinary and long-term approach. This is the approach that has been developed at LTsER Montado, involving researchers from several scientific disciplines - such as biologists, ecologists, social scientists and geologists - and assuming the involvement of the region's population and policy makers. As mentioned in a press news[12] of CE3C, LTsER Montado researchers worked with various people involved in the Montado - such as landowners, managers, technicians, hunters or beekeepers and scientists' associations - to identify and evaluate what the main services provided and the benefits we get from this ecosystem. The award also acknowledges products derived from the system, such as cork, and regulation and maintenance services as among the most valued.

What are the concrete processes and practices of co-creation?

The LTsER Montado project results from the collaboration of 15 institutions with the potential to include more institutions in the future. Therefore, the basis of creation of the project in itself is a community of several institutions including the science consortium and the consortium stakeholders. According to the Director of CE3C Margarida Santos-Reis (the interviewee for this case study), Montado is a man-made system that integrates smaller sites for ecological research and the platform with a view to enhance the socio-economy of the Montado regions (a significant part of the Alentejo region, large areas of the Tagus Valley and of Beira Baixa interior, as well as and the mountain ranges of the Algarve (Serra Algarvia)). Among the practices of co-creation implemented within the project are a series of workshops involving regional stakeholders (landowners, managers, technicians, hunters, and researchers) and regional citizen groups. In addition to networking and discussions, these workshops facilitate the understanding the challenges, market needs, climate changes, and the perceptions of land managers involved. Also, the project as a result gathers information on Montado's management activities, and how much is interesting for them to participate in this process. Stakeholders voicing their opinion to co-create knowledge have been helpful in developing solutions to the challenges and threats of Montado. LTsER Montado also follows a cohesive approach in managing the platform. The research team from CE3C establishes a strong relationship with other colleagues and institutions. This involves practices of cooperation at the regional and national level. As acknowledged by the ILTER Network, LTsER Montado integrates expertise from several scientific disciplines - such as biologists, ecologists, social scientists and geologists, and involves the regional citizen groups and policy makers. In regards to the introduction of new opportunities, it is relevant to mention that currently there are no public calls as such with predefined themes.

Specification: What tools and instruments are/ were used to co-create?

The results of the SISCODE questionnaire developed for the 40 case-studies to analyse co-creation in the light of responsible research and Innovation (RRI) and science, technology and Innovation policies conveyed that co-creation processes for the conservation of cultural landscapes in the LTER region of Montado involve a special focus on RRI than on policy making. LTsER Montado with a regional focus intends to involve a variety of

stakeholders in the co-creation processes. These mainly include civil society organisations (NGOs/ community organisations/ activist groups/ associations of producers), business sector, and citizen groups. The initial involvement of these stakeholders was initiated through personalised invitations/appeal to target groups and promotional activities at specific events. The most common tools used by LTsER Montado in the co-creation process to enhance the understanding of end-users include the following:

- Interview techniques (focus group and narrative interviews with end-users);

- Visual and/or tangible output (audio clips, drawings, writing, and photo diaries);

- SWOT analysis, and future scenario vignettes.

Other tools and methodologies highlighting the co-creation approach of LTsER Montado includes an online survey for choice experiment that emphasised the importance of Montado at the national level, and to the people living in the area. During the project and as part of its events, several working groups, round tables encouraging practical exercises were conducted.

Which learnings emerged?

Despite the highly sustainable management of cork that takes place in Montado, the system is under threat from several factors highlighted above. As part of the interview, Margarida Santos-Reis shared that it is challenging as it takes time and support to create a community of practice. It is important to reach the stage where the sustainability of the ecosystem in economic, social, and financial terms can be guaranteed.

Attaining consistent results and progress can be extremely challenging if there is no support. In fact, the platform currently lacks human resources. Individuals supporting the platform are constantly changing and it is not possible for the project to offer short term contracts. According to Margarida Santos-Reis, it would be better to have full time staff managing a consistent workflow of the platform.

In general, LTsER Montado's work since 2011 has been acknowledged by the ILTER network and regarded internationally with an award for its results. This was also a reflection on the multidisciplinarity of its researchers and the involvement of the region's population and policy makers.

The LTsER Montado bibliographic database counts with over 4,000 titles. Subject to regular updates, the database includes articles in national and international peer-reviewed journals, book chapters, dissertations, technical documents, manuals, etc.

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Science Frugale | France

Marion Real (Fab Lab Bcn)

Science Frugale is a forum-exhibition exploring how to do low cost experimental scientific research by hacking various available technologies, at the crossroads between experimental scientific research, maker culture, and cooperation with developing countries. It is a Paris-based project, led by TRACES and funded by two research institutions (ESPCI Paris and PSL University) as well as the Ile-de-France Region. The exhibition was a work in progress, constantly changing over time with the visitors input.

What is the project/ initiative all about?

Science Frugale is a forum-exhibition exploring how to do low cost experimental scientific research by hacking various available technologies at the crossroads between experimental scientific research, maker culture, and cooperation with developing countries.

It is a Paris-based project, led by TRACES-Espace des sciences Pierre-Gilles de Gennes, developed thanks to funding of research institutions (ESPCI Paris and PSL University) and the Ile-de-France Region. The exhibition was a work in progress, constantly changing over time with the visitors inputs. The originality of the case-study relies on innovative practices of co-creation, open science and public engagement that can be replicated in the context of exhibition setting as well as in any scientific mediation activity. Thanks to its museographic approach, the exhibition obtained the prestigious international ECSITE - Mariano Gago prize in the 'Smart and simple' category.

Context and environment: Where does it all take place?

In France and in the Parisian ecosystem particularly, initiatives and institutions are historically creating mediation dispositives to diffuse scientific knowledge. The Academy of Paris claimed that '*In a society where the place and role of science and technology are constantly growing, it is essential to inform, to explain, to educate, in a word, to make lifelong education around subjects that concern more and more all citizens*'[1].Events celebrating science and research as the 'Fête de la Science' or 'la Nuit des chercheurs' are now each year in the agenda of Parisians.

Science Frugale is an exhibition who took place in the innovative Science centre named 'Espace des Sciences Pierre Gilles De Gennes'. ESPGG is a common and shared space between ESPCI Paris and PSL, managed by the association TRACES since 2011 and created as a diffusion, scientific mediation and innovation place to foster collaboration between academics and a wider audience.

- ESPCI Paris is an internationally reknown engineering school funded in 1882 offering original courses in physics, chemistry and biology.

- Paris Sciences et Lettres (PSL) is a famous research university that is composed by more than 25 establishments around Paris with a large panel of disciplines such as sciences, arts, human and social sciences.

- Traces is a think-do-tank about science and its communication/ relation to society. They cover various services such as reflexion, counceling, training and scientific mediation on a strong diversity of axes such as creativity, responsability and public engagement.

The ESPGG is a 240 m² place situated close to the partner universities and is built upon three floors respectively hosting a historical collection, an amphitheatre and a large and open exhibition/ workshop place. It is a meeting point between parisians and sciences that offers temporary art and science exhibitions, a permanent exhibition of scientific instruments (including original instruments by Pierre and Marie Curie), scientific events, seminars, conferences and experimental workshops and support for science education and scientific events. The ESPGG and TRACES look for creating intersections and dialogues, introducing a disruptive thinking in classic way of working with, disseminating, doing sciences.

The topic of Frugal Science was emerging at a convenient time with various trends, where a commom point was to adapt to the (un)availability of resources while endeavouring sharing is essential for the objectives:

1. the local scientific researchers looking for practicing research with reduced budget and limited ressources – New technological platforms such as fab labs started to be integrated in the infrastructure of Universities.

2. The development of North/ South cooperation projects highlights new opportunities to innovate with less and local ressources.

3. In parallel with the creation of the concept of *frugal innovation* in local research group as the French Eco-Design community[2], various social innovation projects emerged based on making and reusing like 'La Recyclerie'[3] or 'Les Grands Voisins'[4], the future ecosystems of makers Fab City Paris[5],'Ouishare'[6], 'La Petite Rockette'[7].

ESPGG proposed to examine these trends which is spreading to the confines of ESPCI Paris. The Science Frugale exhibition attempts to decipher this movement and sets out to meet the men and women who practice it.

Brief outline of the project/ initiative's pathway

The exhibition has emerged with the convergence of three orientations emerging around the ESGG ecosystem: open science, the maker movement and international cooperation with South country. First, the aim of the ESPGG is to facilitate the interaction in and beyond

the ecosystem of local universities, connecting sciences with citizens, raising the proximity between researchers and other members of society, making the research more audible, participative and effective within a real-word context. Second, when the Science Frugale exhibition began in Paris, the maker movement started to be widely disseminated and newly engaged towards new forms of innovation more accessible and sustainable, with an open-source philosophy and using digital technologies as well as more frugal innovation and low-technologies approaches. Finally, efforts was initiated by the local ecosystems to reinforce the international cooperation with South-based country, in Africa or Latin America, exploring how to support the development of research in specific and complex context with less ressources to dedicated to key raising societal problem.

 Science Frugale can be described in three phases: the open incubation, maturation and the post-exhibition phases.

NOV-DEC 2016: Incubation phase

The exhibition is built in front of the public and the visitor is invited to participate in this creation phase, in particular through participation in events (workshop, conferences, etc.).

JAN-MAY 2017: Maturation phase

The exhibition has finished its design phase but continues to enrich itself with the rhythm of its programming. It is regularly updated according to the news and activities of the ESPGG.

June 2017 – 2018: Dissemination and sustainability strategies.

While the exhibition was synthetised and made accessible in an [open access platform of the PSL University](#), communications through various media were realised by the team and new interventions have been realised by the local team in other context. The exhibition won the price of …Gallego that created new opportunities for development and funding via the Ecsite network and beyond.

Management & Organisation: Who interacts how to facilitate co-creation?

The exhibition was managed and mediated by Sandrine Bron in constant interactions with the ESPGG director, Matteo Merzagora, the core exhibition team and external partners of

the ecosystem. The core exhibition team was composed by internal employees of TRACES with different backgrounds and experiences such as Maxime Le Roy, in charge of mediation, as well as an intern from a Master in Mediation in Environment and Scientific Communication, an active retired researcher of the CEA – François Piuzzi and external providers for specific activities such as the scenography realised by the studio Millimetres and graphical communication by the illustrator Colette Pitois and the designer Nathan.

Upstream this exhibition project, Traces members participated in a training about living lab approaches with Didier Laval of Culture Instable who gave them an overview of new practices of design applied and to be applied in the context of cultures and museums i.e. open, participative design, design thinking.

During the project, each member was relatively autonomous in its works with a space for expressing their creativity. The communication between team members happened by different means according to the habits of each member. As an example, Maxime Leroy, facilitator of the co-construction workshop was mainly coordinating and structuring his actions by direct interactions, in the office with Sandrine. Otherwise, they used briefs and shared documents to interact through emails. The illustrator Colette priviledged online communication because of her geographic situation using various tools - from graphic to organisational tools to interact with the manager and Nathan (Evernote, Pinterest, Moodboard, visio-conferences, googledoc, pearltree…).

All along the project, key organisation partners have integrated the project and contributed to the content creation, the conferences and workshops:

-   The Société Française de Physique as a supporter and provider of resources/knowledge.

-   EchOpen, an open and collaborative project and community with the aim of designing a functional low-cost (affordable) and open source echo-stethoscop.

-   TReND in Africa, a higher education charity dedicated to improving university level science education and research in sub-Saharan Africa.

-   The student association PSL-Lab Langevinium is the Technological Creation Space for students of Paris Sciences et Lettres, a HackLab is located at ESPCI ParisTech.

-   The Woelab (a young innovative community of the first African space of Technology Democracy) and the association GotoTogo (a Togolese development NGO, to promote education, culture and health in Togo).

- Antanak (a collective for sharing about digital practices, Electrocycle (Sensib'Action and open design for electrical & electronic objects) and la Petite Rockette (an citizen initiative – ressourcerie).

- The PC Coup de pouce, an association which promotes social entrepreneurship and development aid within ESPCI Paris.

Additionally, a Scientific comittee was created to support the scientific contents and value of the exhibition. It was composed by:

- Roberto CASATI, Research Director CNRS, Study director EHESS, and Institut Jean Nicod (CNRS – EHESS – ENS).

- Joël CHEVRIER, Professor of Physics, Université de Grenoble and Centre de Recherche Interdisciplinaire de Paris.

- Etienne GUYON, Professor emeritus at the Laboratoire PMMH of ESPCI Paris.

- Yohann MACHU. President of Langevinium, ESPCI Paris – PSL.

- Luisa MASSARANI, Président of REDPOP, Latino-american network of SCIDEV.NET.

- François PIUZZI, retired researcher at CEA and responsable for the commission of 'Physique(s) sans Frontière' at [Société Française de Physique.](#)

The exbition was funded by the platform Explore PSL and the region Ile de France sponsored by the SFP. The whole exhibition was done with relatively few ressources compared to other important cultural venues. By providing an additionnal report about the role of living labs in cultural spaces, TRACES has received additional funding that permitted to reinforce the financial structure of the project.

The general public was a key stakeholder in the exhibition process as the audience for the different activities of the exhibition was estimated between 8,000 and 12,000 visitors. Of course, the number and type of engagement varied according to the type of activities.

What are the concrete processes and practices of co-creation?

The processes of Science Frugale can be described in three phases: the open incubation, exhibition and the post-exhibition phases.

The open incubation has consisted in a serie of open events.

- The first event was entitled 'smartphonik: making science with our smartphone' consisting in an open lab made in collaboration with *Ulysse Delabre* and *Antoine Deblais*, researchers at the University of Bordeaux, who interacted with the team members and a larger audience on how smartphones can be used to contribute to citizen science. A demonstration was proposed to show how to use smartphones as sensors for carrying out scientific experiments and gathering mecanical, optical, phonic data. A reflexive workshop was then offered to imagine, build, test and assess new uses from the smartphonique. Later on the phase, citizen science via Smartphonik was newly applied through a collaboration with the CiTicks project run by the association France Lyme and the research centre INRA. They elaborate an original living lab workshop dedicated to learn about tick detection and prevent the Lyme illness.

- The second event was a Do it Yourself workshop facilitated by the Neuroscientist André Maia Chagasto which consisted in learning about how to make a microscope. After two sessions of four hours, an open source and low-cost microscope was made by the group for the Trend in Africa association and directly shown in the exhibition place. This workshop was replicated and improved later in the process by the participation of François Piuzzi from the Physical French Society. That time, the microscope was realised from webcams and other devices who were previously dismantled by the group. Participants could better understand the proximity between the different devices, the optical process behind the microscope and could investigate the quality in term pixels. Another workshop has been realised with François Piuzzi consisting in an autopsy for DVD player – dismantling the device to learn about it and zoom in what is inside the black box.

- Then, the students of Langevinium offered a series of evening workshops to inform about different technologies. Two sessions about how to make computer science for open Arduino's devices followed by 3D printing workshops where participants learnt about the software OpenScad and Ultimaker to design and print 3D objects.

- The open incubation phase also hosted three conferences where different international communities came to discuss good practices of open science. They introduced the activity of Woelab, a shared innovation space for making complex technologies with few ressources. Then they learned about scientific mediation practices in Latin America with SciDev.net and RedPOP network, about low-cost and open-source devices to

support the universal access for diagnosis in the healthcare sector with the EchOpen community.

This phase of open incubation has permitted to build the exhibition and reinforce the partnerships necessary to build a relevant programme for the phase of exhibition.

The exhibition was built with three spaces respectively dedicated to events, workshops and project gallery. The latter was enriched all along the exhibition with new artefacts coming from workshop creation or donations. In term of activities, the phase of maturation welcomed a lots of events. The official opening night was a gold moment where participants could see the gallery, listen to a round table about participative sciences, and experience with different activities to discover what is behind without Ink printers, oscillating fountains and other science demonstration shows. Traces of the first phases as live drawings of previous events were exhibited to talk about the participative construction and make the exhibition process more transparent. Four other events were also realised all along the exhibition consisting of conferences about international collaborations and Science Frugale practices as well as the co-construction of devices like spectroscope or original stuff made from electronic and other types of waste coming from 'La Recyclerie' a upcycling centre.

The exhibition was desinaugurated with a final event. In addition to the content of the exhibition, the documentation with the blog and the pearl-tree has permitted to build an online version of the exhibition that is now published in the PSL platform, available here.

Specification: What tools and instruments are/ were used to co-create?

In term of tools, we can distinguish internal 'open' tools, co-creation worshops methods and interactive and visual artefacts created for interacting with the public, and dissemination platforms.

Internal open tools: They are consisting in the tools used by the core team to plan and create research and tangible objects. We can cite the use of a shared PealTree, concept mapping online tools. Other tools were only used occasionnally between two or three team members.

<u>Co-creation workshop methods and tools:</u> For the design of each workshop, Maxime was designing a set of activities with prepared supports to co-create with. Contrary to other co-creation workshops, these workshops involved not only paper canvases but other materials and tools to be manipulated. They consisted in learning by doing activities imagined by the team. More frequently, the process consisted in exploring an idea, experimenting alone or with few participants from the team/ partners group, validating go/ no-go with the team manager, introducing the events in the calendar, communicating and preparing materials and an agenda for the days to finally 'make' the event. Original objects were co-created such the exploded view of components when realising the autopsia of a CD-Rom. The magnetic blackboard on which they hanged small plastic bags containing all the components extracted by the visitors during public autopsies of old computers, were highly appreciated

<u>Visual identity that support learning and emotion engagement:</u> Original tools have been used such as live sketching in the events realised by the illustrator Colette Pitois - Colpizen. The visual identity of the project with a specific font and the original drawing of Colpizen add a real value of the project: They transmitted the philosophy of Science Frugale, giving an emotional dimension to the complexity of learning how to make things with less. Inspired by industrial design techniques and comics, dense in term of information, with hands-on aspects, letting a clear appearance of scientific instruments while letting the objects being submerged by various representations, the illustrations are opened to various interpretations.

Which learnings emerged?

The learnings from the case are well synthetised in the article published in an Ecsites Spokes.[8] There is a clear disruptive thinking in the attitudes of the over all teams.

Here are some extracts:

'Science centres that become research facilities, through which to explore those aspects of scientific research that can benefit from perturbations and contaminations from other aspects of culture, in order to produce more inclusive, shared research and, first of all, more research.'

'Exhibition as explorations', *'open incubation'*, *'co-construction'* or *'exhibition narrators'* are the keywords we now use to frame our approach to science exhibition.

'Everything that can be done in public should be done in public.'

'We want to value and take advantage of the full range of competencies of our audiences, from the children who never saw the inside of a computer, to the skilled experimental physicists, the FabLab geek or the professional artist. There is an interesting continuum there, that should never be broken down by barriers artificially defined in terms of visitor "levels", clearly separating who is the expert and who is the public.'

'Partnership is the most fundamental and the most fragile component of the approach.'

'Combining diversities of objectives to build synergies is relatively simple, while combining diversities of schedules is a real puzzle.'

'If on one hand the open incubation makes good use of time resources by mutualising the time of conception and the time of actual offer to the public, on the other hand it multiplies the time needed during the exhibition's life and has an impact on the organisation of the institution.'

'In further work, we need to make clear decisions about community engagement and documentation protocols.'

It appeared that the temporary cultural space of exhibition played the role of exploration and networking. In the discussions with Matteo, it appeared that the temporary cultural space of exhibition played the role of exploration and networking. The output of exhibition can be considered as new sources of knowledge, usefull for researchers.contributed to the success of what is now a full-scale citizen science research project.

One important dimension which is coming often when discussing with the team members is their capacity to explore the unknown with passion and creativity, without fears of losing the thread of the exhibition, accepting to show and reacting to failures. Hearing from the facilitators and illustrators, we felt that they enjoyed the experience and diversify their knowledge.

References

Articles about the exhibition

https://explore.psl.eu/fr/decouvrir/expositions-virtuelles/science-frugale

https://www.science-frugale.fr/

https://www.ecsite.eu/activities-and-services/news-and-publications/digital-spokes/issue-38-0#section=section-indepth&href=/feature/depth/science-centres-research-facilities-exhibitions-explorations

Interviews with 3 members of the project

Matteo Merzagora (in ESPGG – More than 3 hours of discussions)

Maxime Leroy (online – 1h30 of interview)

Colette Pitois (online – 1h of interview)

Note: the audio did not work so we just have note from the interviews.

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SPARKS - Rethinking innovation together | EU

Claudia Iasillo (APRE)

As part of the SPARKS project, partners in different localities organised a reversed science cafe: a co-creation activity where Experts and citizens work together to formulate solutions to the challenge of making research and innovation more diverse, inclusive and open. 'Rethinking innovation together' was a major awareness-raising and engagement project to promote RRI through the topic of technology shifts in health and medicine. It took shape via a travelling exhibition and a set of participatory activities took place in 29 countries.

What is the project/ initiative all about?

Sparks – Rethinking innovation together is a three-year EU-funded research project, started in July 2015 and finished in June 2018, aiming to promote Responsible Research and Innovation (RRI) in the field of technology shifts in health and medicine. RRI is the European Commission's approach to fit Europe with the capacity to manage the complexities and uncertainties that characterise contemporary research and innovation.

Labelling itself as an awareness-raising and engagement project, Sparks played an important role in the promotion of RRI in 29 countries across Europe, thanks to the participation of 33 organisations led by the [Association Europeenne Des Expositions Scientifiques Techniques et Industrielles – Ecsite](#).

Ecsite is a network of more than 350 members active in the field of science communication including science centres, museums, research bodies, festivals, universities, planetariums, foundations and learned societies, companies and local authorities. Its mission is to inspire and empower science centres, museums and all organisations that engage people with science, and to promote their actions. Ecsite's network, created in 1990, is mainly, but not exclusively, focused in Europe, and it currently extends over more than 50 countries. In supporting organisations engaging people with science, with the final aim to encourage citizens to actively engage with science, Ecsite's core values are cooperation, diversity and inclusiveness, integrity and professionalism, creativity and innovation and active citizenship.

In line with Ecsite's mission and core values, Sparks project brought together organisations such as science centres and museums, universities, research centres, science shops, and local administrative entities, engaging them in debates about health and medicine, and how they are affected by technological shifts. The emerging trends at the intersection of technology and health were then contextualised in the practice of RRI, through tailored Sparks activities. As such, Sparks promoted RRI through an interdisciplinary and interactive exhibition as well as participatory activities using innovative formats (i.e. science cafés, pop-up Science Shops, incubation activities and scenario workshops) which took place across Europe. Co-creation was indeed the main driver of the project and, at the same time, a methodology carefully planned and applied to different project's activities.

Beside the strong European dimension of Sparks, as a H2020 funded project bridging 29 European countries, the project managed to keep a good balance with the local implementation of the co-creative activities, e.g. through the involvement of a science communicator responsible of adapting the Sparks exhibition and activities to the specific context of the country hosting the exhibition.

Although the project was strongly focused on RRI and tightly linked to the first societal challenge- Health, demographic change, wellbeing (SC1), cross-cutting issues such as

International cooperation, Open access & Data management and Innovation procurement were addressed by this case.

As part of the Sparks project, local partners organised a reverse science café: a co-creation activity where experts and citizens worked together to formulate solutions to the challenge of making research and innovation more diverse, inclusive and open. Such participatory activity offered people the opportunity to identify priority research questions and co-design scientific solutions together. This aspect will be deepened in this document's sections 5 and 6, that are dedicated to the description of the co-creation tools in detail.

Context and environment: Where does it all take place?

Sparks was a Coordination and Support Actions funded under the topic ISSI-1-2014 – 'Pan-European public outreach: exhibitions and science cafés engaging citizens in science' of the work programme Science with and for Society. Overall, the latter aims 'to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility [1]. During the late 20th century, the relationship between science and society has deeply changed, calling for a stronger cooperation between them. On one hand, this is crucial to ensure more responsible science, which is more sensitive to society's needs and takes into account the public concerns on ethical, legal or social issues rising from scientific outcomes. On the other, it is important to underline the added value of science to society in terms of knowledge and economic progress, by working on the education and engagement of civil society in science activities and integrating society in the science and innovation issues, through the promotion of science-based activities.

In particular, the topic funding Sparks was generally aimed to engage citizens in science, and it was seeking for projects organising public outreach exhibition, participatory events and, in particular, science cafés in informal settings to debate emerging science and technology issues. Exhibitions were asked to be interactive and adapted to local/regional conditions (e.g. taking place in local languages), while participatory activities were asked to engage citizens and involve all relevant stakeholders and local actors.

In this context, Sparks and all its activities were perfectly fitting the need to bridge the gap between research and society. Indeed, Sparks activities were intended to engage European

citizens with the concepts of RRI through the topic of technology shifts in health and medicine. Benefits and challenges of emerging technologies in healthcare and medicine were the basis of the Sparks touring exhibition. Furthermore, the Sparks participatory activities, such as the reverse science cafés discussed in more details in the following sections, were actively involving EU citizens, scientists and innovators in discussion around health and well-being. The formats were specially designed for the project, combining elements to engage participants in debate and encourage the sharing of ideas among participants. Sparks was implemented on large scale, in different countries, targeting citizens from all cultural and educational backgrounds, ages and genders across Europe, as it will be deepened in the sections 5 and 6 of this case study.

It is worth to mention that Sparks built upon both the experience of numerous relevant successful EU-funded projects (i.e. RRI tools, Perares, PLACES, VOICES, Twist, etc.) and the support of international networks such as Ecsite, as coordinator of the project, Living Knowledge and ERRIN. This knowledge was essential to facilitate the development of RRI processes and enrich the Research & Innovation system in the health and medicine field with societal inputs.

Brief outline of the project/ initiative's pathway

Sparks was conceived in 2013, when Ecsite started working on the application for the H2020 SwafS call for proposal described above. In the words of Maria Zolotonosa, senior project manager at Ecsite and Sparks coordinator, the main drivers to apply for the call were two aspects mentioned: "'*the need to make exhibitions, that is one of the core activities of our members, which are mainly science centres and museums, and the call's requirement of pan-European project since Ecsite, as a network, had the capacity to reach the whole of Europe and coordinate such a project. The co-creation activities and participatory elements developed in Sparks were not specifically required by the call*'*.

The choice of including participatory activities in Sparks came from the need and desire of Ecsite to push the members of the network towards a more public engaging direction during their activities, becoming a sort of intermediaries between researchers, policy makers and citizens. The Ecsite's network is composed of different members and the majority of them is expert in science communication targeting children, schools and parents. With the Sparks project, Ecsite wanted to push its members a bit further and help

them to play the role of bringing citizens into research processes and that is why they decided to develop different formats that enable citizens to participate in research processes. *'Sparks project could be seen as a sort of communication campaign for RRI. Two different levels could be described: the first one was the exhibition that travelled all over Europe reaching big number of people'* explained the project's coordinator, *'and a second level with a much deeper engagement, thanks to the participatory formats, which was our way to communicate the concept of RRI by having people themselves experiencing it'*.

The call was not specifically asking for any scientific topic, but Ecsite was looking for a subject close to the people, and Maria Zolotonosa explained that the choice was strictly dependent on the nature of the project itself: *'the main purpose of the project was to communicate RRI to the citizens, but RRI is a very complex concept that cannot simply be communicated to people, so we wanted to find a content-carrier for RRI and that is how we choose health and the technology shift in the healthcare since health is a topic that many people can relate to'*.

Therefore, the Sparks choice to focus on the topic of technology shift in health and medicine was not random, as such issue is deeply rooted in big societal transformations that we are living through. Institutions that were traditionally advising about the impact of technology in society, are having difficulties in keeping up with the fast pace of technological developments and the consequent complexity of the changing technological landscape. This has created gaps in both understanding and regulating the use of new technology, and, at the same time, opportunities for new actors to address societal needs by adapting cutting edge research to them.

Sparks has taken a broad approach to define areas where technology shifts are more likely to influence current practice in health, medicine and healthcare, identifying, for each of these areas, initiatives, projects and/ or case studies either showing the how technology is changing the field of medicine and healthcare, or highlighting how and why RRI is changing Research & Innovation practice (see section 5).

Each partner could define and narrow down the broad topic of healthcare, taking into account the local context and the needs of the stakeholders involved in the activities which were happening at local level. The beginning of the project was a preparatory phase, lasting one year, of 'setting the scene' for each partner involved, by holding a first workshop gathering all partners to be sure to have a common baseline for each partner and to help

those that would have been in charge of the exhibition and the participatory activities to get comfortable with the leading concept of Sparks. In particular, it was important to provide each local organiser with enough background information to look for the proper local case study to be displayed during the exhibition, by providing some practical examples. Indeed, as Maria Zolotonosa stated, '*the biggest part of the exhibition was the same everywhere, but there was the element of the case study where every local organiser had to source locally, and co-creatively sometimes, with their local consortium*'. The next phase of the project was the development of the exhibition and the innovative formats, including testing the ones specifically developed by Sparks and training all the local organisers in hosting and the presenting both the exhibition and the Sparks activities.

Management & Organisation: Who interacts how to facilitate co-creation?

The Sparks project benefited from a strong partnership of 33 organisations (project partners or third parties) from 29 European countries with a wide range of competences and, therefore, contacts in different areas. Led by Ecsite, Sparks was carried out by a network of core partners and local organisers that include science shops and science centres/ museums.

First of all, the success of Sparks depended on the wide network of Ecsite which includes 333 members engaging people in science. In particular, Ecsite's network is composed by:

- 202 science centres/ museums

- 18 Natural History Museums

- 30 research bodies

- 32 private companies

- 7 festivals

- 6 professional networks

- 38 other organisations

Amongst core partners of the project, four organisations were specialised in engaging citizens in contemporary science through interactive and innovative exhibitions and/ or participatory activities (Science Museum London, Copernicus Science Centre, Bonn Science Shop and Ars Electronica) and five represented large renowned international networks

(Ecsite, ERRIN, Living Knowledge, AHTI and KEA European Affairs). Sparks' outreach potential was thus enormous and enabled the project to reach and engage with different types of stakeholders.

Sparks consortium worked together since the early stages of the project, to build a shared understanding of the technological shifts that are influencing the fields of health and medicine and of how RRI could be identified, discussed, and modelled in the activities developed within Sparks. For example, local organisers were supported by the whole consortium and, in particular, by the project coordinator and the most experienced partners, through different project's deliverables and reports, aimed to offer them support both in the designing and in the implementation of project's activities. Altogether, these documents were either providing information about the workplan and the methodological framework for research activities connected to the project and aimed to assess them or detailing the planning of activities for each partner. A functional communication flow among partners was achieved by having multiple online platforms for dialogue or by having regular conference calls with each local organiser to make sure they were on the right track. Furthermore, the project also set up a kind of support network – composed of some members of the consortium with experience in engaging with the citizens on a deeper level - to troubleshoot any problem, and to coach the local organisers through the process.

Overall, the whole process went smoothly thanks to the experience of the majority of partners in public engagement in science and to the attention paid to supporting the local organisers. Maria Zolotonosa, Sparks coordinator, explained that *'some of the differences encountered were coming from a geographical point of view, as some countries and some organisations were much more used and open to talk about RRI than others. In some countries RRI was a complete alien concept that was not yet been introduced on the political local level, so for some countries it was much harder to work with it'.*

The core of the project was a touring exhibition that travelled all over Europe accompanied by a number of innovative participatory activities on RRI, such as the reverse science café described in detail in the following sections. 29 local organisers hosted the exhibition in their country and organised and implemented the participatory events. Given that, the success of the project was highly dependent on the promotion and organisation of the activities at local level to ensure the participation of all relevant local stakeholders from education, administration, government and business fields. Participation of different stakeholders to Sparks events at local level required a deep knowledge and adaptation to

the local context. This need was met thanks to the involvement of experienced science communicators which helped local organisers to identify relevant research work and to build lasting collaborations with different local actors with a multi-stakeholder collaborative approach.

Local partnership in Sparks

The importance of establishing local partnership in Sparks is highlighted in one specific output of the project, namely the deliverable D.3.2 Report on local partnerships[2]. The document gives an overview of the 233 local partnerships established by all partner countries, listed in a table with relative contact information, the represented stakeholder group - i.e. Civil society, Education, Research, Industry/ Business, Government or Public Administration, other (specified) - the participation and role of local partner institutions during the activities and their willingness to engage after the end of the project (e.g. if an official collaborative agreement was made).

It is worth to underline that, according to the report, 136 partners were available to engage with Sparks after the end of the project and 70 partners concluded collaboration agreement (33 formal ones and 37 informal ones).

Establishing local partnership was essential for planning and implementing Sparks participatory activities. At this aim, at least one local partnership with a stakeholder representing RRI was required by the project. Local partnership provided partner countries with established local networks helping them in setting research questions for the participatory activities and promoting them successfully. Moreover, the local partnerships were ensuring that local dimension was taken into account, facilitating citizens' participation, giving them an opportunity to express their interest in what should be worked on in the field of technology and health in their country, and, at the same time, giving local scientists or policymakers the opportunity to make an impact in their community. As the document points out, '*the local partnerships increased the capacity of local science actors and public authorities to stimulate RRI processes locally. Last but not least, the established partnerships led to regional success, as in some cases have brought together different stakeholders and established new relationships for future work and projects*'.

Among Sparks partners there was a great variability both in the number of local partnerships established (average in the consortium is 8) and in the different categories of

stakeholders involved. In fact, only few countries managed to build partnerships with all relevant stakeholder groups that were asked for, and, overall, the most represented stakeholder group was research, while government or public administration were the least represented. According to Maria Zolotonosa, it may be because the main driver in the building of the local partnership was the need to find a local RRI example for the exhibition, but this did not represent a mission to whom all the stakeholders could easily relate to: '*within Sparks we were discussing changes in the communities trying to co-create some solutions to local challenges, and I think that the local administrators probably couldn't relate to the project very much. It was mostly relevant for citizens and researchers*'.

Although the starting point of the establishment of local partnerships was the same for all 29 partner countries, the process worked out differently in each country and it was mirroring the diversity of the countries themselves and the strongest area of interest of the different countries. The project coordinator stresses the importance and the success of having formats which could be adapted to the different local contexts: '*I'd say that everywhere these formats were adapted quite happily to local context. Not only we, as coordinating institution, were fine with that, but we actually encouraged it as we wanted people to adapt things to make them work instead of ask local organisers to just follow a set of specific instructions which may not make sense in their context*'.

What are the concrete processes and practices of co-creation?

Sparks thematic focus was on healthcare and medical care, considered a field of prior interest, as observed also in the Eurobarometer survey on the 'Public perception of science, research and innovation' (2014)[3]. In fact, according to most of the respondents, healthcare and medical care were one of the themes most mentioned as priorities when it comes to science and technological innovation. Several independent co-creation or participatory activities took place during Sparks lifespan, all evolving around the general theme of technology shift in healthcare and sharing the final purpose to promote RRI. The choice of Sparks topic was in line with the current societal transformations, as the technological landscape is changing at a fast pace and it is challenging to keep up with it. As written in one of Sparks document, detailing the topic's choice '*this creates, on the one hand, gaps in both understanding and regulating the use of new technology and, on the other hand,*

opportunities for new actors and innovators to address societal needs by swiftly adapting cutting edge research and disrupting traditional practices'.[4]

The project's consortium was working together since the early stages of the project to ensure that all partners shared the same vision on the overall theme and how to deflect it properly. One example of this shared common knowledge and vision, is the project deliverable D.1.1 Inception Report[5], defining with a broad approach the areas where technology shifts are more likely to influence current practices in health, medicine, and healthcare, as following:

- *The quantified self*, referring to the new concept of self, identity and human potential arising from everyday objects which allow us to monitor and get insight into so many aspects of our lives;

- *Happiness*, as a holistic, comprehensive way to look at social progress, wellbeing and health;

- *Biorevolution,* as a result of the advancements in the knowledge of the building blocks of life and the developments of new tools to modify and construct them;

- *Global Health,* referring to global collaboration required to address major health problems;

- *Robotics,* as deployment in medical practice of elements programmed to perform certain tasks;

- *Our Deeper Selves,* referring to the brain and the redefinition of the ethical boundaries of new technologies applied to the brain study.

The six areas are interconnected by enablers, defined as broad developments that enable cross-cutting research and innovation (e.g. mobile technologies, nanotechnologies, digital technologies, lightweight innovation).

The main objective of Sparks co-creation activities was to promote RRI by testing experimental methodologies that would give participants first-hand experience and thus raise awareness of the process of RRI: on one hand there was an interdisciplinary and interactive exhibition, on the other a set of participatory activities using innovative formats.

Being a quite complex EU funded project and with a high number of partners involved (33 in total), the activities were thoroughly planned and described in several documents available to partners of the consortium. The overall idea was to combine an exhibition with innovative participatory activities to raise awareness of RRI and to engage the public in

research and innovation. Both the exhibition and the participatory activities were hosted by the 29 local organisers. The participatory activities comprised seven compulsory events (one reverse science café and six science espressos) and one optional format (to be chosen among three different kinds of activities: a pop-up science shop, a scenario workshop or a Hackathon/incubation workshop). Each local organiser was asked to provide information about the timeframe of the activities, the partners involved, the topics to tackle and the methodology to adopt[6].

A general timeframe for the implementation was recommended by the steering committee of the project. Thus, each local organiser had to organise a reverse science café before the opening of the exhibition (approximatively one month before the opening date) and six science espressos (short science cafés) while the exhibition was on display. The optional activity selected had to be ideally implemented during the exhibition period, but each partner could adapt the timeframe to the local conditions. In total, more than 200 activities were organised in the timeframe of the project, so within Sparks there were a series of independent co-creation activities, hosted by each local organiser, but planned and designed within the project's consortium, and, therefore, connected and sharing the same objectives and conceptual framework.

A deep guidance was offered to the local organisers, with detailed instructions on how to run all the formats and a specific training session which took place in May 2016. Before the implementation of the activities, each local organiser had to detail the local organisation they wanted to involve in Sparks activities (local partnership, see section 4.1). The local partnerships established by each organiser were helpful to:

- To find a local case study for the exhibition;

- To plan and support with the implementation of the activities;

- To generate content and questions for the activities;

- To find experts for the activities (RRI or health/ medicine related);

- To find a hosting venue for the activities– local partners can function as multipliers for the promotion of the exhibition and the activities;

- To identify local events to which the project will be presented;

- To establish long-term relationships which will last longer than the project lifespan;

- To help promote and act as RRI ambassadors in local contexts.

Furthermore, each local organiser was asked to provide information about the specific topic selected for the discussion and the experts they wanted to invite, choosing with them the questions to discuss with the audience. So, the experts were actively participating to Sparks activities since the early stages and also during the designing of the activities.
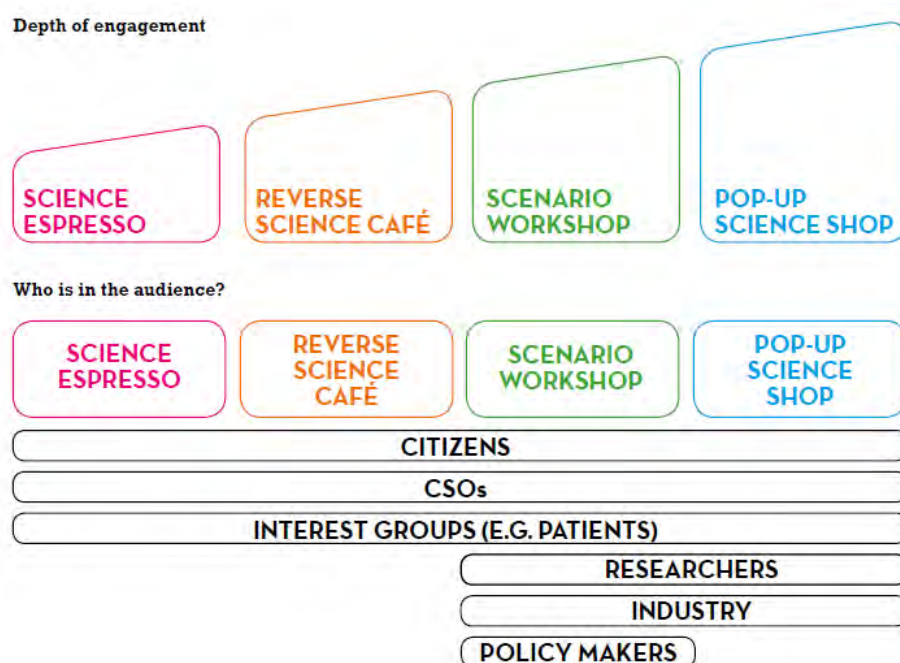
Figure 4 - Level of engagement and audience of the Sparks participatory activities. *Source: Sparks toolkit* [7]

The duplicity of Sparks and its activities (the exhibition and the participatory activities) is mirrored also in the different target audience. Whereas the exhibition is, by definition, an activity with a low level of engagement and it was meant more for informing the participants, the real co-creation moments of the project were represented by the innovative formats (Figure 4). Given that, the target audience was divided in:

-   Sparks exhibition: individual citizens including all actors who (potentially) have a direct stake in Research & Innovation, particularly in the field of health, namely individual citizens aged 12 years old or more, as well as representatives of civil society organisations, government, business/ industry, scientists and the educational community;

- Sparks participatory activities: RRI stakeholders (or actors), namely the industry and business community, scientific and research community, policy makers/ governments, civil society organisations/ communities (e.g. patients' organisations, hackers' communities, etc.), and educational institutions/ communities (schools, higher education institutes, science centres and museums, Science Shops, science festivals).

In total, Sparks organised a total of 240 activities, during which citizens were encouraged to identify research questions together with scientists and to co-design innovative product and service ideas. Given that, Sparks co-creation and participatory activities were framed in the phase of problem identification/ understanding and also ideation, involving all relevant actors in the general field of technology shift in healthcare, in particular academia and civil society.

The reverse science café was a compulsory activity for each local organiser, and it will be deepening in the following section of this document. According to Sparks description of the format[8], the reverse science café was defined as *'a discussion event focused on various ethical and societal topics related to local examples of research, technologies, innovations. Unlike a regular science café, the dialogue is initiated by experts posing questions and listening to answers from the audience. Together they work in small groups to formulate their advice on making research and innovation more responsible'.* As explained above, the organisation of Sparks activities and exhibition followed a detailed timeframe, and the reverse science café had to be organised as first activity (at least one month before the exhibition), paving the way to the exhibition and to the others participatory activities. This was established, as one of the aims of the reverse science café was presenting a local case study (one for each organiser), defined an example of responsible research and/ or innovation that will be the starting point of the event itself and part of the local version of the Sparks exhibition. Given that, the link between the reverse science café and the activities that followed was quite tight, with the outcomes of the reverse science café supporting the exhibition and providing local content on RRI issue. This is a good example of the strong link between the separate participatory activities happening in Sparks. Not only the planning and preparation in the different countries was following a similar workplan and sharing the same purposes and objectives, but the activities hosted by each local organiser were building on each other, starting from the reverse science café. The

following section will therefore explain in more detail the reversed science café, as tool adopted for the first and crucial Sparks co-creation activity.

Specification: What tools and instruments are/ were used to co-create?

The main assumption of the Reverse science café is the two-way communication between experts and the audience. The first ones initiate discussion by asking a question. Then, they leave the group and let the audience discuss and work out an answer. Experts are invited to ask questions whose answer is still not completely defined and that actually require a real feedback or information from the group of audience.

The success of the reverse science café relied on creating a favourable atmosphere to encourage the participation of the audience to the discussion. Therefore, the discussion was meant to be as informal as possible, by choosing a suitable venue (e.g. a real café was recommended when possible) and keeping the discussion in smaller group rather than in a plenary session. Therefore, the audience was divided in smaller groups of maximum eight people, for a maximum of ten groups in total. In each smaller group, beside the eight participants, there was an expert and one group moderator. In the planning of a reverse science café it is important to take into account the following aspects:

- The theme and the questions starting the discussion;

- The expert participating to the event;

- The audience attending the event;

- The role of the moderators.

The general theme and the questions to discuss

As in all co-creation activities, the choice of the theme and the questions to be discussed has a crucial role also in planning a reverse science café. In Sparks, the broader theme was defined as technology shift in medicine, and local organisers were free to identify a relevant aspect of this general theme as focus point in their activities, taking into account the local dimension and relevance in their context. The choice of the topic was part of the preparation and of the set-up of the co-creation moments. On one hand, it had to be in line with the project's general objectives, and, on the other, it had to be defined with the local

consortium, identifying the needs of the local participants. The question should be posed in an open manner and designed to engage and start discussion, and not to test knowledge on the matter. One of the tangible outcomes of the reverse science café was expected to be the production of a list of recommendations, starting from the question coming from the experts and resulting from the following discussion. Therefore, the importance of the questions was stressed by the Sparks partners supporting the local organisers.

Maria Zolotonosa explained the importance of the topic and the way it was adapted to the local context: '*the topic as it is - technology shift in healthcare and medicine - was never presented or discussed with the public in this kind of formulation. It was always much deeper, either we were discussing new insulin pumps in diabetics, a new app for dialysis treatment or something specific as that. It was always presented in a narrow way to facilitate comprehension*'.

The experts

The experts were a second crucial point in the organisation of a reverse science café. Local partnerships established by each organiser were suggested to be the best source of expert, although the inclusion from experts from different sources was not excluded. The essential requirement for the experts was to present the chosen issue from all RRI angles. Therefore, they could be scientists, researchers, innovators and people who in their professional work represent one of the policy agendas of RRI. The experts involved should be coming from different fields, in order to give an overall overview or RRI in practice. The selection of the experts was done bearing in mind the different field, their openness and curiosity to the audience opinion about their work and the theme chosen for the local case study, as the experts were the ones initiating discussion around the chosen topic by asking questions to the audience. The consortium's partners supporting local organisers were strongly recommending them to carefully select the experts, bearing in mind their expertise and their openness as crucial features, and to make clear to the experts that the discussion would have taken place with non-specialist people, before engaging them for the activity. The organisation of at least one meeting with all specialists together, before the day of the event was suggested. Not only to introduce them to each other, but to clarify and find a common vision for the event, the role and tasks of the experts. The project coordinator, Maria Zolotonosa, underlined the importance of having open-minded experts for the outcomes of the reverse science café which in some case had positively affected the course of their research: '*In some places researchers were more open to engage the public. In*

other cases, some of them interpreted the activities more as a science communication type of activity, which is what they are mostly used to, and, therefore, they provided information about their research projects. However, when they came with an open mind and they genuinely asked questions they did not know the answer yet being truly prepared to listen to the answers, then they actually changed something in their research project and this was a nice outcome'.

The audience

It was recommended to create a diverse audience by mixing people who might be already interested in discussing the topic with people with no previous knowledge about it, as the audience had to be representative of various interest groups in the field and also of ordinary citizens interested in the subject of the reverse science café (Figure 5). The first group would ensure a fruitful discussion engaging people with some previous knowledge on the topic and the interest to share opinions with others. On the other hand, the second group would provide more diversity, with the possibility of including new and potentially ground-breaking perspectives and identify new groups of people with an interest in the field. For example, representatives of patient's associations were able to share practical experience of dealing with certain conditions – which is sometimes beyond the scope of medical expertise. The audience had to be prepared before the event, by communicating the event's topic and format. Specific effort was required to local organisers at this stage, to engage the audience and convince them of the importance of sharing their opinion and knowledge. According to the Sparks handbook[9], the local organisers '*might want to communicate the expert questions beforehand, but normally only clear information about the local case study should suffice*'.

POTENTIAL SOURCES FOR AUDIENCE MEMBERS

- Universities
- Researchers (from the field of health and medicine or related to RRI elements)
- Research institutions
- Associations
- Foundations
- NGOs
- Municipalities (health department)
- Health networks
- Health insurances
- Patient's associations
- Hospitals
- Doctors
- Care facilities

… You can also invite people through an open call – this way you will not exclude anyone with lay expertise. And do not hesitate to reach out to your own trusted and tested public – for example, visitors of your exhibitions, if you are a science centre.

Figure 5 - Tips on potential sources for audience members. *Source: Sparks handbook*[10]

The moderators

Finally, it was important to have moderation during the activity: one main moderator at central level and one moderator for each smaller group, with a different role than the experts. The first one was in charge of the smooth running of the reverse science café and of instructing the whole group about the activity. The second one, instead, was responsible of guiding the audience members throughout the whole event and help groups follow through all the planned stages of the event.

All together 31 reverse science cafés were held during SPARKS, attracting almost 1,500 participants. The chosen topics were quite diverse, ranging from beauty and health, green areas in cities, the genome, noise pollution, elderly, space, mobile technologies and quitting bad habits, bioethics and safety, neuro-hacking and so on. In a project's report[11], the main outcomes were categorised as follows:

- new research inputs generated from the public;

- new joint project as well as the design of a new strategy or action plan;

- new collaborations taking shape;

- other main outcomes which were specified as follows: demonstration of existing technology, networking, initiating dialogue between scientists and the public, improvement of research, new exhibitions and events, exposure to media, increased outreach and awareness, new and reinforced contact to stakeholders and updates on technologies.

Assessment of the participatory activities in Sparks

It is worthy to notice, that as the reverse science café and other participatory activities were happening in the frame of an EU-funded project, they were part of research study and, therefore, under evaluation as part of the activities of the project itself. For this purpose, local organisers, participants and local partners were encouraged to report on their activities and fill out evaluation's questionnaires. The data was collected alongside the exhibition and the participatory activities with the purpose of understanding what EU stakeholders think about RRI as well as identifying the best formats to encourage citizens' participation in Research & Innovation processes. The data was then analysed and processed in the toolkit for activities and other relevant documents (e.g. policy recommendations).

The framework of the data collection was defined at consortium level with the document D4.1 Methodological Framework[12] whose objective was *'to define the conceptual framework underpinning data collection. This means design the most appropriate methodology and tools required to collect data - including at least a visitor survey and a template for local organisers to report on their learning from the project'.*

A comprehensive analysis of the data collected is described in the project's deliverable 'Capture learning report'[13] which highlighted three main conceptual areas that inform on Sparks' main outcomes: public engagement, stakeholder engagement and the successful practices highlighting the potential replicability of the different formats and methodologies.

The project activities were evaluated in relation with the level of public engagement by using four indicators:

- the visitors' and participants' displayed interest in the proposed topics;

- their understanding of the topics;

- the level of participation in the discussions;

- their willingness to participate in future similar activities.

In particular, the third indicator aimed to highlight the actual extent of participation in the discussion among the people involved in the activities and exhibition and it was equally informed by the organisers' opinion, thus providing a double point of view on the matter. Overall, the feedback from participants was positive and the opportunity for participants to share their thoughts and to speak with experts was an important factor to trigger future participations (Figure 6). These points of view were shared by the organisers, who equally felt that, overall, the participants were actively engaged in the discussions. According to the organisers, at the beginning the discussion required encouragement from the chair/ moderator, but they eventually easily moved forward and the participants continued the discussion also after the event.
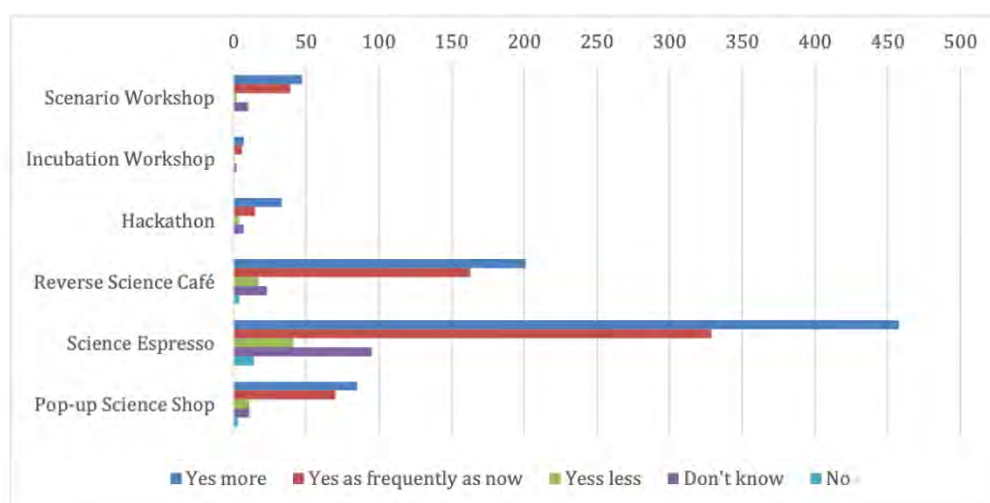
Figure 6 - Willingness to participate in future similar activities per type of activity. *Source: Sparks "Capture learning report"*[14]

The stakeholder engagement area allowed the research team to understand to what extent the local organisers have benefited from local partnerships for the eventual success of the project in the different venues. The data analysis highlighted the local organisers' willingness to organise similar events in the future. Furthermore, the multi-actor dialogue indicator informed about the features of the project which helped in triggering and

fostering debates and discussions, thus providing insights about the stakeholders' involvement in the project's activities. The analysis revealed a wide range of factors which have positively or negatively impacted the multi-actor dialogue. These are:

- the chosen topic;

- the content inputs from the exhibition;

- the way the topic was presented;

- the physical location;

- the presence of different actors and points of view;

- the way the moderator animated the session;

- the availability of sufficient time to engage in the discussion;

- the way in which the different contributions were treated.

The chosen topic was considered as one of the most successful factors in fostering the debate and the multi-actor dialogue, together with the quality and diversity of the experts and the interactivity and informality of the format. Interestingly enough, the chosen topic and the quality of the experts were also considered as the most recurrent factors hampering the multi-actor dialogue. This result underlines their crucial role and it is in line with the importance that was given to these two aspects in the designing of the activities at consortium level to be sure that each local organiser had a successful experience. It is also worthy to mention the recurrence of two other factors that prevented the multi-actor dialogue: communication and timing. The first one highlights the importance of attracting the audience and communicate the proper information about the activities. The latter refers to the fact that, according to the organisers, there was not enough time for the discussions, or, on the contrary, that the event lasted for too long, thus preventing an active engagement in the discussion by the activities' participants.

Moreover, one of the research's highlights was the identification of the most suitable societal actors to play a role in RRI from the perspective of citizens engaged with Sparks' activities. Scientists were identified as the most suitable one, but other categories of actors like individual citizens and the educational community emerged as important in the shaping of RRI practices, suggesting the importance of engaging a broader range of stakeholders and actors in research and innovation

Finally, successful practices were identified to inform on the potential replicability of the project's format, setting and methodology. Science centres and museums were indicated by the participants as the most appropriate venues for Sparks activities. The local organisers, instead, were considering the interactivity of the format as an important enabler to influence the participation and the multi-actor dialogue. The interactivity of the format is influenced by:

-   the type and number of experts invited;

-   the presence of a specific number of moderators:

-   the expected length of each activity.

In conclusion, it is worth to mention one important point of reflection. Sparks is an EU funded project, and as such, it shares the common challenge of these projects which is the long-term effect in terms of impact of the project's activities. After the end of the project, it is always difficult to keep all the activities going, unless there is some kind of support. Maria Zolotonosa, project coordinator, identified this as one of the shortcomings of the project: '*one of the big achievements of the project at local level was the rising of new collaborations between organisations. We managed to bring together organisations which have never worked together before. Unfortunately, we do not really know what has happened afterwards and if the co-creation activities continued or not*'.

Which learnings emerged?

Overall, Sparks project has demonstrated that citizen engagement in RRI can be achieved through pan-European campaigns including exhibitions and hands-on activities and that interdisciplinary connections are crucial to come up with innovative solutions closer to societal needs. More specifically, it has also proven the added value of:

-   science centres and museums as spaces where multi-actor dialogue can take place and be facilitated;

-   tested formats of public engagement activities, which helped bridging the gap between research education communities, civil society and policy.

One of the Sparks' strongest points was the opportunity to improve public engagement in Research & Innovation processes in the field of healthcare, with the support of science centres and museums as places to engage. Sparks defined public engagement/ multi-actor

dialogue, as *'any form of dialogue in which two or more participants engage in an open exploration of thoughts (opinions, needs, concerns, etc.) on an equitable basis with a view to, for instance, set up a research agenda, co-create solutions, or contribute to the development of public policies'.*[15]

The inclusion of citizens in Sparks activities had a positive impact and fostered the relationship between researchers and the public, as together they were co-creating solutions. This contributed to the trust building and to improve the visibility and transparency of researchers and scientists as well as to engage a well-informed public.

The Sparks self-assessment activities allowed the project to evaluate the overall impact of its approach and the effectiveness of different Sparks formats to facilitate multi-actor dialogue in scientific research, with the final aim to understand drivers for public participation in scientific research. To do so, Sparks payed attention to the visitors' view on:

- Actors involved in the Research & Innovation field of healthcare;

- Topic/ issues on which they would like to dialogue;

- Motivation to dialogue on healthcare-related issues;

- How they would like to be involved;

- What was considered as a pertinent place for the discussion;

- Challenges faced during the dialogue.

The outcomes of this process were relevant for actors usually engaging people with science at different level (as science centres and museums), and for policy makers which could take advantage of the information gathered to develop better strategies to engage multiple actors in Research & Innovation. Societal needs should be acknowledged and valued ad policy level. This aspect was considered in the Sparks Policy Recommendations[16]. The document provides the following five key recommendations and suggestions on how they can be implemented practically by European and local/ regional policymakers:

- INSPIRE: stimulate citizens' desire to engage in science;

- DIVERSIFY: broaden the participation including also stakeholders that do not typically engage in Research & Innovation;

- EMBED: incentivise organisations to embed public engagement into their practices and policies;

- MAXIMISE: exploit the existing resources of science-engaging organisations;

- DEMONSTRATE: assess the impact of public engagement by appropriate indicators.

These recommendations were validated and further developed by more than 100 participants of the Sparks final conference held on 4th May 2018. The recommendations have reached European policymakers (European Commission, European Parliament, multiplicator networks of universities, funding bodies, municipalities, regions, etc.).

In conclusion, Sparks activities demonstrate the potential of bringing in different perspectives from the society, research and industry fields.

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Interview

Maria Zolotonosa

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Centre for Social Innovation (CSI) Toronto | Canada

Eva Wascher (TU Dortmund University)

Members of the Centre for Social Innovation work across sectors to create a better world. They accelerate their success and amplify their impact through the power of co-working, community and collaboration. CSI offers co-working, community and acceleration services to people who are changing the world. Members get special rates on meeting and event spaces, promotional opportunities, networking and community and free consultations.

What is the project/ initiative all about?

The Centre for Social Innovation (CSI) is one of the oldest co-working spaces in the world. At the core of the Centre is the leasing of office space and co-working spaces for non-profit organisations, self-employed and small businesses (usually up to a maximum of five employees), who find a special place and space at the CSI. In addition, the CSI offers various start-up programmes, e.g. Accelerator and incubation programmes for social entrepreneurial initiatives such as start-ups of the energy industry. The programmes to promote the livelihood and support of young entrepreneurial initiatives include i.e. training and seminars for project consulting, strategic management and financing options. The participants in the programmes can also use the infrastructure and the various services of the CSI. Unlike traditional start-up support programmes, the CSI explicitly targets the development and diffusion of social innovation. The CSI now has around 2,500 members. These are most of all social entrepreneurial initiatives as well as many individuals working together to increase the social impact of their projects. The CSI sees itself as an innovation ecosystem in which many players, albeit partly in competition with each other, find a platform for cooperation. There is hardly any cooperation with the public sector in Toronto. An exception to this is a sponsorship from the City of Toronto Economic Development Agency for the purchase of a property that was essential to the realisation of the first CSI. The basic financing of the CSI is covered by the rental income. For additional programmes there are recently also a cooperation with the Province of Ontario on Climate Ventures. The non-profit company currently has about 65 employees.

The organisation now has five locations in Toronto, Canada, and New York City, USA. The organisation attaches particular importance to the physical design of the workplace, i.e. the equipment of the rooms. Because this room design contributes significantly to a specific working atmosphere and the behaviour of those working in this atmosphere. Working in

the CSI is an 'experience' that is a key factor in the success of the overall concept. In addition to space, the processes of cooperation, i.e. the 'community building' is very important for the success of CSI. The members of the CSI are encouraged by various participation formats. In a special way, members are approached and network from both their professional and personal perspectives. Such a participation format is e.g. the IDEA (Inclusion, Diversity, Equity and Accessibility) management committee to manage inclusion, diversity, equality and accessibility for CSI processes.

Context and environment: Where does it all take place?

The Centre for Social Innovation Toronto is located in the Province of Ontario in Canada. As a response to public funding cuts and finding remedies to societal challenges starting in the mid-to-late 1990s the non-profit sector in Canada grew largely. After two decades of bottom-up development of socially innovative initiatives, Canada became a global leader in social innovation. The non-profit sector lay ground for the development of a variety of local social innovation ecosystems. Based on this, social innovation has grown to be embedded in university programmes, local initiatives, and provincial laws in Canada. As local social innovation ecosystems are growing, practitioners are beginning to connect nationally as never before.[1] The spread of socially innovative initiatives can also be seen in the government. For example, policy labs and collaborative processes have marked the adoption of some key social innovation practices into the public sector. Moreover, the Canadian federal government has put an 'experimentation directive' in place to shift resources across departments towards experimentation, learning, and to adopt better practices. All societal sectors are involved in social innovation and experimentation – more or less. More and more non-profit and business actors create social entrepreneurship initiatives. Still, there are some legal barriers stemming from out-of-date laws that constrain charities, exclude non-profits, and prioritise for-profit innovation. Fortunately, there is a growing recognition that like technological innovation systems, the support of social innovation ecosystems is vital to seeing inventions and the spread of new and renewed ideas that equally use culture, markets, and policy to alter societal challenges[2].

One major result of the growing importance of social innovation is the 'Social Innovation and Social Finance Strategy' of the Canadian Federal Ministry of Employment and Social Development. Although Canada is a relatively prosperous country, there are many

communities that face persistent and complex social problems that affect some groups more than others, such as Indigenous people, seniors, youth, immigrants, and women fleeing violence. The federal government recognizes that new and innovative approaches are required to tackle these social issues. That is why the Government has committed to developing a Social Innovation and Social Finance Strategy for Canada as a strategy that will provide better support for community organisations working to achieve positive solutions to persistent social problems, including those facing vulnerable groups.[3]

Back in 2017, the Government of Canada appointed a Co-Creation Steering Group to guide the development of a Canadian Social Innovation and Social Finance Strategy. The Steering Group members were asked to share their perspectives on three key challenges:

1) the skills and capacity of community organisations and governments to pursue social innovation and social finance, including their capacity to measure social outcomes and impact;

2) federal laws, regulations and policies that have an impact on the ability of community organisations to participate in social innovation and social finance initiatives; and

3) access to the capital needed to fund, replicate and expand the reach of social innovation and social finance projects.[4]

As a result, the Strategy will strengthen healthy and sustainable communities; granting better access to jobs for individuals, especially those in vulnerable circumstances, having access to safe, affordable housing; a future characterised by reconciliation with Indigenous people, dynamic official language minority communities, vibrant diversity, and social and economic inclusion. For the steering group, the way in which these recommendations are implemented is as important as their content. For example, implementing the Strategy must leverage the work that is already taking place across all sectors and regions in Canada. Different groupings, including the co-operative, social economy, social enterprise and community economic development movements, are key drivers of social innovation and social finance across the country. The Strategy must build on and accelerate these achievements, not reinvent them. Furthermore, public authorities must broaden their understanding of innovation beyond business and technology and acknowledge the important contribution that charities, non-profits and co-operatives and mutuals make to Canadian society. This includes, that cross-sectoral partnerships are essential for system change. Therefore, sectoral silo-thinking between the structures and motivations of the

charitable and non-profit, private, and public sectors need to be overcome. The Steering group also emphasises that the potential of social innovation and social finance should lead to meaningful effect to the Government's commitments to reconciliation with First Nations, Inuit and Métis people. Hence, their recommendations recognise that Indigenous communities must be engaged in the design of and benefit from measures resulting from the Strategy. The Government should commit to engaging Indigenous organisations in supporting and partnering in Indigenous-led processes on social innovation and social finance, at a pace determined by Indigenous communities and under the guidance of community leaders. Social innovation and social finance are powerful tools for advancing diversity and inclusion. To this end, the strategy developed recommendations to equip communities with the tools and knowledge they need to achieve better social, economic and environmental outcomes. These recommendations were informed by a large-scale consultation process undertaken in the fall of 2017, which involved more than 60 in-person engagement sessions, two online processes, and outreach to over 15,000 Canadians and more than 400 expert stakeholders, as well as an analysis of the activities currently under way through the support of municipal, provincial and territorial governments. Summing up, the Strategy is a call for a genuinely integrated, whole-of-government fashion involving all of the relevant federal departments and agencies.[5]

One of the consultation papers was submitted by the Centre for Social Innovation as an important player in the pan-Canadian social innovation ecosystem. The report called 'Unlocking Canadian Social Innovation'[6] takes an inclusive approach to social innovation that spans system change, social entrepreneurship and culture and is based on decades of experience on the front-lines of social innovation. The CSI contribution to the consultation process highlights the importance of an understanding of 'ecosystems', especially social innovation ecosystems to the success of any individual initiative. Because CSI as a conglomerate of social entrepreneurs, together has long years of experience in creating conditions for other social entrepreneurs to succeed.[7]

The Strategy for Social Innovation and Social Finance by Employment and Social Development Canada resulted in the creation of a Social Finance Fund. This fund is meant to support charitable, non-profit and social purpose organisations in granting access to new financing to implement their innovative ideas, and to connect them with non-government investors seeking to support projects that will drive positive social change. At the end of 2018, the Government announced to make up to $755 million available on a cash basis over

the next 10 years for the Social Finance Fund and an additional $50 million over two years for social purpose organisations (SPOs) to improve their ability to successfully participate in the social finance market.[8] The second announcement has been implemented in 2019 as an Investment Readiness Program (IRP). It is a two year $50 million pilot programme designed to help advance Social Innovation and Social Finance (SI/SF) in Canada by building on existing supports to help catalyse community-led solutions to persistent social and environmental challenges. The pilot will provide a learning opportunity to inform future direction on how best to support and mobilise the social finance sector. The IRP is a foundational element of Canada's SI/SF Strategy. The programme will provide time-limited investments to support a broad range of social purpose organisations (SPOs) (e.g. non-profits, charities, co-operatives, hybrid social enterprises, and mission focused for-profits) in improving their capacity and ability to participate in the social finance market, access new investment and contract opportunities, and support them throughout the innovation cycle (see figure below). So-called Readiness support partners will help administer a large part of the IRP on behalf of the Government. These organisations will establish open and transparent processes to fund and support a broad range of SPOs across Canada so they can access tailored expertise to become better positioned to take advantage of financing opportunities that will become available through the Social Finance Fund, as well as other investment opportunities. These include the Community Foundations of Canada, Chantier de l'économie sociale, Canadian Women's Foundation, National Aboriginal Capital Corporations Association and National Association of Friendship Centres. Furthermore, some funding will be used to strengthen programmes offered by existing expert service providers with the specialized knowledge and services required to help SPOs build their investment readiness. Expert service providers include LIFT Philanthropy Partners, McConnell Foundation (Innoweave), Social Enterprise Ecosystem Project (S4ES), Social Venture Connexion (SVX) and Raven Indigenous Capital Partners. Funding will also be provided to support organisations who can help address system-level gaps on key areas such as social research and development, knowledge mobilisation, impact measurement, building the readiness of social finance intermediaries, and for-profit engagement. These Ecosystem mobilisation initiatives include Canadian Community Economic Development Network (CCEDNet), McConnell Foundation, Carleton Centre for Community Innovation (3ci), New Market Funds, Centre for Social Innovation (CSI), The Waterloo Institute for Social Innovation and Resilience (WISIR), Imagine Canada, Startup Canada, Sauder Social Innovation Academy (UBC) and the Congress of Aboriginal Peoples.[9] Eligible SPOs can

apply for grant funding from readiness support partners and are given the autonomy to purchase time-limited supports from any number of expert service providers to build their capacities in targeted areas to help improve their overall investment readiness. This could include expert services in the following key areas:

1) Early stage innovation (for example social research and development)

2) Strategic impact focus (for example growth ready; impact measurement)

3) Impact sustainability (for example financial sustainability; accessing outcome-based funding)

4) Financial resilience (for example revenue generating; capitalisation structure)

5) Investor ready (for example investee technical skills)

Figure 7: Investment Readiness Programme model (Source: Employment and Social Development Canada [10])

Over the last decade, the pan-Canadian social innovation community connected via the Social Innovation Generation (SiG) network-platform. Social Innovation Generation (SiG) has been and still is an important intermediary in building a national SI network. SiG's mission was to address Canada's social and ecological challenges by engaging the creativity and resources of all sectors to foster a culture of continuous social innovation. It was formed as a partnership founded by four Canadian institutions and organisations which are important proponents of the Canadian SI ecosystem: the J.W. McConnell Family Foundation, MaRS Discovery District, the University of Waterloo and SiG West (formerly with the PLAN Institute). Spearheaded in 2006 by the McConnell Foundation, SiG was a

response to the growing recognition that mounting social and environmental challenges needed to be met by Canadians capable of developing solutions at scale. The McConnell Foundation is a private Canadian foundation that develops and applies innovative approaches to social, cultural, economic and environmental challenges through granting and investing, capacity building, convening, and co-creation with grantees, partners and the public. SiG's activities were supported by a national office located at MaRS Discovery District Toronto. After more than a decade the SiG platform activities ended in December 2017.[11] Individually and collectively, SiG partners served a constituency of nonprofits, charities, social enterprises, cooperatives and social purpose businesses. Committed to tri-sector dialogue and solutions development, SiG also worked together with federal and provincial governments, the private sector, and academe. Our ultimate goal is to support whole system change through changing the broader economic, cultural and policy context in Canada to allow social innovations to flourish[12]. Social Innovation Generation (SiG) has produced a range of materials on various themes related to social innovation: the SiG Knowledge Hub. This is a website designed to provide learning resources about creating conditions for social innovation and to highlight examples in Canada and around the world. This website presents a collection of those materials as well as other relevant resources, and its goal is to connect people interested in social innovation to learning that can support new thinking and new forms of action[13].

Since the activities of SiG have ended, another intermediary was founded, partly to continue SiGs work. This is the platform '*Social Innovation Canada'.* Social Innovation Canada (SI Canada) is an emerging pan-Canadian initiative to connect social innovation practitioners, build the capacity of the SI sector, and elevate this work in Canada and beyond. The SI Canada Secretariat is located at Centre for Social Innovation Spadina in Toronto. Social Innovation Canada operates with support from the McConnell Foundation, Ministry of Employment and Social Development Canada (ESDC) and Suncor Energy Foundation (SEF), a private, non-profit, charitable foundation. The focus of SI Canada is on 'ecosystems', because a robust, connected, social innovation ecosystem inspires new efforts to illuminate relationships between social innovators, bringing together key parts so they can combine to create a much greater whole. SI Canada aims at creating the collaborative infrastructure to connect, support and enable social innovators to maximise the potential for change all over the country. They do so by empowering people, organisations and systems with the tools, knowledge, skills and connections that they need to solve real and complex problems. SI Canada's work is emergent and many things are still being designed.

At this point, the SI Canada team consists of a small 'secretariat' at the national/operations level, working in partnership with regional 'nodes' or host partners in various parts of Canada. Each node has a 'weaver'. These 'weavers' are natural networks who are responsible for convening regional gatherings and learning events to revel, share, unlock, and enable people, organisation and systems to thrive. They meet regularly and work together to reflect the vibrancy, diversity and knowledge that is emerging from coast to coast.[14]

Recently, the SI community founded the Canadian Social Innovation Institute to 'build the field of Social Innovation'[15]. It is a registered charity, working in close cooperation with other actors and activities in the SI community. The SI institute is an educator, content creator and disseminator with a purpose to connect, convene, and support social innovation actors. The SI institute team consists of[16]

- Tonya Surman, Consulting Executive Director, one of Canada's leading social entrepreneurs and innovators. Actively seeks models that harness collaboration and spaces to accelerate system change.

- Chi Nguyen, Director, Social Innovation Canada, a civic leadership and equity champion. Sees the biggest opportunity for transformation as connecting and bridging unlikely partners to help actors align for change.

- Joshua Cubista, Dean, Social Innovation Institute, an experiential designer and facilitator. Engages learning pathways and co-creates toolkits and best practice resources for social innovation and systems change.

As mentioned above, the Centre for Social Innovation has an outstanding role in the SI community of Canada. To a large extent this is due to the work of CSI's executive director, Tonya Surman. Since a couple of years, CSI has had some attraction to policy advocacy, due to its essentially system-changing nature in the SI community. For example, through the consulting work of Tonya Surman, CSI led a multi-stakeholder policy consultation on toxics and children's health in 2007, one which ultimately helped produce a ban on Bisphenol A in baby bottles in Canada, triggering a market transformation. Furthermore, CSI's work on the Social Entrepreneurship Summits of 2007 and 2008, and on the Social Enterprise Council of Canada, has been instrumental in building a movement of practitioners and decision-makers who are beginning to create the conditions that will strengthen the SI community.

Brief outline of the project/ initiative's pathway

The Centre for Social Innovation is a non-profit social enterprise with a mission to catalyse, inspire and support social innovation in Toronto and around the world. Main activities of the CSI are to create and provide community workspaces, incubating emerging enterprises, and developing new models and methods for social entrepreneurship initiatives. CSI's core business is the provision of shared office space. The enterprise rents or purchases space and then divides it and rents it out to small organisations, either as offices, private desks, or coworking spaces (part-time shared workspaces). CSI orchestrates all of the shared services and manages the shared infrastructure while providing a vibrant menu of programmes and activities intended to support its members to foster collaboration and innovation. The difference between the rent (or mortgage) CSI pays to landlords and/or investors and the rent they charge their members is what covers their operating costs[17].

CSI is a collaboration, and it emerged from a collaboration drawing on the various experiences, proclivities, and perspectives of the persons involved in founding the organisation. The Centre was registered as a nonprofit on March 22, 2004. In January 2004, the first meeting of the official founding partners was held, including Tonya Surman as Executive Director. The team decided to move things along as quickly as possible, and set themselves a six-month deadline for getting the operation up and running. CSI was created on a cost-recovery model as a plan according to which there would be enough revenue from the rents to cover operating expenses. Thus, the primary financial challenge was getting started in the first place. Canadian Heritage provided $15,000 for a feasibility study of a shared spaces venture.[18] One important driver of founding CSI was a comparatively low rent agreed with the landlord, Margie Zeidler, who was also one of the founders of CSI and the founder of Urbanspace Property Group, a mission-driven real estate development company. Urbanspace Property Group underwrote the build-out of the space and the start-up for CSI tenancy, including partial support of the salary of the Executive Director and half the salary of an administrator for the first year, as well as an interest-free loan of $52,000. This initial investment totaled over $250,000. Concerning the rent, one important aspect was that CSI had not been required to pay rent until it had its first members. Furthermore, the Execcutive Director, Tonya Surman, brought her successful consulting practice and its revenue into the Centre, and continued to take on consulting work until CSI's fourth year of operation — equally essential to making the Centre work financially. The founders intentionally did not apply for financial start-up schemes like from government assistance,

grants, or private donors. They found that they would have to face certain barriers because they did not fit neatly into any funding model as CSI was a new kind of enterprise and it did not fall into any recognisable or existing funding categories. In the end, Margie's and Tonya's contributions of money, time and labour allowed CSI to circumvent all those roadblocks and enabled the space to go from idea to execution. Tonya developed marketing materials and the founding members sent an email out to their existing networks, announcing the availability of member spaces in the now-named Centre for Social Innovation. At the same time, the team developed a business plan with financial projections, pricing models, space designs, member recruitment guidelines, and a whole host of other documents that were essential to starting up.[19] This included working on membership information. Though CSI is technically a landlord, renting out space to small organisations which are its members, CSI and its community did not want to use landlord-member language and needed to find their own terminology for what they were doing. Representatives of forty organizations came out to the two information sessions the founders held, and twenty-five of those submitted applications for the fourteen available spots.

Starting with 14 organisations back in 2004 CSI today supports over 1000 social mission organisations, with thousands more having graduated through their networks and spaces over the years. From an initial surplus of $572, CSI has reached nearly $9M in annual revenues, with assets over $40M. The organisation has grown at about 40% per year, facing and tackling every stage of organisational growth. CSI is especially proud of the role it has played in co-creating and building the field of social innovation in Canada and their special skill for cultivating social innovation ecosystems.[20] In 2004, CSI opened the doors to their first 5,000 square feet shared workspace in the Robertson Building in downtown Toronto. This workspace provided offices, desks, meeting rooms and amenities to a community of 14 social mission organisations. Within three years, CSI had a waiting list of more than 40 organisations that wanted to be part of the Centre. In 2007, CSI opened an additional 13,000 square feet of space in the Robertson Building, welcoming 75 new socially innovative projects and organisations to their community.

This type of Coworking is only one of the many activities of CSI. To strengthen the SI community, CSI provides Summits designed to spark new collaborations as well as acceleration programmes such as Agents of Change and microloans and free consultation services with experts. Current CSI programmes include[21]:

- The Social Entrepreneurship 101 programme covers all aspects of social entrepreneurship, from making sure to identify the right problem, to testing solutions, turning solutions into a sustainable business model, and measuring its impact.

- CSI's Desk Exchange Community Animator (DECA) programme is a work-exchange programme that trades time for space. DECAs work at a CSI welcome desk for eight hours a week and get unlimited access to coworking space and other benefits of being a member of CSI.

- Peer circles are regular facilitated meetings in the community that leverage peer-to-peer expertise to foster shared learning, growth and collaboration.

- Agents of Change is one of CSI's flagship acceleration programmes. Every programme is different but the goal is always the same: to accelerate the success and amplify the impact of a cohort of high-potential projects. The programme includes unlimited use of workspace and all the benefits of membership plus events, mentorship, workshops and access to capital.

- Climate Ventures are a cross-sector incubator for climate entrepreneurs, innovators, and leaders is placed at CSI Spadina, offering coworking, community, and programmes.

- TechSoup Canada is a programme of CSI which connects non-profits and charities to donated and discounted technologies, such as graphic editing software, office productivity suites, accounting programmes and more. Since 2003, over 26,000 non-profits, charities and libraries in Canada have received over $303 million worth of software and hardware donations through TechSoup Canada. TechSoup Canada is a member of the TechSoup Global Network.

- The Ontario Catapult Microloan Fund enables social entrepreneurs and innovators to grow their world-changing enterprises with loans of $1,000 – $25,000, and CSI's existing programming and services.

- CSI Summits are designed to reveal the assets in the SI community, and spur collaboration and shared learning opportunities. They are the most intentional and successful initiative to connect members in within the community.

The Centre for Social Innovation's space and community has an intentional culture of people who see social or environmental problems and want to find solutions to these. It is

an innovation ecosystem that weaves within and between organisations, and inspires new efforts to illuminate relationships and identifies key actors and initiatives. Collectively, social entrepreneurs, social intrapreneurs, intermediaries and supporters can build an innovation ecosystem capable of self-organising to address one, a few, or many social problems. Outputs of an innovation ecosystem are to a certain amount defined by underlying networks of relationships that create innovation and which are harder to recognise than individual innovators[22]. CSI has taken an active role in incubating certain projects like the Ontario Non-profit Network (ONN). Some of these projects have fizzled out while others have spun out of CSI to form their own organisations. For example, previously incubated projects include the Enterprising Nonprofits Programme, Green Enterprise Toronto, STEPS, FPYN, and others.

For CSI's overall impact the notion of 'from Space to Innovation' is important. Its 'theory of change' captures the way in which CSI creates the conditions for social innovation to emerge:

- Serving as the foundation is the *physical space*, the environment in which members see and feel and touch and inhabit every day. The space is the base of the pyramid because members want to come to work simply to enjoy the space in the first place. The physical space is the container for everything that occurs at the Centre and it sets the conditions for community.

- Community develops as people start to feel comfortable in a space, are happy to spend time in it, and develop relationships with other members doing the same. With some delicate animation, the bonds of community are forged and strengthened, building social capital and a network of relationships. Community relationships allow members to exchange ideas, to collaborate easily, to find services and access knowledge that might otherwise be hard to come by.

- In short, community is what leads to *innovation,* because a community of other creative, engaged people allows you to see an old problem in a new light, and helps you find creative ways of implementing solutions you might not otherwise have considered.

Supporting all the myriad ways in which space and community foster social innovation is the purpose of the Centre for Social Innovation."[23]

Management & Organisation: Who interacts how to facilitate co-creation?

CSI is led by a multidisciplinary team of entrepreneurs, innovators, community builders, system thinkers and designers. Certain organisational functions are in responsibility of dedicated staff positions[24]. This includes a Chief Executive Officer (Tonya Surman), a Chief Operating Officer, a Chief Community Officer, a Director of Partnerships, a Director of Programmes, the Director of Social Innovation Canada, a Director of Social Enterprise, a Director of Growth , a Director of Finance, a Director of Online Services, an Associate Director of Communications, Project Managers, Community Animators (DECAs), an Events Space Coordinator, a New Membership Coordinator, an Events Space and Production Manager, a Diversity Consultant for CSI Staff, Facilities Managers and Caretakers, a Development Writer & Prospect Researcher, a Web Developer and UI/UX Designer, a Social Enterprise Animator, a Digital Marketing Coordinator, a Business Analyst, a Leasing Manager, a Payroll and HR Administrator CSI Staff, a Tech Infrastructure Lead, an Accounting Manager, a Community Membership Administrator, a Design and Communications Specialist and a Content and Engagement Specialist.

The CSI board consists of founding members and important actor of the SI community in Canada, including Marie Moliner, Brian Iler, Rahul Raj, Bernie Li, Tim Draimin, Eric McGoey and Rizwan Tufail.

An important bridge between CSI as an organisation and its members and the wider community are the Desk Exchange Community Animators (DECAs). They work an eight hour shift a week in exchange for access to CSI spaces and network. The DECA's role is to provide cautious animation (instead of programming). The DECA's purpose is to enable community rather than directly trying to create it. Animators help to build CSI's culture. Rather than working directly to form new relationships between members the Centre decided it would act as a facilitator, clearing logistical questions (like phones, printers, internet connections) off small organisations' desks, thereby freeing them up to pursue their goals as creatively as possible. The daily tasks (the printer, the toilet, the kitchen) are a way for the Community Animator to have conversations with community members. These unstructured, day-to-day interactions allow DECAs to gather information, to connect people, create events & programmes to engage the community, and maintain an incredible workplace experience for everyone. Therefore, the DECA's function can be described as being curators of a unique CSI environment, comprising the physical environment, the

social environment, and the psychological environment with the goal to 'spark instigation' among CSI members rather than for CSI to be that instigating force itself.[25]

In order to become a more inclusive organisation and to assess its current inclusiveness CSI conducts Demographic Surveys since 2016. The idea to undertake a demographic survey came from CSI's IDEA (Inclusion, Diversity, Equity and Accessibility) Committee, which is a Board of Directors governance committee. The IDEA Committee is composed of CSI members, DECAs, Staff and Board. Its purpose is to steward and support CSI's work to become more inclusive, diverse, equitable and accessible. The Committee's initiatives have resulted in developing a vision for CSI's work; developing the demographic survey; programming education opportunities; and driving important policy updates such as CSI's Diversity, Inclusion and Anti-Discrimination Policy. The purpose of the demographic survey is to use this data to know who is well-represented at CSI and who is not in order to address the potential barriers for individuals and communities who are currently underrepresented at CSI. To help contextualise the data, we compare it with the 2011 Census data from the City of Toronto (CSI's home base). CSI gathered data on 10 demographic indicators for 4 different CSI subgroups – Staff, Board, DECAs and CSI Members. The community subgroup is also broken down into 4 further subgroups to reflect different membership offerings – CSI Annex, CSI Spadina, CSI Regent Park and CSI Online Membership.[26] With the 2016 demographic survey, CSI explored age, income, gender, race, and more, and used Toronto's demographic data to contextualise our findings. CSI published these findings publicly. Because by surfacing and acknowledging the ways in which CSI succeeds at creating a welcoming community as well as areas for improvement, the organisation can move forward with its commitment to foster inclusivity in their work."[27]

Partnerships and Networks are extremely important to CSI – internally as externally to the organisation. Advancing 'synergies of connection, the explosive potential of partnership, and the transformative power of movements' is key to CSI's mission. Therefore, collaboration is imperative for CSI.[28] CSI offers different sponsorship opportunities, e.g. for sponsoring events, accelerator programmes or (parts of) the space itself. In the broad network of partnerships CSI distinguishes Champions and Partners. Champions are key partners that sponsor and finance major parts of CSI activities such as the Government of Canada, Province Government of Ontario, City Government of Toronto as well as different savings and investment banks and foundations. Partners include Carleton University, Code

for Canada, Impact Hub Ottawa, Maison de L'Innovation Sociale, Ontario Trillium Foundation, Toronto Tool Library as well as Via Rail Canada.

Because of the large variety of members CSI is overflowing with inspiring stories of socially innovative initiatives. One major part of CSI's communication is the stories featured on the website. This includes relevant news and research in the world of social innovation.[29] Social Innovation Canada recently published a blog post detailing some of the biggest social innovation developments that happened across the country in 2018. Some of the work at the Centre for Social Innovation made the list. In addition to recommending the report 'Unlocking Canadian Social Innovation', the post also shone a light on CSI's Six Degrees of Social Innovation and Impact Fest events.[30]

What are the concrete processes and practices of co-creation?

The Centre for Social Innovation has supported numerous socially innovative initiatives and is itself an organisation which creates innovative projects. In brief, the rather new Civic Hall Toronto project will be introduced here as well as the outstanding CSI Community Bond Campaign.

Civic Hall Toronto

The Civic Hall Toronto[31] is a project to provide space for citizens with ideas for innovative community initiatives. It is a 'home for Toronto's civic innovation community'. The project is jointly operated by Code for Canada in collaboration with CSI and the City of Toronto and was initiated by Councillor Ainslie, member of Toronto City Council[32]. The space functions partly as a maker space and design lab to enable people to work with technology and design in the public interest. The project connects government innovators with entrepreneurs, technologists and residents so they can collaboratively address civic challenges. The programmes and events that Civic Hall Toronto offer foster a culture of collaboration across sectors and fields, provide a supportive and collaborative space for learning, creating, and testing new ideas, and encourage greater resident involvement in the design of public services and policy. With the main goal to 'build a better city' and to create a dedicated hub for civic change, Civic Hall Toronto will be a space where City Hall staff and 'Torontonians' work and learn together. The projects starts off with the provision of desk space for those working at the intersections of civic and social innovation. Further

programmes are planned like thematic workshops and hackathons. The project is based on the Civic Hall New York project in New York City. The City of Toronto asked CSI to conceptualise a Civic Hall Toronto and engaged Code for Canada as the content leads, because their experience with the popular Civic Tech Toronto meetup group made them an important partner.

The Community Investment Bond

Non-profits usually depend on donations and grants - be it from government departments, foundations, corporate sponsors or individual philanthropists. They might make own revenues via not-for-profit consultancy work, but they are seldom connected to the topic of 'investments'. In 2009, CSI was in dire search for more space to offer for their tenants and after a phase of idea exchanges and discussions they decided to try creating a 'Community Bond investment opportunity' as an ultimate form of impact investment.[33] The Community Bond can be characterised as an innovation in social finance. It is an interest-bearing loan that is accessible to unaccredited investors and can only be issued by a non-profit organisation. This kind of investment bond allowed CSI to buy a building in the community area of Annex, Toronto, with the help of citizens in that community and their network of supporters as investors. Back in 2009 CSI was already operating 23,000 sq ft of co-working space and had a dynamic membership of over 175 people and projects. Their waiting list of possible tenants continued to grow. As an interesting property came up CSI decided to try to buy a building.[34] To that date CSI had already proven that their social enterprise model was successful, leading to a strong reputation and broad networks in Toronto and beyond. But as a non-profit with only six years in operation and a minimal surplus, the organisation did not have any assets that would be required by banks. The building in focus would cost $6.8 million to purchase and renovate. An almost impossible task.

A major lever for CSI was to secure a loan guarantee from the City of Toronto that enabled them to get a mortgage for 75% of the projected value of the building after renovations. CSI knew that the City had provided loan guarantees to other non-profits before. Therefore, they prepared a proposal to the City which was eventually approved after six months of work. The loan guarantee would help CSI to get the mortgage and it would also demonstrate the City's support for the idea and the organisation. In effect, through the support of the City, the bank provided a larger loan to CSI which was necessary for all renovations, the interest payments would cost less and it increased investor confidence in CSI's project.[35]

But additionally to the loan guarantee, the organisation needed $2 million more to realise the project. At first, there was no clear strategy for how to raise that amount of money in such a short time. This was possible due to the immense work of the executive director and her team, plus dozens of other CSI staff as well as CSI board members, investors, tenants and community supporters. CSI characterises the Community Bond Campaign as an 'ensemble performance'.[36] Initially, the idea of a Community Bond as a financial tool for 'community investment' and 'community wealth' derived from conversations of the executive director with a social finance expert and a social purpose lawyer. Together, they developed an investment plan idea for the community with all necessary legal and financial considerations. Eventually, the Finance Department, the Executive Committee at the City of Toronto and the City Council all approved the Community Bond investment plan. Following that, CSI could start to formally market the Community Bond. CSI chose the rates and length of time for the Bond offerings in relation to their timelines, debt tolerance, and by asking people directly about the return they expected from an investment of this nature. The first investor already made a big contribution with a $150,000 investment, which helped to establish a baseline. In addition, CSI secured the investment of three foundations. Almost all of CSI's Board members and the Executive Director became investors in the project and overall 47% of investors are CSI members.[37]

Overall, in 2010, 58 people collectively invested $2M in the Centre for Social Innovation to buy the building for CSI Annex. Four years later, 227 people invested $4M to buy the building for CSI Spadina.

Specification: What tools and instruments were used to co-create?

CSI offers a lot of programmes which include innovation design methods and other tools. But not all of their activities are design-based. One possibility for participation and communication in form of a tool is provided by the 'CSI Impact Dashboard'. This is an online tool that CSI's social entrepreneurship initiatives can use to analyse and visualise their impact. The dashboard gathers relevant key performance indicators of the initiative, identifying their social impact in relation to various variables, including: against the background of the Global Sustainable Development Goals (SDGs). The tool also allows the creation of project reports, e.g. for the sponsors of the initiatives. With the tool it is possible

for relatively small, non-profit organisations to conduct professional reporting on their activities.[38]

As another example, the Community Bond Campaign emerged as a very dynamic strategy. First of all, it started as a quest for a new financial tool which had no standard model and a team to design this tool with no previous experience in that field. Though, what mattered most to CSI in being successful in the end, was a skilled team and community which where courageous enough to start innovating a financial tool. CSI could rely on a group of advisors willing to engage in the Community Bond. The team divided up roles and tasks to create the Community Bond Campaign. On the other hand, the core staff team at CSI could focus on keeping day-to-day business running. Eventually, all of CSI's team got involved in campaigning the Bond. A lot of decisions had to be taken in order to come up with a deal structure. This was not a linear process but involved inputs from a variety of actors. The Community Bond as an investment concept required at least the contribution of a knowledgeable lawyer, a financial expert to assemble projections and budget documents, communications staff, project managers and a bookkeeper. The campaign on the other hand, required the same people and even more actors involved in communicating and marketing. A Community Bond offer will not be successful if no one is willing to actually invest. Therefore, CSI started an investment campaign, including an investment package and numerous forms of communication. A general call-out to the mailing list was done, already leading to one of the first Community Bond investments. Furthermore, CSI conducted a series of pitches where they informed about the Community Bond investment opportunity as well as tours of their space and programmes. The team created an investment information package, including information about CSI's mission, values, history, operations and financials as well as the nature of the investment opportunity and an assessment of the likelihood and scope of associated risks (terms and conditions etc.). During the concept development CSI directly talked to potential investors in their community but also more influential organisations to learn about expectations of both financial and social gains. This had been an iterative dialogue process to which CSI established the terms and conditions, the language, the arguments, the prospects etc. along the conversations. This way, community investors helped shaping the Community Bond concept.

Which learnings emerged?

For CSI in general and especially concerning the Community Bond, the importance of having a powerful idea that resonates with people has been crucial to the success.[39] This relates to the fact that CSI had two major activities at that time: On the one hand the Community Bond campaign, and on the other the day-to-day business of CSI as a social enterprise. Therefore, the staff had to take double the effort and an overlap in human resources, time, energy and money had to be planned accordingly. This included capacity challenges such as ensuring the team had the necessary skills to properly develop, launch and manage a financial tool like the Community Bond and to appropriately manage the resulting organisational growth. Furthermore, it was vital to CSI to build up a strong relationship with their supporting financial institutions. The CSI Board offered invaluable advice and opened up the bond opportunity to their networks.

During the bond campaign, CSI had to handle changing commitments by investors over time. A promising conversation may not result automatically in an investment and confirmations of payment may be withdrawn later on. The team needed to sustain their own passion and commitment throughout the process and learn to handle ups and downs in that field – on the level of personal reference and organizational readiness.

In developing the Community Bond concept, CSI and their group of advisors soon realised that there were hardly any major legal constraints to the idea, but the real challenge was convincing everyone else to develop a similar understanding and to think of the Community Bond as a promising financial tool. Though, as the bond is an investment some financial institutions had difficulties in acknowledging this new 'buy-local' impact investment opportunity. Especially concerning customer and investor protection rules some actors were quite hesitant. Two aspects seem to be especially relevant to CSI:

1. A project like this requires incredible support and CSI's team of experts had just the right mix of skills and enthusiasm.

2. Community Bonds turn supporters into investors and democratise finance.

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Ocean Living Lab - Smartifier Case | Finland

Ines Vaittinen (ENoLL)

The Co-Creation in the Ocean living lab aimed to develop a companies' service design further and internationalize it through joint experimentation in a series of co-creative testing and validation activities with potential end-users and stakeholders. It is a Finish product developed and tested in the framework of a regional funded project which was looking for an international partner to develop their service design further, gather feedback from local users in other countries (Spain and France in this case) and internationalize their service.

What is the project/ initiative all about?

Smartifier is a company originally established in Finland that designs different products and applications. In this case Smartifier is the name of the project that Ocean Living Lab has been working for in collaboration with the company. Smartifier project aimed to test the usability and utility of a product in the pre-commercial phase, involving end-users while also exploring international partnerships in Spain and France. Ocean Living Lab entered this testing and further design phase of the product through an open call for a

tender, that aimed to develop the company's service design further while also internationalising the product-service concept through joint experimentation in a series of co-creative testing and validation activities with potential end-users and stakeholders. Through this international collaboration, Smartifier could gather feedback from local users in other countries.

Thanks to the Living Lab methodology, the usability and usefulness of the platform was analysed in order to explore its potential for exploitation and internationalisation. This was achieved through testing and analysis of the user experience through three-week pilot activities with different end-user groups (technology companies, health professionals and athletes). The end result was the valuation of one of the products of the Smartifier Company: a standout balance board and the accompanying application.

The standout balance board can be used for different purposes, for example for rehabilitation of ankles or knees, or simply for specific exercises to promote stability. It can also be used in rehabilitation or physiology, clinics, etc. The project aimed to test these use cases and the utility of the product in these.

The difference between the balance board and other competitors in the field is the accompanying application that allows the balance board to be used also in gaming. With the Smartifier balance board and application the user can thus play a video game while completing the exercises on the board. The games can be played as single player or in competition with other players, for the different exercises. The board can be used by private users to enhance their stability and physical wellness, as well as by professionals in physiology, physicians or even by coaches and sports teams. There are many scenarios for the utility of the product, and the aim of the project was to discover the added values for selling these products to the different markets.

The project duration lasted for roughly five months, of which a three-week interval was dedicated to the product testing phase with the users. Previous work with the company (Smartifier) preceded the testing phase, and translation of the application to Spanish was required. A questionnaire was prepared for testing with the users. Prior to the testing phase also a recruitment phase was required and post-testing a period of analysing the results followed. The project was initiated in 2018.

Context and environment: Where does it all take place?

Ocean Living Lab is a transnational Living Lab, therefore being able to deploy the experimentation with partners both within Spain and also in France. Historically the Basque country is divided between the French and the Spanish side, allowing Ocean Living Lab access to the French side also even if physically located in Spain.

Within this case a lot was learned about the differences between the three countries involved: Finland, Spain and France. Differences were found in terms of design needs, values and/ or requirements that can be found depending on the gender. Different focus groups with end-users being women and elderly were organised, including the gender and age dimensions in the case. Based on this inclusive case design, the evaluation of the usability and utility of the product was completed, detecting problems encountered by each user group, and identifying improvements to be considered, encouraging users to express their thoughts and attitudes towards the tested product.

Regulatory norms within the European Commission were used in both cases regarding user selection and in terms of their acceptance within their participation in the process, protection of rights etc. Therefore, as the project followed known limitations, the regulatory frameworks were not seen as a challenge influencing the process, rather the known processes were followed exactly as usual.

However, some problems were experienced regarding the application and the connectivity of the product. At the time the application the opportunity of using the service within one application or one device together for a different group of people was not yet conceived. During testing, for example with the Pilates group, it was not possible to see who was performing the test as no different user profiles were provided within the same application. Some technical difficulties followed regarding the application in order to be able to design the user participation in a way that would allow such dynamics with groups.

Brief outline of the project/ initiative's pathway

The project was originally a regional project in Finland. The original project was called the spinning pilots project where students from Universities of Applied Sciences/ general Universities and health tech companies were linked together in order to co-create and test ideas, concepts and prototypes in living labs, real-life environments. Laurea UAS

implemented the project together with Helsinki Think Company, HealthSPA and Metropolia University of Applied Sciences with support from European Network of Living Labs and Forum Virium Helsinki. Public funding was received from Helsinki-Uusimaa Regional Council and supported the implementation of the strategy for Smart specialisation for Uusimaa region in Finland; priority Human Health Tech.

After, a tender followed, organised by Laurea University that invited new partners to submit their proposals for facilitating the testing in their local communities and internationalisation of the product. Ocean Living Lab won this tender and from there on, the work with the Smartifier project in Spain and France began.

Co-creation was deployed not only for the testing and experimentation phase as emphasised in the description of the project, but also in other phases of innovation. The initial co-creation of the project had already taken place in Finland prior to the start of the Smartifier project, but it was necessary to conduct initial phase co-creation also in the local context for this project. Through the Smartifier project, the initiators were looking for partners with whom they could develop the technologies and services as well as products in rehabilitation and well-being, that they were already designing, to earn feedback from local users about their product.

The first step in the project was to plan the engagement of the target group: athletes and persons active in sport, as well as senior citizens or working age people. Ocean Living Lab decided to focus on all three different user groups, as they have the ecosystem with the possibility of engaging and testing with all of these kinds of users. Different criteria were used for the different user groups: for those active in sports the focus was on the app, the usability of utility of the product for the improvement of daily training. At the same time, in the case of ankle sprain prevention and recovery and the point of view of the senior citizens the focus was more on the aspects of usability and utility of the product regarding full prevention or functional ability and maintenance. For working people, the project ended up focusing more on the collaboration with companies that are associated to the cluster of Ocean Living Lab. The aim here was to maintain a physical activity during the day, preventing back pains etc. in the working context. It was important that both men and women were engaged throughout the project, and the percentage of women participating within the project was quite high.

The three user groups were not mixed during the co-creation activities, but rather separate experiments were designed and tailored to each – running the experiment three times, throughout the three-to-four-week period. The largest participation in the events was from the 'silvers' group, the ageing population who attended events with up to 45 persons – mostly women. This level of participation was reached by collaborating with an association, and for the sports sector also the participation was linked to a group of pilates and a football club. For the working population the tests were performed in collaboration with a coworking space in Bilbao, and different working environments in companies in other locations in France. Therefore, it was clear that for each experiment, a strategic partnership was formed with relevant actors in order to facilitate testing in a real-life environment.

The project brought stakeholdersin co-creating solutionstogether and bringing together the different partners opened all the different avenues for diverse partnerships for scaling up. It gave the opportunity to study possibilities and interests of scaling up products and services to new sectors through pilot participation and the internationalisation of these. The participation or collaboration within internationalprojects improved the products or services process. Co-creation in this case provided valid values for the design and usability or agility per se of the product or service, but also for the scaling up of the product or service within the exploitation strategy side.

Management & Organisation: Who interacts how to facilitate co-creation?

The project was also realised in collaboration with Laurea University from Finland who facilitated the co-creation process overall. The contract for the project was set up between Laurea University and Ocean Living Lab, Laurea University being the partner who was funding the tender.

Laurea University and Ocean Living Lab are both certified Living Labs and as such very familiar with co-creation with prior experience in orchestrating such processes. It was rather easy for the Living Labs to fit their expertise into this project as they are already dynamic, already have the ecosystems in place and already have co-creation processes established. This also allowed to involve participants outside from the three user groups – not limiting the scope just to the users listed but also exploring the possibilities with the wider group of stakeholders.

In addition to widening the user groups beyond the initial context, the Ocean Living Lab also allowed the project to extend between the Living Lab also widened the geographical area from Spain to include also the French side of Basque country. Through this collaboration the project gained access to testing the products and services within two different countries at the same time. The user base in France and Spain already existed through the Living Lab, providing access to the different points of view and different stakeholders or collaborators in the two areas.

Open collaboration with the Smartifier Company that offered the opportunity to validate the product included also the requirements and user requirements from the company's side. From Ocean Living Lab, Smartifier gained access to local collaborators in two different countries providing them access to a bigger potential market.

A strategy was developed to align with the already existing and wide-reaching ecosystem around the Ocean Living Lab, involving the university and clusters, but also small and large companies. Quicksilver was also engaged in the project, providing a new point of view for the balance board and different exploitation strategies – targeting also surfers and skateboarders. The offer was then adapted also to this niche market, with an exploitation strategy to their product and potential marketing channels. The project therefore did not analyse only the product itself but also the merchandising as a whole, and the process of co-creation led also to the analysis of the box in which the product was housed, widening the scope to include packaging design as well.

What are the concrete processes and practices of co-creation?

The phases followed through the co-creation started with a questionnaire, deployed separately to all the four different user groups – the focus of the questions was different for each of the groups. During the three to four week piloting phase the tests were also run in parallel between the different groups, at the same time the analysis of the questionnaires was completed. The phases followed by all were the same, with only slight differences between the timings of the different activities.

Throughout the process, different partners were involved in the process. Workshops were held with students in collaboration with one of the local universities, focusing on the market and the business. A one-day testing activity followed from this, adding a spin of

creativity to the process – something not considered in the initial tender but in any case, performed by the Living Lab, in order to gain such outside perspectives. This did indeed succeed to provide added value to the testing, contributing different points of view not only for the product but also interesting ideas emerged regarding the packaging itself as well. Neither Smartifier nor the Living Lab were focusing on the packaging at the moment, but the point was raised by the students in this phase. In addition, Ocean Living Lab added much more detail into the exploitation phase of the product than expected by the company – taking into account the existing ecosystem around the Living Lab and utilising this as a strength.

Through the co-creation activities different user scenarios were found than those initially imagined by the company. Given the possibility to test not just in two markets but in two developed ecosystems, with access to industrial and end user ecosystems surrounding the Living Lab, it was possible to provide an overview of the different future possibilities and not focusing solely on the product itself. This dynamic environment proved the possibilities that can emerge from collaboratively improving these kinds of innovative products, while also given the possibility to scale up and even internationalise it. Different markets, different perspectives, different users and tests in different user scenarios, different countries all gave a value in providing various points of view.

The access to the ecosystem provided the possibility to see or to balance the possibility to have different businesses and different scenarios. Potential collaborations with companies emerged and created further business strategies for the future.

The experiences with co-creation from the participant's side were collected through questionnaires for each of the focus groups, focusing on the different aspects to take into consideration on the usability and utility point of view.

Through the collaborative process, almost two months were spent on designing the co-creative process itself before the start of the activities, including the design of the questionnaires, planning the testing and experimentation phase etc. A workshop was also conducted in order to design the questionnaires with the users input already.

Specification: What tools and instruments are/ were used to co-create?

The questionnaires were structured and semi-structured, two open workshops were hosted – one in Spain and one in France. The workshop in France involved University students. The workshop in Spain was hosted in a co-working space, where participants could also test the product.

No special methodology was used in the workshops, but the workshops were designed by the facilitators for these sessions specifically. Each group required a different style of workshop design to match the needs of the aims of the testing and the users. The setting was very open and dynamic, simulating a real-life environment allowing participants to test the product without a special methodology to follow.

The participants were satisfied with the experience and keen in keeping up with the improvement process of the product itself, knowing and being aware of the final product itself. Participants were therefore engaged, and some are known to have continued its use also.

The project was used as a use case example of open innovation and cocreation methodologies and user engagement at the Ocean Living Lab. Currently, it is widely disseminated as one of the activities that Ocean Living Lab has successfully completed.

The international collaboration and internationalization aspect of the project was very successful, in proving the value of the Ocean Living Lab ecosystem in scaling up of products and services. This is one of the main aims of the Living Lab. The project also provided further opportunities for learning as a different approach was utilised in the case, giving possibilities to the continuation of services to the company in the end.

All stakeholders in the process were very involved in the project and with a clear and contributing role – the relationship did not resemble that of a consultant – client, but rather a collaborative effort. Ocean Living Lab learned a lot about the different kinds of value that they are able to deliver to companies, including bringing a product or service to market beyond the cocreation of the product or service itself – and the collaboration with quicksilver and Smartifier has been a fruitful declaration between all parties. Ocean Living Lab was also able to connect all of these partners to other Living Labs and has the connections to many other Living Labs across the globe through ENoLL.

Which learnings emerged?

The added value of including different user groups, stakeholders and partners was a clear added value that can be highlighted from this project. The importance of having an inclusive design within the creative process was very important, to involve different people and adding richness to the design by considering the different types of users in an inclusive way. Different activities and co-creative processes were used, not only for the structural design of the end user testing but also in terms of the process in itself and the different workshops ran, a lot was learned for the future.

The open workshop methodology and brainstorming methodology were a nice output, gathering learnings also from those open workshops. In addition to the end user engagement, the possibility of offering something much further, beyond product improvement to business design and partnerships was a clear added value in the project. The Living Lab acted as a key intermediary in the process, between potential business collaborators and SMEs willing to test the products and services. New ideas for exploitation opportunities and business market potentials emerged.

The additional idea of focusing on the packaging was also a great added value that was not foreseen at the beginning of the project.

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3.3.2. <u>Case studies in Policy Making</u>

Borgernes Hus (The Citizen House) | Denmark

Stephanie Joy Hansen (Danish Design Centre)

An Innovative collaboration between the city of Odense and two design agencies has created a solid concept for the development of the city's most pivotal house, creating a shared urban space for citizens and businesses alike. The City of Odense is project owner. A series of co-creation tools made it easy and flexible to create the future residents of the house. One example was the use of personas and visual maps, translated from interviews with the citizens. Moodboards supported the development of ideas.

What is the project/ initiative all about?

The Citizens' House ('Borgernes Hus' in Danish) in Odense (the third largest city in Denmark) can be characterised as a modern assembly house, where a number of the traditional welfare functions are rethought in a modern context – with learning, dissemination and civil society as the guiding principles. The house opened in November 2017 and hosts the Main Library and the Music Library (public libraries), the Citizens' Service, the Volunteer Centre and the Civil Society Centre. The Danish Design Centre (DDC – more detailed description of DDC in section 4) was engaged in the project as a strategic advisor. An idea catalogue for the house was produced by the design companies Urgent.Agency and Blue Bakery. The architect/ engineer companies AI and Henry Jensen did the programming and interior design of the house on the basis of the idea catalogue.

The Citizens' House was very much co-created in the first place and now, with the house having been built, co-creation is a guiding principle in the everyday functions of the house. This case study will focus on the development of the Citizens' House, not least the development of the idea catalogue. The idea catalogue was produced on the basis of a design-driven process with three main target groups: 1) The residents (the libraries and so on), 2) the users (of, for example, the libraries), and 3) businesses.

The cross-cutting themes addressed in the case are 1) 'Gender, diversity, inclusion, and intersectionality', 2) 'Public-private partnerships', and 3) 'Innovation procurement'. The case tackles the societal challenges of 1) 'Europe in a changing world - inclusive, innovative and reflective societies', and 2) 'Health, demographic change and wellbeing'. The mission

of the Citizens' House is to support the life projects of the people in Odense. By bringing together the mentioned residents in a common house with shared facilities and a shared entrance, opportunities for new collaborations and approaches arise. This applies both across the residents of the house (from a more internal, municipal perspective) and across the users of the house who will experience new physical spaces and meeting places for community. The house thus functions as a meeting place that creates and develops communities across traditional divisions between municipalities, private actors, citizens, associations, volunteers and other actors. The possibility of dynamism and flexibility in relation to activities and services ensures that the content is relevant at all times to the needs of the citizens, increasing the chances of the house being used.

The Main Library has the classical library functions, but it is also a place where citizens can meet with popular contemporary authors, watch theatre and movies together, become more familiar with IT and smart gadgets, and meet with others around literature, movies and music. The same goes for the Music Library which has a concert stage, a sound studio and a practice room for musicians and bands. The objective of the Citizens' Service is to make it easier being a citizen in Odense, and they, among other things, administer applications for public day-care facilities. The Volunteer Centre Odense is an association that supports, develops and promotes volunteer activities in the municipality and the Civil Society Centre offers one coordinated entry for all active citizens, volunteers and associations into Odense. The Citizens' House also offers common areas for interaction, ideas and creativity at the Citizens' Square and the Citizens' Workshop where people can go and participate in co-creating activities. The house offers meeting facilities which can be booked by local associations, citizen groups, students and companies. Political talks, community-relevant debates, informative youth events for first-time voters are also hosted in the house. Also worth mentioning is that the house functions as a living lab and makerspace where local companies can test new products, solutions and technologies.

Context and environment: Where does it all take place?

The Citizens' House (covering 9,000 square metres) resides in an iconic building in the centre of Odense (adjacent to the central train station) which has been completely renovated. For a long time, the building had suffered from being a transit point and a place where people on the edge of society hung out. It was not a place where people wanted to go,

and people tended to either avoid the building or make sure to go in and out as fast as possible on their way from one type of public transportation to another. Also at that time, the building hosted the Main Library, the Citizens' Service, the Volunteer Centre as well as a number of local businesses and NGOs, but there had not been thought out a coherence or synergy between the residents.

The vision of the city council in Odense was to make the building an attractive gateway to the city again and for the building to play a role as a lively and well-visited urban space. A place where citizens would feel welcome and which the city's companies would use actively when developing their business and creating new products and solutions – a central hub for the city's life. It was a clear strategy for the municipality to create new value through striking architecture and new identity (now, a golden facade catches the eye, and a gold-coloured staircase ties the whole house together).

The municipality was very aware that urban development projects often don't live up to the good intentions. The citizens might stay away from the city's new, beautiful square or local businesses might not take part in ambitious urban development projects and thereby miss out on great business opportunities. The municipality wanted to anticipate these scenarios and ensure that the great potential of developing the city in close cooperation with residents, users and companies was exploited. That is why the municipality decided to partner with DDC and go through the user-oriented design process that will be further explained in sections 5 and 6. The motivation for creating the Citizens' House was a combination of push and pull factors. The former building didn't function as it should. At the same time, the municipality saw an opportunity for rethinking the way the municipality and the citizens jointly provide and generate welfare. An opportunity to create synergies between municipal services, private actors, citizens, associations, volunteers and other actors.

Brief outline of the project/ initiative's pathway

The kick-off moment of the Citizens' House can be dated back to 2013 when the city council decided to bring together physically the Main Library and certain functions of Citizens' Service (later on, other residents came on). In 2014, the project was named the Citizens' House and the city council allocated 200,000 Euro (1.5 million DKK) to the project for a maturation phase focusing on construction and economy. The year after, in 2015, the city

council decided to go through with the Citizens' House with funding from the municipality (2 million Euro – 15 million DKK) and private investors (2.7 million Euro – 20 million DKK). The same year, a pop-up prototype of the Citizens' House was produced and tested in the centre of Odense. All of the activities described above can be characterized as part of the first phase of the development of the Citizens' House (but also as a design loop in itself which will be further explained later).

The second phase of the project covers the engagement of DDC as a strategic advisor and the design-driven process leading to the production of the idea catalogue for the house which was carried out to be the design companies Urgent.Agency and Blue Bakery. DDC was engaged in 2016. Prior to this engagement, DDC and Odense Municipality had had meetings and small collaborations on other matters. Earlier on, Odense Municipality had also engaged with MindLab (the former Danish policy lab) where a number of employees now working in DDC (including the CEO, the COO and the programme leader who was going to work on the Citizens' House) used to work. The relation to DDC (and not least its employees) as well as the knowledge of co-creation and design methods was thus not something completely new at the time around the development of the Citizens' House. Urgent.Agency and Blue Bakery were chosen to carry out a user-oriented design process through an open call and they carried out their work in the Spring and Summer of 2016. The idea catalogue describes 1) an overall disposition concept for the areas and functions of the house, 2) the central values of the house, and 3) interior design principles.

The programming of the house (building and furnishing), on the basis of the idea catalogue, can be characterised as the third phase of the project. The architect/ engineer companies AI and Henry Jensen were chosen to do this after an open call. Meetings were held between the design companies and the architects/ engineers to ensure a thorough hand-over of the idea catalogue to form the basis of the programming. A prototype of the house was developed which was tested at a workshop with the residents in August 2016. The work on the house continued, and in November 2017, the Citizens' House opened to the public.

As will be further described in sections 5 and 6, Urgent.Agency and Blue Bakery focused on the residents and their users when developing the idea catalogue. In parallel to this, the municipality decided to let DDC run a process focusing on the involvement of businesses (the third target group mentioned in section 1). The purpose was to get input to how the

house could be developed, so that companies could use it actively in their business development (for example by testing their products in the house).

Management & Organisation: Who interacts how to facilitate co-creation?

The project owner of the Citizens' House is Odense Municipality (led by the Administration for City and Culture). As described in the previous section, co-creation and design methods wasn't something completely new to the municipality when starting the work on the development of the Citizens' House. From the beginning, the municipality had a clear idea about how they wanted to go about with the project: They wanted to co-create with residents, users and companies and rely on design methods. The municipality already had an in-house designer (who was the one responsible for the production and testing of the pop-up prototype of the house in 2015). And, as mentioned in the previous section, the municipality and DDC had contact and meetings in relation to other matters prior to the official engagement of DDC to the Citizens' House. DDC is the national design centre of Denmark and works on a number of initiatives for public and private actors in areas such as health, innovation and cities with an objective to promote the value of design for Danish businesses and industry. The main way they do this is by giving companies and organisations an opportunity to test how design practices can boost innovation and development. The previous contact between the municipality and DDC contributed to the municipality's knowledge of co-creation and design methods and laid the foundation for an interest in using this approach in the process of the development of the house. The task for DDC as a strategic advisor was to a large degree to translate the language of co-creation and design methods into a language understood by the municipality. A steering committee was set up to manage the project, consisting of members from the municipal administration and a single member from DDC (the programme leader from DDC's platform Design Cities which was in charge of the project). Also, a project group was set up with members from the administration and one from DDC (a project manager from the same platform).

Urgent.Agency and Blue Bakery were chosen to carry out the user-oriented process because they showed a great understanding of what was essential to the municipality and DDC: 'To get the residents, citizens, businesses and the association's life involved in a process about how the house should look and what it should accommodate'. AI and Henry Jensen, doing the programming of the house, were involved late in the development process and did not

have a big influence on the final concept in the idea catalogue. This caused some challenges of ownership of the final concept for the programming of the house. This was eventually overcome by dialogue and bilateral meetings, but one important learning is to better integrate the different actors in the early stage of the co-creation process, including those responsible of implementing the ideas and concepts.

What are the concrete processes and practices of co-creation?

Co-creation plays an important role in this project. The Citizens' House was co-created when it was first built, and the whole function of the house today relies on co-creation. In section 1, it was described how the residents of the house not only offer their traditional services in traditional ways. For example, the Main Library facilitates meetings between users in relation to literature, movies and music. And at the Citizens' Square and the Citizens' Workshop, people can participate in co-creating activities. Worth mentioning is also that the Citizens' House today functions as a living lab where the municipality, together with local actors, can test prototypes and develop solutions (based on the Smart City approach). For example, various types of sensors are installed in the house measuring movement and indoor climate. The rest of this section will focus on the co-creation process related to the development of the house. Three main groups of stakeholders were the target of this process: 1) The residents (the Main Library and the Music Library, the Citizens' Service, the Volunteer Centre and the Civil Society Centre), 2) the users of the house (citizens in the municipality), and 3) businesses.

As mentioned, one of the first things done was building and testing a very early pop-up prototype of the house over a period of two months to get an initial idea of how things would work out. This process was carried out by the municipality's in-house designer (before the engagement of DDC, the design companies and the architects/ engineers) and can in some way be seen as a design loop in itself. With Urgent.Agency and Blue Bakery (and DDC) on board, an intensive user-oriented design process was initiated, leading to the production of the idea catalogue for the house. This part of the project covers the phases of (a new loop) of problem identification and understanding/ ideation (and also small-scale prototyping and testing). Urgent.Agency and Blue Bakery focused on the first two of the mentioned groups of stakeholders: The residents and the users. The residents were seen as important to involve as they were the ones to move into the house and use the house in

their daily work. The needs of the residents naturally varied according to their different functions and users. The balancing of these needs caused some challenges which will be further explained in section 7. The users of the house are, too, a very diverse group of stakeholders as this in practice is all citizens in the municipality – people borrowing books from the library, people renewing passports at the Citizens' Service and so on.

The engagement of the residents and users in the creation of the house was seen as important because knowledge, engagement and co-ownership from the residents and users were seen as a prerequisite for creating an innovative, relevant and functional Citizens' House. The purpose of the process was 1) to identify the needs of the actors (residents and users), 2) to identify possible synergies and challenges, 3) for the residents to get to know each other and their users better, and 4) to develop a number of principles for the overall use of the areas and the interior design. The activities in this phase include user interviews and meetings, an inspiration tour, co-creation workshops and an analysis of the culture, space and needs. This will be further explained in section 6.

The idea catalogue was developed and qualified along the way through the residents' input, responses and ideas (among other things, they were the target group of the co-creation workshops). Moreover, the residents played an important role in the engagement of another group of stakeholders, the users. Thus, it was the residents themselves – and not the design companies – who were leading the engagement of their respective users. An important objective of the process was to inspire the residents with new methods to engage their users and to make sure that knowledge about the users was embedded within the residents themselves (and didn't disappear when the design companies had done their job and left the project). This 'outsourcing' also helped to lower the workload of the design companies. As mentioned, a third target group was the businesses. It was important for the municipality to make the house relevant for the businesses, so while the design companies focused on the engagement of residents and users, DDC was put in charge of a process focusing on the businesses. Around 15 businesses and five experts within the field were involved in the process who, among other things, participated in workshops with the objective of identifying how the house could be of value to businesses.

With the idea catalogue produced, the architect and engineer companies AI and Henry Jensen were engaged to actually build the house and do the interior design. First, however, the project went through a phase of prototyping and testing which will be further described in section 6.

Specification: What tools and instruments are/ were used to co-create?

As already mentioned, a *pop-up prototype* of the Citizens' House was produced and tested before the engagement of DDC, Urgent.Agency, Blue Bakery, AI and Henry Jensen. The prototype was a way to do some early field research and was created as a shop in the centre of Odense. The objectives were that citizens could gain knowledge about the project and have the opportunity to provide input, and that the municipality could enter into a dialogue with the citizens and test and develop new collaborations and concepts before deciding who should be the residents of the house. Around 500 people came to the shop over the two months that the shop was there.

In the phases of problem identification and understanding/ ideation – with the idea catalogue as the end result – the two design companies carried out an *analysis of the culture, space and needs in relation to the house and its residents*. In charge of the engagement of their own users, the residents carried out *questionnaires* for their respective users and conducted a *user meeting* at Odense Castle. At the meeting, employees from the different groups of residents facilitated focus groups interviews about the users' relationship to the city and wishes for the future Citizens' House (assisted by the design companies). The residents were themselves responsible for the recruitment of their users and were told to select participants spanning across age, gender and profession.

Two *co-creation workshops* were facilitated by the design companies, this time with the residents as participants. The workshops focused on 1) needs and knowledge sharing, and 2) scenarios for the use of the areas in the house (zones). A number of design grips made it easier for the residents to be co-creators of the new house. Among other things, the residents worked with *mood boards*, focusing on moods, materials and interior. The mood boards supported the idea development in relation to activities and spaces in the house. The residents also worked with making *sketches* as prototypes of the zones of the house. In addition, the residents went on a *study trip* where they visited different places in the city to reflect on how different spaces and elements work from a user perspective.

Data from interviews and meetings with users were translated into *persona cards* impersonating users of different age, gender, employment and interest. Based on the persona cards, the residents went on a user journey around the old house and discussed user needs. For example: If I was a young user of the library, what would I then want the

library to provide? This exercise was really helpful as there at times was a tendency for the residents to think about themselves instead of their users.

After all of these activities had let to the creation of the idea catalogue, the idea catalogue was handed over to the architect/ engineer companies AI and Henry Jensen. Meetings were held between all of the actors engaged (the municipality, DDC, Urgent.Agency, Blue Bakery, AI and Henry Jensen) to ensure a thorough hand-over. On the basis of the catalogue, AI and Henry Jensen developed a *prototype* of the Citizens' House which Urgent.Agency and Blue Bakery helped testing.

Which learnings emerged?

The accommodation of the needs of the different residents was a challenge at times as the needs could vary a lot from one resident group to another. For example, some of the residents wanted open spaces whereas Citizens' Service needed more discretion as some of their users are vulnerable citizens (for example people receiving cash benefits). This was a challenge which needed attention throughout the project. In the initial phases of the project, there were some internal struggles and negotiation between the different resident groups in the municipality. The municipal administration responsible for the libraries of course wanted the libraries' needs to be prioritised, whereas the administration responsible for Citizens' Service wanted their needs to be prioritized and so on. The struggles were overcome by a close dialogue and by creating an understanding of the many internal needs and it highlights the importance of creating and working towards a shared vision.

The use of design grips helped on this matter – to have visualisations and something concrete and tangible to discuss and co-create around. These methods worked really well at, for example, the co-creation workshops for the residents. A learning from the process is that it is important to communicate to participants testing a prototype what the prototype really is about. There was some confusion about this in relation to the testing of the pop-up prototype where people didn't know what they could do in the shop and what the purpose was.

A very positive experience from the process was to let the residents be in charge of the engagement of their respective users. This helped building up the residents' competencies within co-creation and design methods and it meant that it was the residents themselves

who had the important knowledge about their users and not the design companies who would take the knowledge with them after the end of the project.

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<u>Interviews</u>

Monica Maria Moeskær (Danish Design Centre, senior project manager)

Runa Sabroe (Danish Design Centre, programme leader)

Lab of Collaborative Youth (LoCY) | Portugal

Olga Glumac (Sociedade Portuguesa de Inovação - SPI)

This Lab aspired to improve intergenerational collaboration between adults and youngsters, by sensitising all parties to acceptance of plurality in an understanding of key concepts related to youth policies and active youth participation in school, neighbourhood and city. It based in Porto-and focuses on the support of Youngsters self-empowerment as learners, citizens and co-creators, while at the same time giving an opportunity to other stakeholders to reflect on this processes and possible changes in their own methodologies.

What is the project/ initiative all about?

Lab of Collaborative Youth (LoCY)[1] is a platform grounded on the youth-driven co-design research and practice with the stakeholders of the local communities. In 2014, the initiative was born out of the curiosity of few practitioners eager to acquire understanding on how and in which way the local youngsters (12 to 16 years old) are engaged into the decision-making processes in the compulsory basic education context and the city of Porto. This initiative has thus intended to demonstrate how local students of art and design (16 to 20 years old) could build their capacities in citizenship and co-design practice with peers.

The LoCY's subscription to Participatory Design/ Co-design led to developing democratic design experiments co-created and co-owned with the youngsters. By democratic design experiments are considered the exploratory ways of applying co-design practice in order to form local challenges and publics around them[2]. Considering these experiments are

political processes as well, LoCY uses them as a playground for staging and implementing a *Learning Framework in Active Citizenship: Active Learner is an Active Citizen*. The framework addresses the youngsters' multiple-role engagement and self-efficacy when co-designing as citizens, students/ learners, friends/ peers, and participants/ end-users. The precondition to framework use is an access to the school community and its students.

Through partnerships, LoCY demonstrated a capability to act as an intermediary in the school context and among intergenerational community members when assessing the learning and organisational challenges. In correspondence with the existing institutional school structures and the available resources, LoCY's activities were either carried out as the curricular or extracurricular in the partners' spaces and counted with 91 youngster-participants. From 2014 until 2019, there were four co-design programmes developed and implemented:

- *Recreio dos Pioneiros* (2014 – 2016);

- *Illustracionário, à minha maneira 1.0* (2015);

- *Ilustracionário, à minha maneira 2.0* (2017); and

- *Codesigners da Sala 52* (2018 – 2019).

While staging and implementing moderation of the participatory approaches, some of the outcomes were co-produced together with the youngsters:

- Local needs assessment;

- Short-term youth bottom-up initiatives (i.e. Christmas Pioneer Party, Football tournament, co-design challenges, collaboration between two schools);

- Visual dictionaries for youth participation and youth policies;

- Open exchange spaces for intergenerational discussions;

- Learning framework; and

- A community of young co-learners/ co-designers.

LoCY has contributed to raising the awareness and initiating the discussion among the city stakeholders on the topic of relating active youth citizenship with active learning, and vice versa. The effective co-design methods and tools developed through the intergenerational collaborative projects were scaled from the school context to the neighbourhood and to the city context.

Context and environment: Where does it all take place?

Porto is the Portuguese second-largest city with 215.284[3] inhabitants and with a territorial area extending to 41.4 km^2 in the North Region of Portugal[4]. The economy of this region mainly depends on the sectors of traditional industries (e.g. production of textile, clothing, footwear, cork, furniture, wine, and metallurgy), and medium- and high-tech sectors (i.e. automotive and machinery)[5]. To respond to demands for the professional staff of diverse backgrounds, the University of Porto (public higher education institution) consist of a wide-range of faculties, incubators for the creative industries and technologies, students' and youth associations and federations and technological research centres spread around the city in four campuses. Such a supporting environment for studying and creating businesses based on innovation and technologies also attracts young foreigners. In 2019, the University of Porto hosted more than 6,000 foreign students and researchers[6].

To accommodate young population's needs, the Porto's City Council published a strategic document for youth policies entitled *Plano Municipal da Juventude do Porto 2.0* (English: *Municipal Youth Plan 2.0)*. The plan emphasised professional and higher education as the key element to cultural and socio-economic societal development and compulsory education as the key for citizenship practice[7]. Consequently, one of the supporting mechanisms for youth consultation in regard to city development was and still is the *Concelho Municipal de Juventude do Porto* (English: *Porto' Municipal Youth Council*). This collaborative platform exists since 2000 and it was meant to be used as an intermediary space in which youth members are invited to join and take part in consultations, together with the representative of the Porto City Council, the Councillor for the Youth and Sports Department and the Human Resources and Legal Services Department. Among 126-member organisations, the majority works with the higher education students, even the plan defines youth within an age bracket of 12 to 35 years old[8]. The students of younger age (12 to 16 years old) are represented by two basic-school members[9]. The low percentage of youngsters' participation and experience in Municipal Youth Councils relies on several factors. Firstly, youngsters depend on the will and availability of parents and teachers to provide means and conditions to join the meetings. Secondly, the collaborative formats proposed by the City Council tend to be of hierarchic with frontal nature and setting. Thirdly, youngsters are unsure in what they are participating (what is the outcome and direct impact on their life). The latter is due to the used language and terminology – sometimes is more abstract, institutional and formal which makes it more difficult for

youngsters to engage. The Youth Office stated that the youngsters' reach in aforementioned events is lower because the youngsters lack the skills required for the effective debating. The practice of democracy in Portugal only exists for the past 46 years which makes debating in public events harder. Furthermore, Raquel Morais, the interviewee, stresses that in general families don't like to talk about 'those' issues (i.e. politics):

People don't link state, public affairs or council actions to their daily lives, they don't believe that their opinion or actions could make a difference.

Another example is the annual public event *Debate a tua cidade!* (*English: Debate your city!*)*,* promoted by the Department for Education, Organisation and Planning and the Youth Office of the Municipality of Porto, and supported by the Federation of Youth Associations of the Porto District (FAJDP) and the Academic Federation of Porto (FAP). For the past five years, this event supports the involvement of local youth in needs' assessment and prioritisation of the urban development topics that have a direct impact on youth wellbeing. This event is usually organised through voluntary, non-hierarchical and non-frontal participatory processes in which youngsters are encouraged to act as the active citizens. However, the overall objective of their participation is not clear – how and in which way their contributions are going to be used in the long-term urban planning.

Besides the aforementioned examples of policymaking with youth, youngsters are also exposed to the learning experiences in the schools. There are general indications on citizenship education provided by the Portuguese Ministry of Education[10], however, each school and teacher are responsible to find a way to implementing it transversally. Through this period, any individual is confronted with the personal growth through formal and informal social participation and relationships built with the peers, teachers, directors, parents and other community members. In Portugal, the youngsters spend a considerable amount of time in compulsory schooling which is 12 years or until they reach the age of majority.

Brief outline of the project/ initiative's pathway

Before LoCY was officially formed, the staging process began with a co-design programme *Recreio dos pioneiros* (2013 to 2016), installed in the historical neighbourhood of Miragaia and within the Basic School of the Second and Third Cycle of Miragaia. This was a

collaborative research and social innovation project with more than 25 students coordinated by the school, youth association *MEDesTU* and International Doctoral Programme in Design/ ID+. Through the cycles of workshops and its iterative processes, the project team (composed of a researcher/ designer, youth workers, school's socio-cultural animator) came to conclusion that the language, terminology and meanings behind the processes were too complex and abstract for youngsters. The idea was to deconstruct key working concepts and terminologies and to (re)construct their meanings through a variety of individual comprehensions, taking into consideration existing definitions. For such challenge, the Artistic and Vocational School *Árvore* from the same neighbourhood was invited to engage. This originated in developing a second co-design programme *Ilustracionário, à minha maneira 1.0* (February to April 2015). This initiative was incorporated into the educational module Illustration and in the class of Graphic Design with 23 students. The main tangible output was the visual dictionary and public exhibition on the concepts and terms related to youth participation and youth policies. By concluding the second co-design programme, LoCY was officially structured and presented at the public event uniting different stakeholders such as the professors, students, volunteers, youth NGO members, researchers, youngsters, local authorities and public institutions (e.g. Portuguese Institute for Youth and Sports (IPDJ)). This event aimed to introduce the platform and focused on:

- Network with partners that supported the co-production of the first Porto's visual dictionary which can be used for individual learning, learning among peers, and in intergenerational collaborations[11];

- Exhibit art and design students' illustrations co-created with the students of basic school from the same neighbourhood;

- Create an open space for learning about Porto's youth associations and their grassroot initiatives;

- Create a space to exchange and discuss overall participatory processes of co-creating dictionary in two-month' time.

The dictionary was used in the continuous workshops with the same and other participants of Miragaia neighbourhood and its schools, whenever the topic or issue of terminology were identified. The relevance of the topic and dictionary as a tool were also raised in the process of drafting *Municipal Youth Plan 3.0* (never officially published). Nevertheless, LoCY continued promoting the topic and in 2016 has developed the third co-design programme *Ilustracionário, à minha maneira 2.0* which was implemented in another

Porto's neighbourhood and in the Basic School of the Second and Third Cycle Maria Lamas. A class of 17 students were asked to intertwine both practices of manual work (subject discipline: *Workshop*) and language (subject discipline: *Portuguese Language and Culture*) and to co-design and co-produce hand-made dictionary, together with their form teacher and core team composed of youth workers, graphic design professor, researcher/ co-designer, NGO representatives, volunteers, master students of educational sciences, among others. As the responsiveness of the school towards the project was high, the proposal for students to be evaluated by themselves and by their peers was accepted. LoCY introduced new elements of values and dispositions in regard to intergenerational collaboration, relevant both for the community of teachers (i.e. pedagogic scenarios) and also for the students (e.g. self-awareness and self-efficacy processes). In these cases, LoCY understood that in general there is no much emphasis or practice on coaching and guiding youngsters in their professional orientation.

To further stress the role of design in policymaking among design students and to form a community of co-designers in the Artistic and Vocational School *Árvore*, LoCY implemented the fourth co-design programme entitled *Codesigners da Sala 52* (2018 – 2019). The same group of 23 students in two academic years developed three graphic design projects for LoCY and Porto's community, through which they acquired competencies for co-design practice through self-organisation and coaching by their graphic design professor and LoCY team. According to Raquel, these processes demonstrated the power of education to solve problems based on co-creation and co-design. In addition, Raquel stresses that the students also developed the definition of the problem which helped the class/ community to configure new forms of understanding their problems, such us, 'why do we need the school' or creating goals for their personal and collective growth.

Management & Organisation: Who interacts how to facilitate co-creation?

LoCY is led by the coordinating body of five practitioners with the professional backgrounds in Psychology, Education, Graphic Design, Biology and Portuguese language. The team acts as the external moderator/ co-facilitator of the situated co-creation. Other types of co-facilitators are the members of the school staff such as psychologists, teachers, and a socio-cultural animator.

The youngster-participants are recruited through the partner schools, however, LoCY also invites individuals and collectives to contact the team in case they want to develop a grassroot projects. Consequently, LoCY promotes 3 main levels of youth engagement:

- For Youth: co-design for youth/ top-down initiatives;

- Youth-led: co-design by youth/ grassroots initiatives;

- Co-ownership: co-design with youth/bottom-up initiatives.

In an area of youth policymaking, LoCY has been significantly promoting the relevance of creating conditions for youngsters to take part in the participatory processes such as the planning of learning activities in the school context, and in the planning of youth polices and urban development in the city context.

The work of LoCY is also supported by the external volunteers coming from youth and cultural organisations and/or from the master course for the Educational Sciences of the University of Porto. Some of the volunteers provide technical and pedagogic support to the project and some are using LoCY's activities to develop their educational/research projects.

Since its inception, LoCY has been receiving support from a wide range of partner-stakeholders, for example, the Artistic and Vocational School *Árvore*, Basic School of the Second and Third Cycle of Miragaia, Basic School of the Second and Third Cycle Maria Lamas, Youth Association *MEDesTU*, Youth Association *Tudo Vai Melhorar*, Youth Culture Association *ConnectART*, Federation of Youth Associations of Porto District (FAJDP), Research Institute for Design, Media and Culture (ID+), International Doctoral Programme in Design of the Faculty of Fine Arts of the University of Porto, among others. Their support can be the provision of volunteers, infrastructural/space support, financing, working programmes and organisational structures, coaching and expert-service provision.

What are the concrete processes and practices of co-creation?

LoCY applies the *Learning Framework in Active Citizenship: Active Learner is an Active Citizen* as a basis of the platform's experiential and experimental attempts to encounter iterative ways of reaching quality when co-designing the learning processes in collaboration with youth. This is a complex conceptual framework which was built through

the design processes in the LoCY's activities and by 'drawing things together' of both practice and existing frameworks for youth citizenship and youth design practice.

As seen in the *Figure 8*, the framework is visually divided to the learner's sphere and a context sphere, trying to refer to designing of any educational activity by customising it to the measures of each individual.
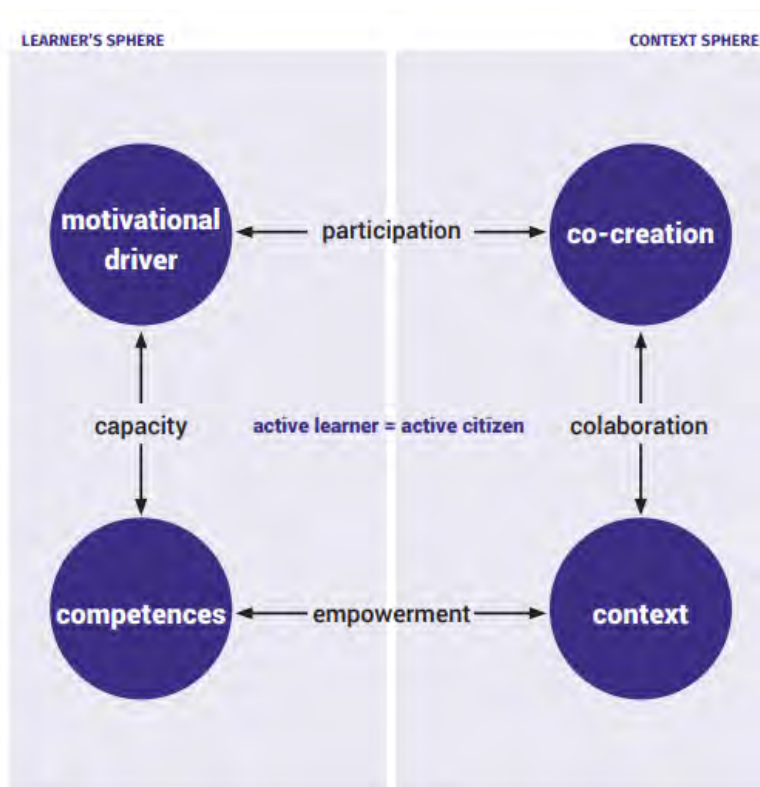
Figure 8 - Learning Framework in Active Citizenship

To develop any type of co-creation activity, this framework suggests assessing the individual's motivational drivers and matching them with the required competences for the process of co-creation. To build a framework of competences needed for the process of co-creation, the negotiation's process between existing individual/ collective competences and required individual/ collective competences are needed. As the co-creation usually involves people of various backgrounds, interests and aspirations, this process of balancing and aligning to match everyone's expectations should be done in a transparent and open way.

To prepare participants for co-creation through participation, some processes of sensitisation and understanding are necessary. So far, the best practice was to develop and implement some kind of desirable and tangible activity (e.g. Christmas party, co-design challenges) and then draw conclusions through collective engagement. Once the

intergenerational team is sensitised to the co-creation, the individuals can focus more on the understanding of co-sharing responsibilities and decision-making processes, and how these can make the impact on the situated problem-solving. Through further assessment processes it becomes clear to intergenerational team that for a meaningful and effective partnership, youngsters need to undergo the process of self-empowerment, but also to receive support from their peers and elderly team members (internal and external moderators as mentioned earlier).

The recruitment of youngster-participants was either established through a general promotion of the project in the school context (extracurricular activities) or through a school teacher/ psychologist who identified the class of students (curricular activities) that would be available to work with LoCY. Subsequently, the students were asked if they accept the challenge and work plan for the specific educational module. So far, in all cases, youngsters did accept the challenge as they were curious to participate in something new with the external moderation.

Specification: What tools and instruments are/ were used to co-create?

In all four co-design programmes, LoCY has dedicated workshops for sensitisation and training, generation of ideas, prototyping, validation and evaluation. For each stage, specific design and learning tools were used. They aspired youngsters to move, draw, think, tell stories and discuss certain aspects of the processes, having in mind their roles as colleagues, co-designers, co-learners and citizens. In the following table (see *Table 6*) some of the examples of design methods and tools are provided:

Table 6 – Example of design methods and tools

Design methods and tools[12]	
Map of emotions The objective of this exercise was to reflect upon the favourite and the least favourite places at school by using the map of the school space (see *Figure 9*). The place that gathered the most votes was chosen to be the place in which sessions/workshops will be held.	 Figure 9 - Map of emotions
Storytelling cards These cards (see *Figure 10*) are composed from the images of the conducted project activities. To distinguish between the elements such as the learning setting, students' tangible outcomes, methodologies, visual dictionary project, sequences and photos of the school environment, the cards were colour-coded. The student-participants used this tool at several occasions for collective reflection and dissemination of the project.	 Figure 10 - Storytelling cards

Co-design challenge

This method was developed in order for youngsters to learn that they can co-design tools pertinent for them and their peers. The proposed challenge was to co-create a learning tool which could be used in their classroom, either by teacher or by them.

An example of the result would be that one team decided to address the issue of 'injustice' in the classroom, related to the fact that teacher treats students differently. They made a prototype of a learning tool that is composed of a hammer, a book and a registration element to mark when some type of injustice has happened. Once someone placed the marker on the side of the book that says 'injustice', the class would stop with current action and make a collective discussion on how the occurred situation makes them feel and what they can do to improve intergenerational and peer relationships.

Figure 11 – Co-design challenge / learning tools

All applied design methods, tools and techniques were appropriated and adjusted to the target audiences. The most difficult aspect was to explain youngsters the difference of playing for the sake of playing/ having fun and doing serious playing which leads to some tangible and not so tangible outcomes that will eventually have impact on them and their school communities. Considering the challenge of seriousness in playing, follow-up reflections were made in round table discussions.

Which learnings emerged?

LoCY found its way to integrate in the existing landscape of citizenship education and practice by addressing the gaps of intergenerational relationships and partnerships, and by

establishing new collaborative formats such as the co-design programmes. LoCY focuses both on individual and collective capacity-building; therefore, it aims to accommodate overall expectations of the youngster-learner and the context in which the youngster-learner is situated. According to Raquel Morais, it is relevant for students to have an opportunity to experience problem-solving of tangible challenges and increase their sense of social responsibility. Unfortunately, in some cases of LoCY activities, with the lack of support from the school community, youngsters felt that their work and results were not truly recognised and appreciated by the rest. Raquel argues that

Students should feel they have a voice and the teachers are there to hear them. To make youngsters responsible for their actions and behaviours towards school, family and life it is relevant they are 'in command', not the older ones.

In such environments, it is hard to balance between the quality of youngsters' self-empowerment and mutual-intergenerational empowerment. The knowledge-transfer and multiplication of learnings in a non-supportive school context stops with the conclusion of LoCY's project and/or when the youngsters leave the school.

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<u>Interview</u>

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ninux.org | Italy

Stefano Crabu (POLIMI)

With Ninux an emerging typology of grassroots information infrastructure for digital communication, defined as a wireless community network (WCN) was co-created. WCNs are bottom-up infrastructures, built and self-managed by communities of voluntary people (hackers, geeks, lay peple). The Ninux Community Network is one the oldest CN in Europe. It was bootstrapped in the early 2000s in the city of Rome, in which still today there is the majority of the network nodes. Each Ninux community (or Ninux islands, as the Ninuxers say) is run by an independent group of people.

What is the project/ initiative all about?

The ninux.org Community Network (CN) is one of the oldest and most widespread CN in Italy. Technically, it is a decentralised wireless infrastructure for digital communication that allows interconnecting people (i.e. their computers, notebooks, mobile phones and other smart devices) by means of wireless antennas, usually set up on the roof of participants' homes, or on those of informal groups and collectives federated with the community (see Fig. 1). These decentralised networks are fully independent from the 'mainstream' internet, even if it is possible to access to the 'regular web' through ninux.org. Indeed, CNs in a few countries (for example in Spain, France and Germany) also became popular as a less-expensive, and sometimes more reliable, alternative to commercial

Internet Service Provider connections; as well as a suitable grassroots strategy to cope with the digital divide[1]. In this respect, the economic sustainability of CNs represents a very complex issue, touching many interrelated social, political and legal dimensions. CNs are often self-funded by the community, or financed through crowd-funding initiatives or donations, both periodic or occasionally. These donations are generally bestowed by friends or relatives of community members, activists, and other people that are sympathetic with the ideas embedded in such initiatives. Furthermore, the most formalised and organised CNs can adopt clear and accountable structures of fees, related to the kind of services offered by the network.
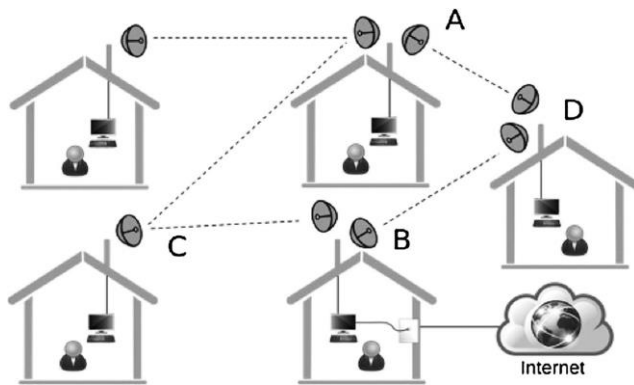
Figure 1. The structure of a CN[2]

With reference to the Italian context, ninux.org started originally in Rome, following other similar projects, such as the Seattle Wireless created in 2000 in the Northwest United States. In recent years, ninux.org has expanded beyond Rome to other Italian cities, where similar local grassroots networks have been launched under the same acronym. The community is not operating as 'formal association' recognised under the Italian law, and its initial spirit was mainly targeted at experimentation, ICT tinkering, and hacker/ geek culture. Indeed, the name of the network, 'Ninux', stands for 'No Internet, Network Under eXperiment'. Each Ninux community active within a specific urban context (or Ninux 'island' as the Ninuxers usually state) is run by an independent and informal group of people. Thus, ninux.org community aims at co-creating a broadband wireless network operating at the urban/ local level, as well as the co-creation of technical devices (such as routing protocols, and *do it yourself* wireless antennas) that help to achieve this aim. In this respect, ninux.org is totally self-funded by the community, and every participant is expected to pay for the technical devices require to make the network operative (e.g. routers, wifi antennas,

cables, and so on). Furthermore, there is no a formal structure of fees, and people in the community offer their own resources (both tangible and intangible, such as skills, voluntary work for installing antennas and for the maintenance and repair of the network) following the logic: 'do and pay what you can'. As ninux.org is non-profit, commercial activities aimed at profit-making are not part of the community's agenda.

From an organisational point of view, Ninx.org is characterised by being built and self-managed by not-for-profit communities of voluntary people (hackers, engineering students, political activists and lay people). Even if members have many different (and sometimes ambivalent) motivations that push their participation, in general they agree that all people can build and access a network without paying unfair fees to commercial telecommunications providers. Even more, they want to directly deal with privacy policies and data security concerning their personal digital data, by assuring a more transparent management and ethical confidentiality of the communications occurring within the ninux.org infrastructure.

Finally, another point regarding the ninux.org community as a whole concern the issue of the emerging forms of digital innovation within our network society, which attracted in the very last few years the growing interest of the European Commission, especially for what concern the following two societal challenges: 1) 'Smart, green and integrated transport', and 2) 'Europe in a changing world - inclusive, innovative and reflective societies'. ninux.org community, and in more general terms all grassroots CNs, represents an emblematic case on how these major societal challenges can be addressed through a bottom-up co-creation approach, as a way to engage lay people and other relevant actors in boosting responsibility and ethical sustainability within ICT and digital innovation. Indeed, ninux.org community engage citizens and stakeholder in building digital infrastructures able to be manage and used in a free and openly accessible manner, thus generating positive externalities that benefit society as a whole, especially by sustaining active citizen engagement in responsible entrepreneurship, social ties generation and community building, and by animating awareness in the critical and responsible use of digital technologies, with particular attention to the millennial generation.

Context and environment: Where does it all take place?

Ninux.org community presents all the major features of a bottom-up organisation, being self-organised, decentralised, and emerging as the result of a process of radical bottom-up co-creation where 'end-users' and 'designers' and 'developers' substantially overlap. Nowadays, ninux.org represents an informal umbrella organization composed of several various local 'islands', based in different Italian cities. Despite the different degree in network development, in 2019 ninux.org is deeply rooted in the following Italian cities: Bologna, Firenze, Pisa, Roma, Torino, Verona[3]. In general, these cities (except Verona) have had a strong tradition of mass mobilisation and political activism related to left-wing social movements. However, in the last decade the emergence of new waves of social conflict from below and the shaping of political alternatives to the neoliberal governance of these cities (also subject to gentrification policies) have been particularly weak. Thus, the societal and political climate tends now to be conservative, with high rates of electoral abstention, both at the local and national elections. The economic production is mainly organized around service-based markets, with a strong presence of high-skills cognitive workers.

Although ninux.org, as well as the grassroots CNs in general, can play a pivotal role in boosting responsible innovation and social and economic cohesion at the urban level by means of co-creation strategies – as it has been also highlighted by the Organisation for Economic Co-operation and Development[4] – there are several dimensions that conflict with the actual Italian normative e regulatory context. In this regard, it worth noting that ninux.org is not yet established in a form of 'legally recognised association' under Italian law. Thus, ninux.org is based on a distributed or mesh infrastructure, in which each node (i.e. a wireless antenna installed in the roof of a member's community) allows the generation and sharing of digital data within the network. In order to access the online features available in the 'regular web' through ninux.org, it is sufficient that only one node of the network should connected to the Internet (see Figure 1). In this case, the node is called 'gateway', since it allows the sharing of the Internet connection among the community members. The bottom-up approach that characterizes ninux.org is reflected in the lack of internal hierarchical structure. Indeed, there is not any internal centralised and formal body that can monitor members behaviors. Furthermore, a user that shares his/ her connection is not liable for third party conducts, and the absence of a formal representative

body prevents - de facto - to apply the regulatory measures defined by the national and supra-national normative frameworks.

Alongside these peculiarities, the high level of anonymity that the Niunux.org network can guarantee is undoubtedly one of the main features of the community. This aspect has become particularly relevant after the so-called 'Edward Snowden affair' during which it has been revealed several global surveillance programmes run by the US National Security Agency in collaboration with telecommunication companies and European governments; or in relation to the commercial tracking based on advertising on computers and smartphones (as in the 'Facebook–Cambridge Analytica data scandal' in 2018), that highly compromised the integrity of the individual privacy of European and American citizens. Accordingly, the central aspect of the co-creation culture of the ninux.org project is not so much related to the technological dimension in itself, but rather on the actual institutional governance of the Internet, based on a top-down centralised infrastructure, which does not allow the self-determination of the user experiences and the control of their personal digital data, thus compromising the individual privacy. Indeed, ninux.org members stress the idea that the conventional model of the consumer needs to be replaced with the figure of an active co-creative user, who should participate actively in some of the co-creation activities required to make the network work.

Brief outline of the project/ initiative's pathway

Within the ninux.org community, the network located in the metropolitan area of Rome, which is the most consolidated one, got underway in 2001 as a technical experiment, thanks to the effort of about ten people, including informatics students, experts in network operating systems, media activists, home-grown hackers, and geeks. The pioneer collective originally meet in a popular local café, called by ninux.org members 'nerd pub', and subsequently in the spaces of a non-profit associations Fusolab 2.0 engaged in promoting countercultural and artistic activities in Rome. Fusolab 2.0 is a formal association traditionally engaged in developing and disseminating a critical and alternative perspectives about the existing cultural and economic social model, by promoting sharing of knowledge in the following areas: cultural production (music and art); critical consumption, sustainability, degrowth and common goods, information and media, interculturalism, digital cultures and technological innovation. Thus, ninux.org is highly

embedded in this kind of counter-cultural milieu, and Fusolab 2.0 has traditionally represented a situatable place to interact with a pool of potential collaborators.

Initially, the building of the network was almost entirely crafted, and for this reason it was necessary – besides a great passion and technical expertise – to purchase prototypes, and manually assemble the components (such as the antennas and routers) necessary to make network infrastructure operative. Furthermore, in the early period, the ground-breaking group began to collectively test emerging wireless networking hardware and software, building up experimental connections between wireless antennas (also homemade) installed on their own home roofs. Year after year, thanks to the implementation on the network of services such as file sharing software and tools for cooperative writing or code development, the infrastructure attracted a growing number of participants, thus turning into a relatively wide urban decentralised wireless network, which in 2019 numbers about 350 nodes. In this regard, a turning point for the significant development of the network both in Rome and within other Italian cities happened in 2008, when a private company (Ubiquiti Networks) started to market low-cost wireless devices and antennas, gradually adopted as 'gold standard' by all members of ninux.org. The adoption of these devices has considerably facilitated the construction, maintenance and repair of the infrastructure, thus lowering the threshold of technical expertise required to be active part of the community. Due to this 'technical' turning-point triggered by an High-Tech company, community participation has grown resulting in the need to develop 'internal governance tools', such as the 'Ninux.org manifesto'[5], in which the community mission, strategic goals, as well as a set of common principles and visions have been summarised. In fact, even if the local networks based in different Italian cities remain technically separated from each other, they share the same name, a common political framework, and governance tools supporting a collective cooperative work for the development of software, hardware, and protocols. This shared framework is the result of an on-going collective effort of negotiation, which occurs through the mailing lists, and thanks to periodic meetings, such as the desultory 'Ninux Day' national happening.

Management & Organisation: Who interacts how to facilitate co-creation?

As previously argued, ninux.org community, and all the different local 'islands', does not have any formal legal status officially recognised under the Italian law. Even if this

condition implies fewer constraints in terms of public accountability, it also prevents the community to shape of formal and reliable partnership with both collective public and private organisations to be engaged in the co-creation of the infrastructure.

Although the general technical framework of the local 'islands' is almost the same, their connectivity and organisation has developed independently, and their respective informal working groups are driven by distinctive mixes of political and technical needs, local constraints, and motivations. For example, while ninux.org at large is still informal and non-institutionalised, some 'islands', such as Rome or Pisa, have established various kinds of occasional indirect relationship with institutional actors (such as local municipalities), ISPs and public universities. A relevant point is that the most active members of the community are also particularly influenced by the hacker culture, thus developing informal (although particularly fruitful) partnership with the free/ libre open source software (FLOSS) movement, and, more generally, with several informal collective engaged in co-creating hardware and other digital resources through a peer-to-peer production model. In this sense, ninux.org developed collaboration with several sister projects, such as the Metro Olografix Camp MOCA - an international meeting organised in Italy until the 2016 (and now working as an online community) where people are invited to observe, experiment and question everything about computers and ICT ussing the hackers' approach.

Another crucial network for ninux.org development is the Italian hack meeting: an annual meeting of digital countercultures engaged in co-creation of ICT. Finally, the so-called Linux Day network represents a crucial partnership, since it organise an annual initiative occurring in several Italian cities, with the aim to spread the culture of the free software movement, and where ninux.org community usually organises activities to promote its project.

What are the concrete processes and practices of co-creation?

Ninux.org is run by activist and volunteers. Each of them co-creates and runs one or more than one node, participates to the meetings and is active in the promotion and advocacy for the network. Each member has to agree on the 'Ninux.org manifesto' (see section 3), that is a foundational document inspired by the pico-peering agreement adopted by other European CNs[6]. Thus, the manifesto explain some basic principles that inform the co-creation of the network, such as: i) the non-discriminatory routing, that is all the nodes

(and users) in the network should guarantee the transit of the traffic regardless of origin, destination or content; ii) organic growth, i.e. all that is required to join the network is to find someone that is already connected and make arrangements directly with them; iii) distributed networking: because volunteer work will continue to be the core of the community, it's seems important to render the ordinary maintenance of the infrastructure a sustainable and as less time-consuming as possible. Distributed networking allows new nodes (and users) to be automatically be detected and integrated into the network.

In general terms, co-creation engagement starts with the involvement of an individual: each potential member of the community is invited to join the community, present him/ herself and be active, but no formal engagement is required and no identification is requested.

Within ninux.org community, engagement and co-creation processes unfold trough the following stages:

1) Introduce him/ herself to the community, via the national and/ or specific island-based mailing lists, or using telegram channels;

2) Create a 'potential node' in the ninux.org mapserver[7] available on the community website, which correspond to a venue where the member can physically install a network node. More in detail, a 'potential node' is a new placeholder in the online map server, that anybody can set-up to express the willingness to enter the community. In this way, a new member can find the existent or potential nodes that are likely to be in communication and then connected with his potential node. Once such nodes are identified, the members who are in charge to manage them can be contacted in person or directly via the map server;

3) Once verified the possibility of installing a new node connected to some other existent node, the new member will be supported in the process of acquiring the necessary hardware, modifying the firmware and mounting the node. This procedure is guided with practical documentation that the community has been producing since its beginning, and by means of the voluntary efforts of the experienced participants;

4) The new member is invited also to actively participate in the face-to-face meetings and general assemblies that ninux.org islands organise. The frequency of such meetings

depends on the specific island. In the most active islands they are typically held weekly, or bi-weekly.

Even if there is no structured entity, some ninux.org users take the responsibility for some online services that would not be possible to achieve in a collective, non-structured way.

Accordingly, ninux.org community is enlivened through a completely voluntary work of co-creation. Usually, community members organize technical task forces engaged (mainly during the weekends) in installing antennas on the roofs of the buildings where citizens interested in joining the community lived-in. At the same time, other expert members are involved in developing protocols, or in the network configuration activities.

Specification: What tools and instruments are/ were used to co-create?

Ninux.org members have developed several tools oriented to manage the co-creation activities:

- Mailing Lists: every island set up and manages its own mailing list, created on request by the participants. In addition to local mailing lists, there are two others national mailing list (wireless@ml.ninux.org and not-wireless@ml.ninux.org) in which generic issues related to the community can be discussed, such as the organisation of national meetings, relevant public events, discussions on the technological development of the infrastructure and its maintenance. Concerning online communication, a subgroup of members are engaged in replying e-mails sent to the address contatti@ninux.org. This e-mail represents one possible main entry point to the community, thus to provide information to interested people in more mediated way;

- Website & Blog: the website of ninux.org is a wiki, collaboratively realised by the community. Some of the pages are translated in English, but the language is primarily Italian. The community has also developed a Wordpress blog, where members can write on issues of common interest. The website hosts general information about the community; a frequently asked questions section; several online handbooks devoted to give more technical information. These technical guidelines are organized according to five levels of complexity: 1) starting members; 2) novice; 3) intermediate; 4) student; 5) advanced. According to some testimonies collected during the interviews, the website –

in the form of wiki – does not seem to be particularly effective as s tool for attracting the attention and interest of novel potential members;

- Face-to-face meetings: each island organises periodic meeting (weekly or fortnightly), in form of horizontal assembly, with the local community. From time to time a national meeting – called ninux Day – is organised. The last one was organised in Bologna on November 26th 2017. Furthermore, local meetings are conceived as skill-sharing happening, where members perform an informal pedagogical arena to share and learn relevant technical skills useful to network management. In this regard, one of the most problematic issues raised during both interviews and mailing list discussions relates to the fact that local meetings are not perceived by starting members and newcomers as inclusive discussion spaces, due to the hegemony played by the nerds and geeks which are mainly interested in discussing network engineering issues;

- The map server: this online tool is a key instrument in the ninux.org community because it acts both as technical entry point in the community and monitoring device of the network. The map server is updated periodically by a software that is configured to load all the topologies from the various ninux.org islands: each island publishes a topology file at a public URL using one of the supported formats, and the active nodes and links can be visualised in the map. It is not only a public mirror of the state of the network, but it is also a fundamental instrument for new users that want to enter the network, that can use it to find other nodes nearby, compute an approximated distance and contact the owner of existent or potential nodes in order to set-up a new link;

- Internet Relay Chat meeting: recently the community start to organise national online meeting using IRC protocol in order to take collective decisions about specific technical or organisation issues. These meeting are organised about every two weeks, with the participation of about ten/ fifteen members. After every online meeting a summary report is automatically produce by a BOT, with a summary of the main points discussed by the participants. Thus this report is send to the national mailing list: wireless@ml.ninux.org. However, the format of the meeting summary is extremely concise. In this sense, it would be advantageous to produce a more narrative report of the discussions occurred via IRC protocol, thus to solicit two-way feedback from members who did not take part in the discussion;

- Telegram group[8]: each island has its own local telegram group to coordinate face to face local meetings, or specific activities both technical and organizational. In addition, a national Telegram group has been set up, where there are about one hundred people. Apparently, the telegram group is now the most used communication tool. The management of this group is quite crucial, as by now it represents the main entry point for newcomers. The centrality assumed by Telegram groups resulted in a noticeable reduction in online discussions within mailing lists, both nationals and locals. It is worth noting that interactions occurring in Telegram groups are much more ephemeral if compared to other communication tools (e.g. mailing list; video conference etc.); this is due to the high amount of daily messages which doesn't entail an easy overview of the conversation log;

- Ninux Experimental (NNXX): starting from February 2017, a subgroup of ninux.org members launched the NNXX experimentation initiative. This tool is handled through the following tools: 1) telegram channel for real-time support in co-creation activities; 2) 'Trello board NNXX'[9] to plan and monitor co-creation activities (such as the experimentation of novel hardware or routing protocols; 3) a mailing list called 'ninux-dev'[10] for non real-time support. This last tool initiative has the following main objectives: sustain the generation and growth of new ninux.org islands; simplify connections between different network nodes, thus to increase overall infrastructure resilience; simplify the configuration and updating of the infrastructure; sharing new knowledge in the field of mesh network.

Which learnings emerged?

The focus of co-creation activities within ninux.org is mainly on the internal services of the network, and not on offering a low-cost internet access. The community has a strong commitment in sharing this message to the newcomers that should be attracted by the possibility to obtain a free internet access, but neglect the communitarian aspects of ninux.org. In this sense, members tend to discourage newcomers whose only interest is to access the Internet at a lower price than the price offered by commercial ISPs. This does not mean that there is no Internet access within ninux.org network, but this decision (to offer or not an internet access as a community service) is delegated to each ninux.org island, and it is not sponsored as a main feature of the community. In general, therefore,

the co-creation and management of the ninux.org wireless network should not be considered as an activity of innovation driven by utilitarian and instrumental drives, but rather as a process of involvement of the several actors within a wide ecology of socio-technical relationships that allow them to express creativity, passion, and a political engagement through voluntary participation in the community network development project. In this respect, the overall approach regarding the management of the co-creation activities in Niunx.org adheres to the so-called 'do-it-yourself' culture. This approach in managing communities' life implies a cooperation among members, which can acquire a specific role in relation to their expertise, competencies, and kind of task in which they are involved, rather than through formal process of nomination. Under this perspective, ninux.org members believe that they are building a network that is more than an infrastructure for digital communication. Indeed, they are aware that what is at stake in ninux.org project is a sort of 'digital commons resource'[11] built by means of co-creation processes performed by communal communities of people. In this way, ninux.org members adopt a peer-to-peer production models and shape organisational arrangements which are alternative to – or even antagonist of – for-profit and business-oriented logics of action. This peer-to-peer approach is characterised by features like a horizontal internal coordination and by the fact that their members generally do not receive direct monetary remuneration for the time consecrated in producing a specific digital commons resource.

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Interview

For the purpose of privacy policies adopted in SISCODE and confidentiality, all names and sensitive information were removed from the empirical material used in the case study.

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Urban Mediaspace Aarhus Project - Dokk1 | Denmark

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The case aims at exploring the participatory method to develop a new public building and public services in Denmark, involving citizens, employees, the main users and local stakeholders. Subsequently, a new form of governance in public services and spaces should be developed and applied. 'Dokk1' is the Aarhus City Councils new building where the main library and the citizen's services have been located. The project is part of a wider urban renewal intervention called Urban Media Space that is promoted by the City Council jointly with a private association.

What is the project/ initiative all about?

Dokk1 is an 'Urban Mediaspace' in Aarhus, Denmark, that hosts the city's new Central Library and Citizen Services. The new space has been built in response to a need to re-conceptualise public library systems in a context where access to online resources is more and more diffused and the original purpose of libraries to provide access is lost to the digitalisation of knowledge and content. Dokk1 was part of a wider urban renewal project called Urban Mediaspace which was promoted by the City Council, jointly with Realdania, a private association in Denmark supporting philanthropic projects. It aimed to transform Aarhus' Inner Harbor from an industrial harbor to a lively urban space through the creation of a central library that acts as a multi-purpose place combining citizen services and cultural and recreational activities. The innovation of the case lies in the participatory method adopted to develop the project that involves citizens, employees, the services' main users and local stakeholders over the years, applying a new form of governance in public services and spaces by social engagement.

Recently, the public library has become a strategic element in urban development. Both internationally and in Denmark, new public library buildings form part of the city's endeavors to improve visibility, image and identity. The ambition is that the iconic library

will contribute to reinforcing the city's brand as an attractive future- and experience-oriented city. Whereas classical city libraries were often placed in city centers, many new public libraries are instead located in run-down urban districts, old industrial areas and similar locations with a view to strategically create vibrant new urban and meeting spaces. Libraries are following the trend of reorienting their activities in order to attract a new public and become lively places where people stay and use resources and services. With the recent digitalisation of knowledge resources, library spaces have in fact become progressively less popular, presenting a need for them to reinvent their role in the urban fabric.

Aarhus is the second largest city in Denmark with 310,000 inhabitants. Aarhus Public Libraries consists of a main library and 18 branch libraries working not only as libraries but as community centres with different focalisations on the local context. Aarhus branch libraries function as providers of local community services and as innovation agents of the specific social problems that are present in each area. One example of this can be found in the project, Community Center Gellerup, initiated in 2005, by a local library branch to develop a new type of institution: a community centre uniting library services, health promotion, and counseling services for ethnic minorities and voluntary social work to engage the immigrant and refugee communities. From this experience, the Aarhus libraries have pursued an innovative agenda to reduce the growing gap between skilled information users and individuals who have no access to information. Denmark's Aarhus Public Libraries exemplify the pivotal role that public libraries can play in integrating citizens from all walks of life into today's complex, knowledge-based society[1].

In this context, the City Council started a project to re-conceptualise the central public library, in the city waterfront area, and co-create a space with its citizens that provides encounters with knowledge and culture that are enjoyable, appealing and fascinating experiences.

Context and environment: Where does it all take place?

As already mentioned, public libraries across the world are challenged with finding new ways forward in their service offering. Along with other industries, for instance traditional media like newspapers, the digitalisation of knowledge resources has changed the paradigm of access to information and knowledge production. As a result, the libraries

have become progressively less popular and less meaningful in the urban context. The problem addressed is internationally diffused and has raised the attention of public institutions. In some countries, the issue is taken into serious consideration, as in Denmark, where libraries are already considered as community centres that have to respond to the localised needs of citizens. With the construction of Dokk1, the city wishes to make libraries once again a space for learning by aligning the 'education' offer with the knowledge needs of citizens, focusing on people and their relationship with their surroundings rather than physical media as in the past[2]. In order to intercept the innovation demand that is being placed on all sectors and reflected in the public education system, the new library seeks to provide a space for citizens and communities to experiment with innovative ideas that enable them to live better, as reflected in movements like Maker Culture, Techlabs, Fab Labs, Urban Offices and Smart Cities, that urge for spaces that encourage relationships between people, objects and places.

The municipal reform of 1st January 2006, moreover, exemplifies the direction taken by the Municipality as it merged Citizen Services and Public Libraries under a single administration. This directly affected the project development orienting the Mediaspace towards being both a cultural and service center for Aarhus' citizens, hosting a service point for Citizen Services and offering manifold facilities for social and associative activities, as well as networking by means of project rooms, study cells, media, café, classrooms, halls, activity and transformation spaces and informal open spaces. Its vision is to become an open and accessible learning environment supporting democracy and community.

Furthermore, in 2006, the Committee on the Public Libraries in the Knowledge Society was formed in response to the closure of a large number of public library branches due to budget cuts resulting from a municipal reform that reduced the number of municipalities[3]. The committee was tasked with three principle objectives: (1) to evaluate the need to re-conceptualise the role of public libraries and lifelong learning in today's knowledge society; (2) to analyse the state of the digital infrastructure of information sources and to consider new concepts for more traditional roles in providing access to information; and (3) to reflect on how and if libraries could support Denmark's globalisation strategy[4] that focused on innovation as an important lever of continued welfare and societal progress[5].

The case is located in the Scandinavian context where legislative and socio-cultural conventions related to participatory concerns are an important pre-condition for implementation. The case highlights the importance of social engagement in defining new

library spaces and functions in order to create lively urban hubs that answer the real needs and wishes of its citizens, while also considering those of future generations. The insights and ideas coming from participation merge into a shared vision, nurturing the public institution.

Dokk1 is the largest construction project in the history of the city of Aarhus. The project emerges from an urban agenda that saw the construction in Aarhus of a new container port, Pier 4 or rather the East Harbour. This led to the release of the central and northern harbours for non-industrial purposes. The North Harbour was transformed into a new residential area, Aarhus Ø[6], while the central harbour – the closest to the city – was dedicated to the creation of new urban spaces for Aarhus' citizens and the construction of the new Central Library and Citizen Services. The project also includes an innovative automatic car park with 1,000 parking spaces, three new waterfront spaces, restructuring the area's infrastructure, preparations for the light rail, opening up the last part of Aarhus river and climate protection of the city center. The area will become a brand new urban space that will strongly influence the city plan. The solution adopted an extended plan for citizens, employees and stakeholder involvement that started with the design of the vision for the new urban area, going through the identity and branding process defining the name of the main building, and finally defining the building spaces, functions and forms of interaction.

The Aarhus City Council showed a great commitment to the approach, to the extent that the Aarhus Model for Citizen Involvement, including principles for how citizen involvement should take place in the City of Aarhus, has been a part of its operative model since 2004 and has been applied to different local projects. The attention and motivation of the institution is also highlighted by the creation in 2013 of the Model Programme for Public Libraries by the Danish Agency for Culture and Realdania. This offers a web-based inspiration catalogue and tools to communicate new knowledge, best practices and inspiration for brand new space/ function interplay for library developers and proposes a participatory approach in the definition of the new libraries spaces. In 2014, Aarhus Public Libraries collaborated with the international design firm IDEO and Chicago Public Libraries and developed a toolkit for libraries to create services and interior design to suit user needs. The innovation model is developed based on human-centered design and was released in late 2014 as a digital book (http://modelprogrammer.kulturstyrelsen.dk/en/).

Brief outline of the project/ initiative's pathway

The project started in 2001 with the decision by Aarhus City Council to build a Mediaspace that included plans for the new central library. In 2003, the Unified Plan for the Waterfront was passed and later that year, the City Council set aside financing for the construction of the project. Following the city council's resolution to realise the project in 2003-2004, the project was initiated in 2005. The final location of the building was decided by City Council, in 2006, together with the design of tenders and core values. The project competition took place, in 2008, and the project grew to include a new Citizen Service center, restructuring the infrastructure in the area and opening the remaining part of Aarhus River[7]. In 2009, the winning consortium to construct the building and environing sites was selected.

The project was developed over the years through a series of activities. In 2005 and 2006, the first ideas for the area were developed jointly with the planning process. The core values and the framework for competition and tender were also established. From 2005 to 2007, citizens were involved for the first time in the creation of the vision and values of the project. The competition programme was drawn and the network and cooperation with local stakeholders were developed. In 2008, the competition was launched and in 2009/10, the winner of the project competition, Schmidt Hammer Lassen Architects, was announced. After the negotiation and the enterprise tender, the firm became the coordinating contractor of the project (http://www.urbanmediaspace.dk/en/project/facts/timetable-project). From then on, the services and activities in the Mediaspace were further developed with a broad participation of users, employees, children, and other possible users of the building in co-design workshops and activities (see Figures 1 and 2 below).

Figure 1. Citizen involvement in the participatory process activities

Between 2011 and 2015, the main project was designed and the implementation process started, while the involvement process proceeded on selected activities (Table 1). Dokk1 opened in 2015, along with the car park, while the rest of the area, including the waterfront spaces and the opening of the river, were completed in 2016.

Year	Activity	Involvement	External	Internal
2005	Development of vision	broad	X	X
2006	Development of values	broad	X	X
2007	Competition programme	broad	(X)	X
2008	Competition phase	narrow	X	X

2009-10	Building programme	broad	X	X
2011	Project proposal	medium	(X)	X
2012	Final project	narrow		X
2013-14	Interior decoration and furnishing	broad	X	X
2015	Furniture and IT	broad	X	X

Table 1. Synthesis of the co-operative design process[8]

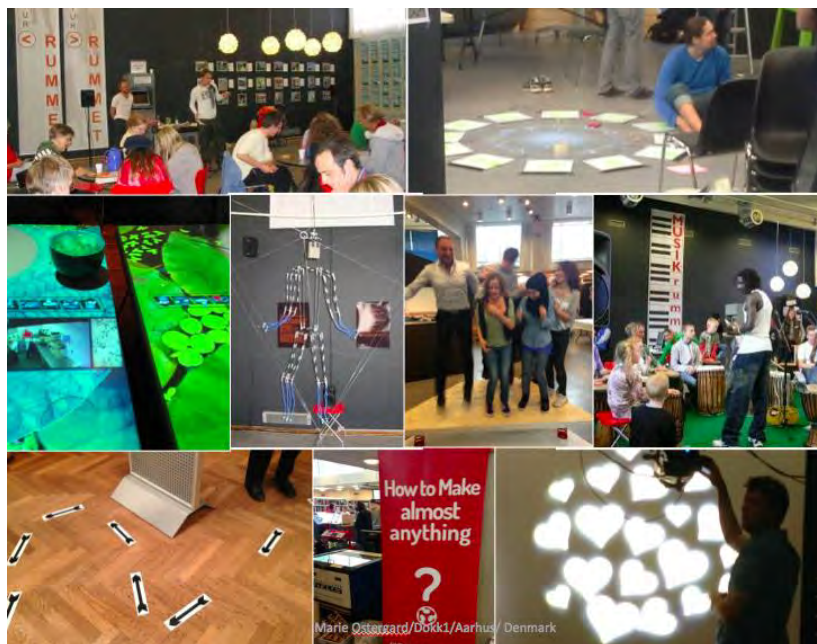*Figure 2. Citizens involvement in the participatory process activities.*

The project created value for citizens and system actors not only through its service offer, but also through the process itself. User and local stakeholder participation in the definition of the vision, physical spaces and services offered was an innovative approach that improved, on the one hand, the relationship between citizens and institutions, and on

the other hand, the services offered, thanks to the contribution and experience brought by the direct input of citizens and staff.

Figure 3. Image taken from a webcam at the construction site (19.05.2015)

The construction of building through an inclusive and participated design process poses a challenge to the standard way of managing these types of projects for architects and the construction client. The direct user engagement in the design of the spaces, their functions, geometry and form, as well as the provision of insight into the working processes, job junctions, working conditions and service expectations, created 'new' insights and sources of knowledge for the architects responsible for the design that required new competences and working practices of the architects themselves. The in-depth and direct use of user involvement and of knowledge coming from different domains challenged architects to transpose and develop the project based on user insight and needs while also preserving the original design concept[9]. This difficult and delicate process of accommodating user needs while also respecting the more technical elements of the project required that actors embrace a wide variety of needs and recognise that they will carry different value to each person.

Management & Organisation: Who interacts how to facilitate co-creation?

The project's formal organisation includes: the municipality of Aarhus as the principal developer; the Project Board made up of the mayor of Aarhus, City Council members, and

representatives of Realdania, a private association in Denmark that supports philanthropic projects in the realms of architecture and planning and sponsors part of the project; a general steering committee appointed by the board in charge of the entire project including the transformation of the areas surrounding the building; and a sub-committee responsible for the building itself. The Mediaspace project management refers to these committees and is responsible for the planning, development and coordination of the project.

Furthermore, a strategy group involving representatives from numerous local institutions and organizations contribute to the ongoing planning and development process at a strategic level, and another group provides input regarding technology, architecture, civic communication and library development[10]. COWI consulting group headed construction management on Dokk1, in charge of quality control and cost control of the entire building site.
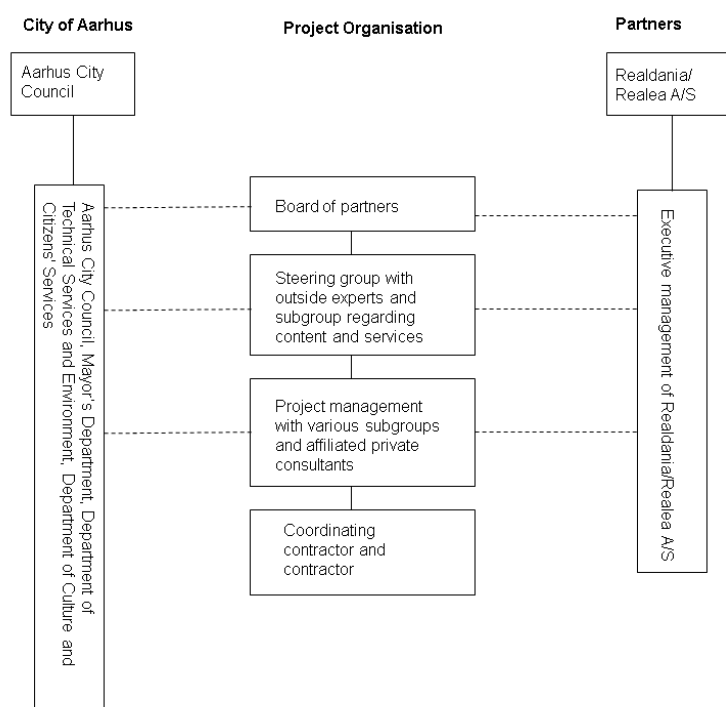
Figure 4. Organisational chart for the construction project, Urban Mediaspace Aarhus[11]

Aarthus City Council is the main financer of the waterfront area requalification intervention, supporting the Mediaspace project, traffic alteration, cleaning of Aarhus Stream and the New Central Urban Waterfront. The project is also financed by the proceeds coming from the sale of the previous main library and profits from renting out parts of the

Mediaspace. Furthermore Realdania and its subsidiary company Realdania Byg have engaged in the project with a financial contribution of 700 million DKK (2008-price level). This contribution was allocated partly to the construction of a parking area, with room for 1,000 cars and partly to the construction of the waterfront. The budget for the entire project is 1.7 billion DKK (2008-price level)[12].

What are the concrete processes and practices of co-creation?

As already explored, the first steps of the co-creation process was the engage citizens and other users (e.g. staff, politicians, civil servants, etc.) in the definition of the problems surrounding the current day use of the library, what the space could represent for the future and how to provide meaning to the place in ways that resonate with user needs. The project's core values were a result of these first workshops in the first phase of the participatory process, and are as follows:

- Citizens as key factors;

- Lifelong learning and community;

- Diversity, cooperation and network;

- Culture and experiences;

- Bridging citizens, technology and knowledge;

- Flexible and professional organisation; and

- Sustainable icon for Aarhus.

These values formed the overall vision of Dokk1 and guided the engagement process.

The co-creation process was based on the Aarhus Model for Citizen Involvement. The model was adopted for the first time in April 2004 and used by the Municipality to make policies, strategies, plans and projects that could be of interest to many people or groups of citizens. This may involve initiatives including the entire municipality, part of the municipality or a single locality. The model builds on the many lessons learned with the citizen participation in previous years and should be seen as a development of methods and principles already in use. The Aarhus model does not ague for more civic participation, but with due diligence on a qualified basis. This approach implies that citizen involvement will

help to safeguard their ability to influence municipal policies, plans and projects and that public knowledge may be useful when the municipality takes decisions.

The idea of the project was to make the citizens' use of services, ideas and wishes visible throughout the development process and to include them in the final outcomes. Citizens, local associations, employees, cooperating partners, schools, entrepreneurs, companies, and other stakeholders were involved in the project development through a series of co-envisioning and co-design activities and workshops when there was an actual opportunity to influence the project. The term user was therefore intended as all users of the building.

Since the creation of such a space was quite novel at its start, the process highly depended on knowledge cooperation between different disciplines, areas of expertise and the engagement of different users and networked linked to the project[13]. In order to manage this according to the Aarhus model, overall guiding principles were established at the onset to inform the process: (1) involvement – to engage and integrate the right knowledge and quality to the project; (2) interdisciplinary cooperation – to bring different approaches, methods and competences to discover new solution able to encompass the needs of the future, and accommodate synergies between knowledge domains that would be manifest in the building itself and services offered; and most importantly, (3) decision-making at the last responsible moment[14]. This last criteria was very important as it allowed for decisions to be made at a moment when 'enough' or a 'reasonable amount of' information was gathered, instead of making these decision, as often happens, at the beginning of the project when the level of knowledge is at its lowest. This principle also enforced an iterative process of development, in which the same themes were treated in a repetitive manner in different aspects of the project (and as will be seen in the paragraph below, in different thematic tracks) allowing decisions to be made at increasing levels of detail[15].

The co-creation process was built on two parallel tracks that built off each other. The first track concerned the library's evolution from its role and identity 'as is' to what it 'could be' and took the shape of a 'transformation space' or lab, that tested services, functions and equipment with users. The second track focused on the construction process, and integrated results coming from the first track or worked on solutions to specific construction issues (e.g. floors, lighting, electrical installations, acoustics, accessibility and wayfinding) with users, architects and engineers. The process was built by a constant reflection at each stage on the kind of user involvement that could contribute the necessary knowledge for the particular issue/stage of the project[16].

Specification: What tools and instruments are/ were used to co-create?

The co-creation process was carried out throughout the years with several forms of co-design activities that made use of face-to-face meetings and paper-based and digital tools such as: the creation of the Fliker tag 'Mediaspace' to upload images to inspire the process towards the Mediaspace; the Dialogue Meetings, in 2009, that engaged approximately 250 citizens in the construction of the new Mediaspace and urban waterfront spaces; the open process to define the new name of the building; the Video Vox Pop interviews where citizens were asked what they thought was important to consider when building the library of the future; briefing sessions to inform the neighbors on the project, in 2009; a public event, in 2008, carried out at the City Hall involving 200 citizens; and Exploratorium, a creative workshop about the library of the future, which was open for children from the ages of 9 to 13, in 2007. Employees as well were involved in the process starting, from 2007, with several meetings and a field trip to Birmingham, in 2012, as professional input for the future development of the organisation[17]

Which learnings emerged?

In connection with the work of the Committee on the Public Libraries in the Knowledge Society, Jochumsen et al.[18] was commissioned to develop a model for the public library. They propose a 'four-space' model that acts as a framework to discuss the values of the new public library in the 21st century and a tool to guide development.
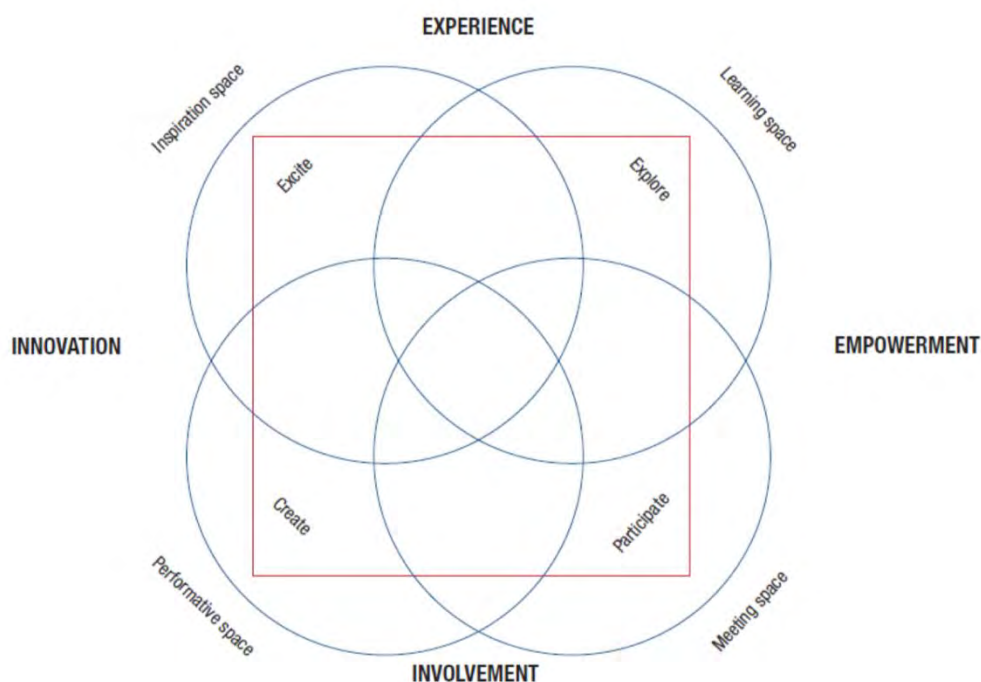
Figure 5. Four-space model[19]

The model suggests that the objective of libraries is to provide four main propositions: experience, empowerment, involvement and innovation. The spaces created in between are overlapping and interact both physically and virtually[20] and are as follows: inspiration space, learning space, meeting space and performative space. In the case, the model was used to drive the development process with the aim of making the four spaces interact by incorporating them into the architecture, design, service offering and the relationships that are created as a result.

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Medialab Prado | Spain

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Medialab Prado is a citizen's lab that serves as a place of encounter for the production of open cultural projects. Anybody can make proposals or sign up for proposals made by someone else and carry them out on a collaborative basis and learn from and cooperate with each other. There are 6 labs, each oriented towards a specific aim/approach. It is a programme run by the Madrid City Council's Culture and Sports Department since 2000.

What is the project/ initiative all about?

Medialab Prado is a citizens' laboratory and the cultural centre of the Madrid City Council's Culture and Sports Department, Spain. The initiative was born in 2000; however it took two years to develop and reveal the project to the public under the original name of MediaLab Madrid. At the early stages, the initiative was focused only on the exhibition of science and technologies. According to the Artistic Director Marcos García, the interviewee, the exhibition was a key device for research and production from 2002 until 2006. In 2006, the new coordinating body of the cultural centre was formed. The team decided to place more emphasis on the education for open experimentation and on the production through collaborative workshops. In September 2007, the programme moved to *Plaza de las Letras* (building of the *Serrería Belga*), close to *Paseo del Prado*. After the geographical relocation, the name was changed to Medialab Prado[1,2] name for which is still known today.

Medialab Prado promotes the cultural sphere as a space for experiential and collaborative learning among different local stakeholders. The centre aims at developing collaborative formats that are well-documented, adaptable and replicable for citizen engagement. This is achieved in four ways:

1) Community moderation — with a goal to co-produce and discuss projects and initiatives through the working groups and through an online community;

2) Prototyping — staging interdisciplinary working groups that undergo the process of ideation towards the development of functions/outputs which feed ongoing research and societal needs;

3) Promotion of free culture/commons to support the open source and free licensing initiatives through a collaboration and sharing of the publishable outcomes;

4) Working through networks to promote: i) international cooperation in the projects funded by the programmes of the European Union; and ii) intersectional cooperation through joint projects (i.e. including participation of the different departments of the Madrid City Council and other local institutions).

Under each pillar, there are 47 initiatives and 22 programmes orchestrated in six labs: PrototipaLab (Creative Prototytping Lab), ParticipaLab (Collective Intelligence Laboratory for Democratic Participation), InCiLab (Citizen Innovation Lab), DataLab (Open Data Lab), CiCiLab (Citizen Science Lab), and AvLab (Audio/Video Experimentation Lab). Among these six labs the most relevant are ParticipaLab, CiCiLab, PrototipaLab and InCiLab due to their topic or methodology.

ParticipaLab is studying, developing and practising the application of situated learning in the international context. To this end, lab analyses participation processes that combine physical and digital spaces, focusing the work on the impact of these processes and the ownership of the tools by the citizens (e.g. Open Access and Data Management). CiCiLab is promoting citizen science through activities in which people can develop scientific research processes. PrototipaLab is a hands-on collaborative space for programming and developing creative hardware and digital design tools and manufacturing with free and open-access tools. InCiLab is promoting public-private partnerships and connecting multiple stakeholders in order to rethink their life in the city. Subsequently, the lab aims at developing prototypes that will create new learning communities and sustain the existing ones. Medialab Prado is actively contributing to the co-construction of the new paradigm concerning the role of the public institutions as potentially enabling places in which people can collaborate. It is, thus, promoting citizen laboratories as suitable models for the experimentation and meaningful interaction of people living in the city. This implies the space, support, means, opportunity and right to citizen engagement. Therefore, the coordinating body, moderators, the cultural centre and municipal and EU funding are the carrying structure for the co-creative activities that are dependent on engagement of different stakeholders. These engagements are transversally carried out through initiatives and programmes developed in the citizen labs.

Context and environment: Where does it take place?

Medialab Prado is situated in the centre of Madrid, the capital of Spain, one of its most important financial and economic hubs. The region has over 6 million inhabitants[3] which is almost 14 % of the total population, being the third most populated area in the country. The existing socio-economic developments have attracted a lot of people to come and live in the city, 'both from different regions of Spain and foreign countries so that society is also becoming increasingly diverse'. [4]

In 2016, 12 % of the total population consisted of foreigners. The Madrid region is considered wealthy and with a booming economy, though the unemployment rate is high, measured to 14.2 % in 2019[5]. Considering the complexity of territorial development and sustainability, Madrid City Council has joined the initiative *Open Government Partnership* (OGP) in 2016 to promote accountable, responsive and inclusive governance. Within the

scope of SISCODE project, this initiative is relevant as it promotes 'bringing citizens (back) into the design, implementation and monitoring of decision-making and public policies'. [6] To approach this topic, Madrid City Council is investing in the use of technologies in its everyday governance. For example, in 2017, the set priority commitment was the citizens' access to information and the opening of data through new spaces on the web and participation in the city through the *Decide Madrid* digital platform (this action is recognised as a local contribution to the international movement *CitizENGAGE*). This platform allows everyone to propose and vote for the new rules and regulations, including the Participatory Budget implementation. The *Madrid Action Plan 2018 – 2020* [7] is committed to solving issues related to anti-corruption, open data/mapping, waste management, access to information, and citizen participation.

The city has thus stressed the unfulfilled need to 'extend collaboration in a constant and transversal manner with the civil society actors and other institutions, as well as to promote more selected and linked commitments to the direct concerns of the city'. [8]

The openness of the government is seen through the implemented and ongoing work of Medialab Prado, a government laboratory for socio-cultural transformation, which facilitates citizen-participants to influence the government's motivations and objectives and to be used as a playground when implementing strategies for the local participatory and citizen actions.

The Medialab Prado space has 4,000 m^2 divided into two labs, two minilabs, an auditorium, the residential area (three apartments) and a canteen. Besides the coordinating team, the key actors that navigate projects and initiatives from inside are the cultural moderators. The moderators' team is diverse and includes technicians, computer scientists, product designers, anthropologists, arts and cultural curators. These spatial and organisational structures support cultural programming and co-production by citizens as they aim at reducing the gap between cultural content producers and receptors of culture (i.e. spectators, visitors)[9] for the purpose of citizen power and direct democracy.

Finally, the lab is a protected space for learning to cooperate and encourages citizens and professionals of various backgrounds to meet and discuss common topics and to develop innovative solutions to occurred common problems. 'There aren't so many places to do this. We need each other to survive', concludes García. He, thus, stresses that labs are the space

to learn about the needs, in reflection to other people's needs, and to negotiate its prioritisation through implementation of the citizen innovation initiatives.

Brief outline of the project/ initiative's pathway

During the 1990s and early 2000s, the culture was not such a strong point in the development of the City of Madrid. The elected Mayor Alberto Ruiz-Gallardón Jiménez (2003-2011) from the People's Party was the one who recognised the value of culture and initiated the development of contemporary arts and theatre.

In 2005, the cultural centre MediaLab Madrid organised fab innovation workshop intended to promote and share good practices of the open and free hardware, free computing and free commercial licenses. Onwards, the centre started to experiment with the exhibition space as a place for the open-ended conversation and co-production.

At first, new models for collaboration were hard to imagine. 'The citizen labs are design of the new institutions and it is hard to explain it', stressed Marcos García. According to Medialab Prado, a public institution is not just an access to information and cultural content, but also a place to create new ideas and projects of free access to anyone. Marcos García considers that the citizen lab model can be applied to any type of institution — a city hall, school, hospital, and recalls four ways of doing it, as earlier mentioned in section

What is the project/ initiative all about?

For example, the libraries are citizen labs aiming to build the knowledge and to stimulate the inception of the new citizen projects/initiatives. This contemporary role of the library requires from the human resources the know-how to facilitate participatory processes and moderate groups, yet, Marcos García explains that 'upon hiring, the new librarian could be mainly requested to dominate skills for cataloguing the books'.

Consequently, with the lack of moderators in the public institutions, Medialab Prado is encouraging building such capacities in programmes of the citizen labs and other transnational initiatives. The programmes such as *Interactivos?* (CiCiLab, PrototipaLab) and *Collective Intelligence for Democracy* (ParticipaLab) associated to labs are organised through the open calls with the predefined themes (Madrid City Council chooses the topic with local partners). Depending on the theme and funding source, the timeframe for the

project implementation can be between a couple of weeks to a couple of months. Any individual can submit the project proposal that addresses the predefined theme. The proposals and collaborators are selected by the Medialab Prado coordinating team. Each awarded project will be assigned to the interdisciplinary team to convey the objectives and define the methodology for its implementation. The creator of the selected project idea will be invited to join and facilitate the project implementation. These activities are both oriented towards the 'production and debate, and have different formats and times with the objective of being able to respond to different interests and possibilities of participation'. [10] The teams are aligned to develop and further promote available free- and open-source hardware and software tools that can be circulated among labs and externally. The overall processes are documented under the open-access licenses in order to recognise the reuse of developed knowledge repositories and digital tools.

Considering the operational framework, the long-term objectives of the Medialab Prado established by the Madrid City Council for the period 2018-21[11] are to:

- Increase the number and diversity of active participants and increase the knowledge and assessment of the centre;

- Enhance the quality and impact of the projects developed;

- Contribute to the construction of local and regional collaboration networks;

- Consolidate international collaboration networks;

- Consolidate cultural centre as an open and sustainable organisation.

These strategic actions also imply a continuation to expanding the territorial development through *Study and Experimentation with Decide Madrid* (ParticipaLab) and the *Experimenta Distrito* programme (InCiLab) in various neighbourhoods of Madrid, initiated in 2016. The former programme was about citizens' experimentation of the aforementioned digital platform *Decide Madrid* and it is developed in the synergy with ongoing political and public projects and active organisations of the district. *Experimenta Distrito* programme is being developed in a close collaboration with the Government Department of Culture and Sports, the Government Department of Citizen Participation, Transparency and Open Government, and the Government Department of Territorial Coordination and Public-Social Cooperation of the Madrid City Council, as well as with the Madrid Health Agency of the Government Department for Health, Safety and Emergency. The initiative represents the scaling out potential of methodology developed within the Medialab Prado ecosystem.

Additionally, the extension to other districts was initiated in 2017 with the General Directorate of Madrid City Council Libraries on the topic of digital creativity workshops aimed at children, youth and family audiences. The cultural centre and laboratory for citizen participation is extending its local, regional and international collaborative networks to share knowledge, know-how and to support replication and scaling, by experimenting back and forth in order to adapt models and formats.

Management & Organisation: Who interacts and how to facilitate co-creation?

The coordinating team is responsible to promote calls and monitor the overall co-creation processes developed in the citizen labs and within the projects of the specific topic. A team of minimum six moderators-researchers (one for each citizen lab) is selected every two years [12] through an open call. They are responsible for hosting and guiding the publics and users in the lab activities and assessing their needs and concerns with projects of their interest. The open calls for collaborators are carried out after the selection of the projects. These collaborators and mediators of various backgrounds usually team up for two-week long international workshops (eight to ten of them) in which they envision alternative solutions and try to prototype them. The promotor of the selected project idea is invited to become a collaborator and a facilitator of the project initiative (in case the individual feels self-efficient in such role).

Furthermore, the project moderators are overall responsible to provide the sustainability of the participatory processes and support self-organisation of the working group dedicated to envisioning solutions and prototyping. The applied methodology supports getting to know each other, openness to sharing ideas on how the project could evolve, providing supporting environment for the collective decision-making processes, also taking into consideration feasibility measures in respect to available resources, members' competences and timeframe. The prototyping stage doesn't have to result in the physical outcome, but in the publication proof. In some cases, Medialab Prado succeeded to sustain some work groups for three to four years and to encourage their commitment in prototyping of the tangible results. Subsequently, the digital community of co-creators and users is continuously growing and represents a mixture of different collectives and individuals, which can be both local and international. The centre is creating new communities of self-organised practice while carrying out the cultural projects[13], including

involvement of the research centres and Spanish and international universities (engineering schools, humanities, social sciences), collectives, high schools and other public institutions, healthcare centres, among others.

What are the concrete processes and practices of co-creation?

Medialab Prado's operational framework is bestowed on the embedment of co-creation practices through several stages such as:

- Six conceptual frameworks (specified themes and methodological approaches) formatted through six citizen labs (see

- *What is the project/ initiative all about*?);

- 22 programmatic research and innovation practices formatted through the programmes;

- 47 bottom-up initiatives involving citizen engagement and interdisciplinary collaboration which equal to over 150 sub-initiatives per year.

This ecosystem promotes co-creation (co-design and co-production) as a relevant element in the residential and virtual events and networks between users and creators organised through the working groups. Additionally, the collaborative formats of the working groups are: workshops (ideation, codesign and prototyping), debates, seminars, residencies, documentary actions and larger public events. There are two types of the continuity when developing projects: i) the ones that are dependent on the availability of target audiences with and for whom the co-creation is being developed (e.g. taking into consideration the working hours of libraries; academic year and timetable of youngsters; weekend schedules of families; among other); ii) the ones that are organised annually through the open call for projects and collaborators, and after that implemented as an intensive and iterative cycle of co-creation processes (e.g. projects developed in collaboration with the international professionals of various backgrounds who are invited to reside for two weeks and support project implementation). In accordance to the model of co-creation of the SISCODE project, Medialab Prado implements *problem identification* in two steps: i) by assessing the global societal challenges and existing municipal organisational structures and services that can be improved by application of the digital tools and stronger citizen' (and therefore relevant stakeholders') participation and engagement; ii) by opening the call describing a broad societal challenge (e.g. 'agro-ecology') for which anyone can propose the project idea

(elaborate the main topic and objectives, propose methodology and desired outcomes). The *understanding of the context* and *redefinition of the key challenge* is achieved by individuals proposing the project ideas and when selected, by implementing them through the working groups and collaborative formats. The processes of *ideation, prototyping* and *testing* are done in an iterative way within the available timeframe and other necessary and provided resources. The *process of feedback and iteration* outside of the working group and Medialab Prado is promoted and implemented with the end-users/ target audiences through testing the products and services and by providing the feedback through an online form and focus groups.

According to Marcos García, the impact of project is measured informally through collective reflections in which individuals share their learning outcomes. If the project is replicated in another setting (e.g. school), the experiments (prototypes) will remain there at disposal. Conversely, the assessment of quality of prototypes and the evaluation plan of the societal impact were not provided.

Specification: What tools and instruments are/ were used to co-create?

Medialab Prado is an 18-year old initiative that is developing and appropriating tools and instruments for the development of Madrid's community. This implies a level of increase in the variety and numbers of citizen engagement practices and the use of digital collaborative tools. It was already stated that the centre organises and maintains its activities through the community moderation, prototyping, promotion of free culture/commons, and networking. These approaches become pertinent for co-creation once they are performed in deliberate democratic experiential and experimental ways.

As the main collaborative format is the workshop, the range of design methods, digital tools, and techniques vary, depending on the set objectives, desired outcomes, background and interest of the working group members, including the project promotors and the moderators. To organise and guide any participatory process in the working groups with a lower number of members, service design tools are being utilised (e.g. service blueprint, customer journey, scenarios and mapping, among other visual and digital tools). To turn an idea into the concrete product, the project members use available open-source materials, such as the machines and devices located in the FabLab (e.g. 3D printing machine, laser

cutter, among others) and open-source software (co-produced at the centre or elsewhere) that can support web and app developments.

Considering the way co-creation processes are promoted, it is relevant to mention that the emphasis is placed not only on the exchange of skills that the project members are bringing to the processes, but also on their motivation to acquire new competences. Therefore, the project members may not have to hold any previous experience concerning the selected digital tools and design methods as long as they are keen on learning and exploring them.

Which learnings emerged?

The overall analysis of the case study clearly shows that the Medialab Prado ecosystem and its labs are examples of good practice for the co-creation as defined in SISCODE. Additionally, Marcos García stresses several aspects of the citizen lab as an operational model that can be applied in every institution by taking into consideration that:

- the collaboration between institutions must be facilitated;

- there should be a collaboration agreement established between the institution and the moderators (service provision);

- the co-ownership depends on the level of engagement and participation of the citizen-participants;

- the collaborative projects (local, transnational) carried out more intensively and in a shorter period can stimulate the production of the effective solutions/ prototypes;

- the documentation is really important not only for communication and visibility of the projects, but also to explain and share the learning processes that happened in the working groups (knowledge transfer).

Medialab Prado is an atypical case of co-creation as the citizen labs are bottom-up initiatives created top-down; therefore, all the preconditions for the qualitative, experimental and effective collaboration between different stakeholders are present.

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Apulian ICT Living Lab | Italy

Margot Bezzi (APRE)

This initiative is promoted by the Apulian Regions Department for Economic Development, Employment and Innovation. It combines Industrial Research and Innovation Service and was implemented by InnovaPuglia to leverage user-driven open innovation in order to support local ICT SMEs and to promote regional PA innovation and civil society evolution from consumers to prosumers. Furthermore, it creates domain-specific innovation environments where local actors can co-design services, products and social infrastructures.

What is the project/ initiative all about?

Apulian ICT Living Lab (http://livinglabs.regione.puglia.it) is an initiative promoted by the Regional Government of the Apulia Region in Italy, and in particular by the Economic Development, Employment and Innovation Department – Industrial Research and Innovation Service, and implemented by InnovaPuglia, an in-house company of the Apulia Region - Technical Support Division, supporting the regional strategic planning in terms of digital innovation.

Apulian Living Labs was officially launched in March 2012 with the aim to 'develop and valorize new products and services for the companies and families of the entire region'[1], and to support the development and growth of SMEs specialised in digital contents and services. In particular, the initiative was launched in order to innovate across eight domains through ICT solutions: 1) Environment, Safety and Social Protection; 2) Cultural heritage and Tourism; 3) Creative Industry; 4) Renewable and Competitive energy; 5) e-Government; 6) Education and Training; 7) Transports and Sustainable Mobility; 8) Social Inclusion and Active and Healthy Ageing.

The experimental projects, of the duration of one year, had to tackle a number of needs, prior identification of these needs by the public authorities. Single projects could be proposed by any entity – NGO; policy programmes; research agenda or need from research; a request by stakeholders – by replying to public calls. Projects had to be realised in partnership, where at least one of the partners had to belong to the following categories: final users; research organisation; ICT regional enterprise.

Living Labs promote collaboration and co-creation processes among innovation stakeholders for the definition of new products, services, technological or societal infrastructures. More specific objectives of the initiative were:

1) Leverage user driven, open innovation in support of local ICT SMEs innovation, growth and competitiveness.

2) Promote the evolution of regional public administration and civil society from passive consumers to active prosumers of content and services of general interest, supported by ICT innovation.

3) Create domain-specific open innovation environments within real-life conditions, in which the active involvement of local end-users and ICT SMEs can pave the way to the

co-design of new services, products and social infrastructures. With real-life settings it is meant either physical environments, such as city boroughs or rural habitats, or virtual places, like social networks and online communities.

The initiative was funded by the Apulian Region through the ERDF Operational Programme 2007-2013. The Living Labs initiative implements an estimated 38,000,000 € budget investment, with a maximum public co-funding ratio of 60 % of the total expenditure. The public investment was supported by Axis I, Measure 1.4, Action 1.4.2 of the ERDF Operational Programme 2007-2013. Overall, the initiative activated a public contribution of 25,000,000 €.

Context and environment: Where does it all take place?

The Apulian Region (*Puglia*) is located in the South-East Italy with a population of about 4 million inhabitants. The region covers an area of 19,354 km2, with the longest coastline, for a total about 865 km of coasts. Across the Adriatic and Ionian Seas, it faces Albania, Bosnia-Herzegovina, Croatia, Greece, and Montenegro. Its capital city is Bari. Agriculture still represents the region's primary resource, and employment in agriculture is above the national average. Fishery is also very important to the region's economy.

Emigration from the region's depressed areas to northern Italy and the rest of Europe was very intense in the years between 1956 and 1971. Subsequently, the trend declined, as economic conditions improved, to the point where there was net immigration in the years between 1982 and 1985. Since 1986, the stagnation in employment has led to a new inversion of the trend, caused by a decrease in immigration. Unemployment rate in Puglia remains very high, representing and important social issue. It grew sharply since 2009 (+33 %) up to 18.9 % in 2017 (well above the national average of 11.2 %), to lower down again to 16,1 % in 2018.

Notwithstanding the employment situation, Puglia is considered one of the most dynamic regions in Southern Italy. Especially between 2007 and 2013 the economy of Apulia expanded more than that of the rest of southern Italy, and in the period between 2015 and 2017, has witnessed a general improvement of indicators such as GPD, employment rate, and export, with SMEs investments surpassing those of big enterprises[2]. Such improvements are attributed, following the interpretation of the regional authorities, to the capacity to make the most out of the European structural funds resources. In the period

where the economic crisis hit the strongest, the Regional government was able to convert the EU financial support into industrial policies as well as supporting and incentives instruments for enterprises especially related to innovation, internationalisation and competitiveness. Such instruments were managed by Region's in-house company 'Puglia Sviluppo'. This has been considered an important *change of pace* for the regional Research & Innovation (R&I) system, with open calls, public financial support and flexibility towards the different needs of enterprises, with special attentions towards the most innovative and advances production sectors. It is within this same wave of reforms and restructuration that the Living Labs initiative was initially launched.

The last decade for the Apulia region has been a moment of deep transformation from the institutional point of view, with public administrations proactively embracing activities to support a cultural change, towards the principles of simplification, transparency, involvement, participation, and sharing. For example, in 2017 the regional 'Law on Participation' was approved (LR 28/2017)[3], setting a permanent framework for the participation of citizens, local administrators, and cultural, economic, political and scientific actors, based on information, transparency, consultation, and listening, as well as on the right of citizens of verifying and monitoring the commitments taken up by the government. The drafting of the law itself was conducted as a participative exercise, involving thousands of citizens, institutional representatives and the third sector throughout the whole region. The law recognises participation as a right and duty of Apulian citizens, identifying forms and instruments of democratic participation, to ensure the quality of decisional processes on important topics and on strategic works. One of these instruments is the 'Annual Participation Programme', identifying which processes and procedures shall be opened to participation, and with which instruments and terms.

The Living Lab experience took off within a stakeholder ecosystem that was not used to such cooperative approaches. However, all stakeholders, including politicians, showed openness to experiment, as well as readiness to challenge previous habits, since they understood that there was a bigger challenge ad stake: addressing the difficulties connected to the economic crisis; finding a solution to community needs; strengthen innovation in the regional enterprise system and consolidate its international competitiveness. If not a pre-existing spirit of cooperation, certainly such a readiness to experiment, and to welcome a new, open approach was certainly greatly influential in creating the basis for the successful deployment of the initiative.

Brief outline of the project/ initiative's pathway

The core aspect of the Living Lab approach was the purpose of facilitating the implementation of the Regional Strategy for Research and Innovation during three consecutive phases, and in particular of the regional Digital Agenda. The underlying assumption was that regional development strategies must define new visions of sustainable future for citizens and businesses, as well as increase the quality of life and social cohesion in the territory of reference, through service-oriented communities.

Also, the logic behind this type of scheme was to reverse the usual 'technology push' vision of innovation, resulting in many project results stagnating in the famous 'Valley of Death'. The Living Lab's logic aims at starting from authentic societal needs and to experiment in real life conditions, creating 'demand pull', sustainable innovation with a strengthened quality, utility, usability, economy, and acceptance of the proposed ICT solutions.

As explained by Dr Gaetano Grasso, Project Manager in Innova Puglia directly involved in the implementation of the initiative, it is interesting to highlight how the attention the Apulia Region showed towards Living Lab and co-creation methodologies is directly stemming from the capacity of the Economic Development, Employment and Innovation Department of the Apulian Region of being involved into EU-level initiatives. Indeed, the region has always been an active participant within several cooperation initiatives at the EU level (e.g. ERRIN network, https://errin.eu/), which allowed to catch and capture the intrinsic value of the Living Lab concept, and to translate it at the regional level.

The intuition about the value of Living Lab and co-creation methods was eventually applied and combined with specific regional needs, with an intentional discontinuity with past socio-economic regional dynamics. The objective of this discontinuity and co-creative experimentation was primarily to trigger and support territorial relevant innovation processes and the industrial and productive fabric, to unleash effective economic development at the regional level, especially of SMEs.

However, another triggering and underlying motivation stood behind the Living Lab investigative and methodological experiment and it was the need to tackle a number of societal challenges and doing it through the collection of multiple actors' points of view to better understand them. The challenges identified were clustered into eight selected

domains: 1) environment, security and territory safeguard; 2) cultural heritage and tourism; 3) digital creative economy; 4) renewable and competitive energy; 5) e-Government; 6) education and training; 7) transports and sustainable mobility; 8) health, wellbeing and socio-cultural dynamics.

The region saw in the Living Lab methodology as a way to bring simultaneous benefit to public administration, companies and enterprises from Apulia, and the entire regional civil society, all called to co-design and co-produce the elements of a better world. On the one hand, the choice of the Living Lab approach is to be contextualised as a new approach to tackling Puglia's economic crisis, and as an innovative way to stimulate local development, through supporting local ICT businesses to develop technological solutions meeting a range of public-sector requirements. On the other hand, the Apulia region opted for the Living Lab methodology in order to explore and understand from municipalities and local administrations which were the most relevant issues that could be addressed through the new possibilities offered by ICT innovative solutions.

The ICT dimension was considered central in this endeavour, given its pervasiveness in nowadays societies that is why the experience is called 'Apulia ICT Living Lab'. The strategy focused on the way to give breath to the existing regional entrepreneurial landscape and to its potential, improving their commercial perspectives through valorising results and solutions conceived within the regional research system, which only needed additional validation and testing. This was done through strengthening the connections with the local innovative SMEs working in the ICT sector, through supporting capacities, potential, skills and knowledge connected to technologies. Solutions were then expected to be presented to final users, during and within the Living Lab activities.

The Apulian ICT Living Labs initiative aimed at experimenting the application of collective intelligence and adaptive capacity building taking into account the evolution of technology, while addressing needs of public relevance. The potential of the experiment was unfolded by the synergic combination of various enabling conditions: the presence of urgent needs and demands; an explicit governance vision and political willingness; and the capacity to seize and experiment the opportunities offered by ICT.
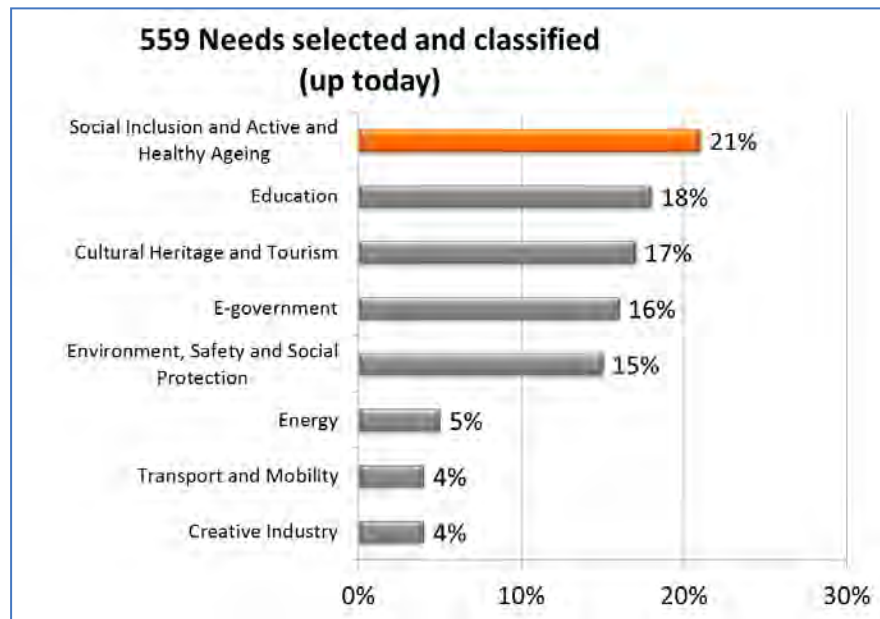
Figure 12 - Needs archive, as of March 2015. Source: Innova Puglia

Phase 1 - Open Call For Ideas: Mapping needs and necessities of local public administrators. The experimentation of the Living Lab experience was rooted into precise requests reflecting the collective interest. In March/ April 2012 a public call was published by the Regional Government, to identify domain-specific requirements and 'map needs of final users' prior to the launch of the Living Labs initiative, to collect and classify needs, necessities, requirements problems and themes brought by all the major stakeholders of the Apulia region (local administrations, third sector organisations, no-profit associations, citizen and consumer associations, schools, museums, etc.). Stakeholders could freely publish their needs in a structured, machine-readable way, onto the platform 'Sistema Puglia', dedicated to the promotion and development of enterprises and territory. Needs covered a wide range of areas (environment, transportation, the digital economy, education, health and wellness, culture, electronic governance, renewable energy and tourism) and were classified into eight thematic domains. All 450 approved needs were catalogued and published in a 'Requirements Catalogue' which constituted the basis for phase 2 activities – Design of appropriate solutions, dedicated to solutions experimentations by local SMEs.

Additionally, representatives from users and research entities were required to register in a 'Partnership Catalogue for Living Labs', as proposers of user-led needs and requirements and at the same time, potential partners of funded projects aiming to provide solutions to

those challenges. The Partnership Catalogue was a way to create partnerships for the experimentation, providing the contacts of subjects available to actively take part to experimentation activities during phase 2 – Design of appropriate solutions. More than 200 different entities registered to the catalogue.

1st call - ICT Living Labs: The Regional Government, through the FESR 2007-2013 operative programme, funded the ICT Living Lab initiative. In August 2012, the Apulia region published a call addressing ICT SMEs as beneficiaries, with the deadline in March 2013. The call intended to fund experimentation projects that would match the needs collected through the need mapping exercise (phase 1) with technological solutions proposed by the local beneficiary enterprises, to be tested and validated.

Each project proposal had to be submitted by at least one local ICT SME, and only partners previously registered in the Living Labs Partnership Catalogue could join. Furthermore, each proposal had to include at least one association or public body and one research laboratory in the formal partnership. This phase funded 11 Living Labs out of 25 proposals submissions, for a total contribution of 2,339,052.74 €, publishing a first ranking on 21st March 2013.

2nd call - ICT Living Labs: A second call for technological solutions, addressing SMEs, was launched through the FESR funds 2007-2013 in October 2012, with the deadline in April 2013. The second call presented the same requirements in terms of partnerships, and at the time of its launch, the Living Labs Partnership Catalogue counted 50 subscribers, with 90 pending requests for subscription to be assessed. The two calls opened the way to 34 Living Labs, allocating 9 Million € for the co-funding of projects of a total value of 15 Million €. This phase funded 23 Living Labs (out of 25 submitted) for a total contribution of 6,221,332.88 €.

3rd call - Living Labs Smart Puglia 2020: This is the name of the third call launched by the Region in October 2013, with deadline in November, to support the 'Apulian ICT Living Lab' initiative, which resulted in 44 new projects funded in March 2014, for a total contribution of 13,932,216.70 €. The third call comprised three intervention strands:

1) Smart Cities & Community for social innovation – directed to valorise and strengthen active citizenship participation, as well as material and intangible infrastructures of the urban territory, including museums and different types of associations (trade unions, consumer associations, economic associations);

2) Knowledge Community – directed to regional technological districts, competence centers, training institutes, research organisations, public-private partnerships, etc;

3) Business Community – directed to entities active in the economic, productive and service sectors (regional economic districts, enterprise networks, big enterprises, category associations, etc.);

4) An interesting feature of this call was the possibility to submit two candidatures – one candidature as a single applicant, and one in a network – for the same intervention strand, provided that two different needs were addressed. Due to their nature of already-close-to-the-market ICT innovations, all project durations were limited to 12 months (with positive impacts also on acceleration of Structural Funds expenditure), with a view to produce the first tested and validated prototypes by summer 2014.

In the 2014 to 2020 programming period, the Region extended the Living Lab model to explore all key enabling technologies (and not only ICT), in relation to their capacity to address the needs of communities, to reduce inequalities in terms of citizens' quality of life, and which are relevant for the smart specialization strategy. At this regard we mention the *InnoLabs* call of March 2017, always following the Living Labs methodology, for projects with a maximum duration of 18 months.

The Apulia Living Lab collaborative operation model includes regional actors belonging to the public administration system; the research system (universities and research institutes); final users; the business and entrepreneurial system (in particular SMEs); and other actors, such as museums. The public administration acts as initiator and has the propulsion role, with a clear vision of which competences and sector nurturing in to create new services and tackling the crisis.

The initiative was funded by the Apulian Region through the ERDF Operational Programme 2007-2013. The total investment for the project 'Apulia ICT Living Lab - New Policy Approach in South Italy to Tackle the Economic Crisis and Enhance Development' is 37,718,333 €, with the EU's European Regional Development Fund contributing 15,083,896 € through the 'Puglia' ERDF Operational Programme for the 2007-2013 programming period (Axis I, Measure 1.4, Action 1.4.2).

The process showed a linear and increasing trend in terms of actors' participation, with the number of funded projects growing during the different edition of the initiative. All in all,

75 innovation projects were funded, affecting 15,000 citizens from 40 different municipalities, with the participation of 40 research entities and 193 local enterprises, interacting with 154 users' organisations, following the quadruple helix model.
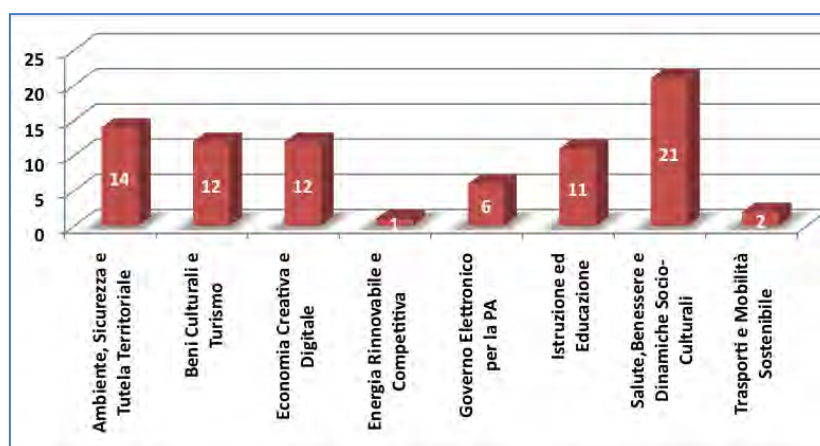
Figure 13 - project distribution across the 8 domains - March 2015. Source: Innova Puglia

As a result of the Living Lab experimentation, over 200 different entities, ranging from SMEs to established businesses and individual entrepreneurs, developed solutions addressing 128 out of the 475 catalogued needs. The co-fund experimental projects of the duration of one year, had to be realised in partnership, with at least a final user's representative or a research organisation.

By the end of the first funding period, a number of partnerships had scaled up into permanent working alliances or formal business entities. Some of these Living Labs asked for the acknowledgment of ENoLL, the European Network of Living Labs, as endorsed by the Regional Government of Apulia.

Regarding the nature and development of the network engaged, the Region has also embarked in a network analysis experimental investigation, executed through open source software by graduating students at the management engineering department of the Bari Polytechnic University. The objective is to investigate if it is possible to identify objective parameters to evaluate participation widening dynamics. Such analysis highlighted some positive indications, and now the Region is trying to understand if and how such

methodologies and software can be applied in order to get non-predictable interpretations of such phenomena.

In the light of the success achieved by the initiative, the Apulia Region has set the next steps, in coincidence with the new programming period. Besides keeping the 'needs database' always available and accessible for users to propose and insert new needs, from the operational point of view, the region has developed a new instrument and related calls. The new call 'InnoLabs' represents an evolution of the first editions, in that they shift their target towards the social impacts of precedent actions, targeted solutions and related projects are therefore expected to produces effects in terms of social and societal innovation.

Management & Organisation: Who interacts how to facilitate co-creation?

The authority responsible for the call management is the *Industrial Research and Innovation Service* under the *Development, Labour and Innovation Policies Department* of the Apulia region. The implementing and managing authority of the initiative is InnovaPuglia SpA, an inhouse company of the region. The managing authority, after the projects' evaluation phase, organised public events to present the pilots to the public, and with the intention to constitute a Living Lab for each of the eight selected technological domains. Role of the managing authority was the monitoring and technical assistance of the pilots.

Regarding the eight domain clusters, no specific responsible entity was assigned for their management. All actors were enabled and encouraged to discuss the eight domains through a web platform called 'Living Labs Cafè'[4] - comprising an informative section and an interactive one, with the objective to create a community around the Living Labs endeavor. The informative section collected all information on Living Labs activities, in Italy and beyond, and relevant EU events and activities for the different domain areas. Also, it contained detailed information regarding each activated Living Lab, on other R&I ICT projects funded by the region, as well as on the needs and necessities identified and the catalogue of possible partners. The interactive and collaborative section, called 'Open community', was intended as the place to propose projects and ideas in search of partners, for a collective elaboration and to create 'a living community, which elaborates needs and innovation together, and plan, design, test, and valorise achieved results together'.

Following the Living Lab logic, in August 2012, the regional government of Apulia also launched a pilot action on Pre Commercial Public Procurement according to the EC communication (COM 2007 799 def) in one of the eight application domains of the Apulian ICT Living Labs initiative, namely Health, Wellness and Socio-Cultural Dynamics. The role played by the region here was to mobilise and aggregate public demand (by other departments of the regional government, in charge for healthcare policies and social interventions) in a number of innovation subdomains, where there are needs for better quality, but also lower cost of existing products and services in support to 'Independent Living'.

As previously introduced, the Apulia region cooperated with the management engineering department of the Bari Polytechnic University to conduct a network analysis. One of the indications that emerged from the relationship analysis of stakeholders is that a stronger support is needed to build-up horizontal dimension's relationships in sectorial value-chains. In other words, the analysis highlights that enterprises, in order to gain competitiveness, shall reshape their relationship landscape outside their traditional and vertical value-chain, in favour of more multidisciplinary, cross-relational, and horizontal approach, entering in contact with other sectors. Using the agri-food value-chain as an example, it needs to expand their relationship network through integrating and interacting with different sectorial disciplines, such as for example informatics and data analysis (to properly manage informatics platform).

Such leap appears fundamental to appropriately valorise local products in the 21st century and guaranteeing economic growth. However, putting in mutual relationship very specific and different scientific areas certainly does entail significant efforts.

A slightly different perspective to describe the same overall emerged dynamic, with the words of Dr Grasso, is the need of 'closing the circle' between technological innovation and social innovation. Indeed, while technology-based sectorial innovation certainly is essential to push the development of new productive processes, it is also essential to explore the impact of social innovation in favouring the flourishing and development of a certain sectors. Taking always the agri-food sector as an example, we know that a number of social inequalities or issues create barriers in accessing certain products or adopting healthy behaviours: for example, low income people are more likely to buy large consumption products, since biological or high quality food may be too expensive. These social issues, however, end up hampering the growth of possible new market niches.

What are the concrete processes and practices of co-creation?

The Living Lab model pursued what is known as 'prosumers' creation model, creating domain-specific, open innovation environments with real-life conditions. Activities targeted priorities in the fields of 1) environment, safety and territory safeguard; 2) cultural heritage and tourism; 3) digital creative economy; 4) renewable and competitive energy; 5) e-Government; 6) education and training; 7) transports and sustainable mobility; 8) health, wellbeing and socio-cultural dynamics.

The living lab co-creation model is characterised by the involvement of researchers, local enterprises and organised citizen groups over all phases: idea proposal, definition of product and service features, testing and evaluation of first prototypes, experimentation of innovation technological solutions. In the Apulia Living Lab experience, the primary beneficiary of the initiative were ICT SMEs, who were requested to work in a cooperative fashion with end user representatives and research institutes taken from the Partnership Catalogue.

Within the Lab, teams co-designed services, products and social infrastructures, tested and validated their use in demo-lab experimentations, and drafted business models for their eventual marketing, ensuring that the solutions developed match actual market needs. In this model, all players are also beneficiaries of the value they actively contributed to create, following the open innovation 2.0 model.

Projects to be funded through the Living Lab initiatives had to comply with specific requirements. As of the requirements of the third call, projects must comprise the following activities (that can be associated to SISCODE categorisation of co-creation phases). Co-creation is meant as a feature and approach that can emerge and become embedded at various phases of the entire process, with a requirement specification in the call text that projects will be taken into consideration only if including the activities listed in points a, c, d, and e of the text:

a) Analysis and understanding of final users' technological needs also through specific co-design phases (corresponds to problem identification/ understanding phase);

b) Definition of interactional model among the different involved actors (contributes to ideation phase);

c) Prototyping and progressive personalisation of solutions (prototyping phase, including iteration to achieve further personalisation);

d) Test and experimentation of new technologies in real applications, respondent to actual final users' needs (corresponds to verifying/ testing phase, including iteration);

e) Demonstration and presentation in public demo-lab modality of the developed prototyped solutions, also with a view to make them available and accessible to a wider additional community of interested users (corresponds to feedback phase).

f) Analysis for the economic valorisations of experimentation results.

In terms of experimental development, the work included acquisition, combination, structuring and use of existing scientific, technological, commercialisation knowledge and capacities, to produce conceptual definition, planning, and design of products, processes or services, either new, modified or improved.

It is also to be highlighted that the funding mechanism was built in order to allocate the major part of the budget to experimentations of the proposed solutions, with and by the end-users (employees, students, teachers, tourists, civil servants, patients, etc. – depending on the thematic domain selected) in real life environments.

Each project proposal had to be submitted by at least one local ICT SME, and only partners previously registered in the Living Labs Partnership Catalogue could join. Furthermore, each proposal had to include at least one association or public body and one research laboratory in the formal partnership

prior to these phase, local public administrations were asked to discuss open issues and to advance a brief description of concrete problems and societal challenges which they would like to tackle in an alternative and innovative way, through the determinant contribution of new technologies (and in particular of ICTs), to pave the way for others (in particular regional ICT SMEs) to develop ideas and solutions.

The wider citizenship was reached and involved into the process through the web platform. Citizen's contribution could relate to different issues, such as reporting a viability problems for people with disabilities, or warning about a hydrogeological risk, or acting as a sensor for environmental issues, as an active agent of a civic system, combining the levels of smart community and smart city.

Specification: What tools and instruments are/ were used to co-create?

The perspective kept so far concerned the policy level and the way policy makers contributed to inject new interaction and innovation dynamics within the quadruple helix society, putting the values of hearing and participation at the center of policy making objectives.

In this paragraph – to give a better idea of co-creation methods, tools and instruments – we will adopt a different perspective, going down to a more specific level of granularity and trying to look at how the single Living Lab projects interpreted their work. Information was collected from the presentations of four projects (EPULIA, GIOIALAB, ROBIN, PARS-ECO), selected among the many project presentations available in the official 'Apulian ICT Living Lab' SlideShare channel.

Here a few main tendencies we extracted from the comparative analysis. As a general consideration, the opinion of the writer is that the quality and degree of interactions during this first Living Lab pilot reflect some specific features of the context they took place in.

From the qualitative point of view, the choice of the specific interaction channels and modalities as well as the degree of interactions, exchanges and iteration with stakeholders were somehow linked to the specific sectorial context (ICT). In other words, the specific rationale of the first living lab call – dedicated specifically to SMEs in the ICT sector, to boost their competitiveness – had an influence in the way interaction with users and quadruple helix: it is observed in many cases that interaction was enabled through technological means.

Also, the fact that it was the first time that the socio-economic context of Apulia was confronted with multi-stakeholder requirements and new ways of working, designing, planning – more iterative, interactional and collaborative. The impression is that there is a wider reflection of the SMEs points of view in the available materials (SMEs were the direct beneficiaries of the funding), and less information on other stakeholders' experience. In general, it was difficult to find information on the methods and the models applied, especially on stakeholder experience with co-creation tools.

Methods and tools adopted for user's active involvement over the four projects analysed:

- The DemoLAb. In terms of concrete practice of the Living Labs, a fundamental role was played by a DemoLab, a place where end users could test technological

solutions every day, and where knowledge, real life and concrete experiences merge and cross, generating added value and making the project advance.

- PARS-ECO organised two public interactive demonstration sessions in the two urban areas where the experimentation would take place. Also, organised permanent workshops with demonstrative sessions, recorded.

- GIOIA-LAB co-designed the graphic and informational layout of the platform and validated the prototype against the presented need. Also conducted in iterate and final testing on the layers of the solution and services.

- Operative focus group for sharing problems and difficulties, designing solution perspectives, suggesting strategies for results exploitation, further stakeholders involvement, networking actions.

  - ROBIN followed the User Centered Design Methodology (further details below);

  - EPULIA the FormIT methodology specifically developed for innovation processes within Living Labs.

  - PROS-ECO mentions the creation of multidisciplinary focus groups.

  - GIOIA-LAB explored the functional and usability aspects of both the web platform and the app, as well as the strategy for product economic sustainability and commercialisation, scalability and replicability.

- Users' involvement and engagement through ICT technology. PARS-ECO mentions the involvement of actors via weblog and social networks, which are not necessarily direct end-users of the initiatives, but who could have an interest in replicating alternative solutions in other contexts.

- Panel / Permanent fora of end-users (see ROBIN experience, below).

- Thematic workshops open to the public. GIOIA-LAB explored the economic, touristic and cultural context through a SWOT analysis; explored and got feedback on the functionality and structure of the CMS and of the app. Also used the workshops for dissemination.

- <u>Communication plans, and creation of direct communication channels</u> with public administrations, citizens and associations of category.

  - PARS-ECO mentions interactive web communication to compare and discuss their experimentation with other existing experiences.

  - GIOIA-LAB focuses communication efforts on media 2.0, such as mailing, blogging, social networking.

Focus on Project ROBIN (Robotic interaction system for visuo-spatial data presentation for effective learning):

ROBIN addressed dyslexia through a dedicated Learning Management System LMS, able to provide a multisensory and multimodal representation of data (robot, touch, audio/ video information). The project was developed in partnership with pedagogists and pychologists, schools (teachers and pupils), parent organisations, scientific and enterprise partners.

ROBIN organised focus groups following a user centered design (UCD) approach, to follow the development of the Learning Management System platform during the phases of analysis, development, validation and testing, future perspectives investigations, monitoring and revision.

The ROBIN solution (system and the services) has been shaped according to the UCD - User Center Design methodology, which focuses on the attention of the user's need, expectations and limits in respect to the final product, in order to maximise the usability and acceptance of the product. ROBIN applied a multi-level co-design and problem solving process, based on analysing and foreseeing not only how the user will utilise the final product, but also testing and validating their assumptions at the same time by taking into consideration the end-user's behavior during the usability and accessibility tests (test of user-experience) into the real world. The final product was created through an interactive process that provides the development of a first prototype to which a test and assessment stage followed, constituting the basis for the next prototype.

As of a publication concerning the project results: *'To explore the problems and potential of ICT in support of learning processes with dyslexic students, the survey technique of focus groups (FGs) was used. This is a special type of group interview that is designed to produce data on a specific topic by comparing participants. The comparison between the clusters of focus groups conducted with groups of adults (A, B, C, E), has also highlighted three*

different macro-narrative categories. (…) Discussion in the focus groups concerned these cores and went through an analysis in terms of expectations and critical aspects. In the first case desiderata, in the second one suggested solutions to some of the problems emerged. The results of the focus groups have become the guidelines for the development of the LMS. [5]

ROBIN also created permanent fora of citizens/ users, moderated by a member of a thematic association participating to co-creation activities. Moreover, it organised periodical workshops to reach out to a wider public. Workshop were hosted in conjunction with pre-existing annual events, or other existing for a (e.g. the Italian forum for Ambient Assisted Living – FORITALL)

Which learnings emerged?

- The process was in many ways a learning-by-doing process, and as such it comprised moments where competences, knowledge and skills appeared to be lacking and had to be created, especially about the management and the conduction itself of a co-creation exercise. Also, being a collective learning process, sometimes divergent conceptions towards crucial concepts emerged in the process of co-creation.

- As already mentioned in Section 6, the impression is that the whole process was more strongly led by – and reflected the point of view of - the SMEs that were the direct beneficiaries of the funding. Very few information is available on other stakeholders' point of view on the experience, and it was difficult to find information on the methods and the models applied, especially on stakeholder experience with co-creation tools.

- The very part of integration of the user perspective had to be learnt by SMEs and it was not always easy to integrate user perspectives into more traditional processes.

- As a lesson learnt, it emerged that a deeper need analysis is necessary.

- From the experiences, it emerged that technological solutions able to capture and valorise informal training experiences – such as social learning, knowledge sharing, learning on the job, but also coaching and mentoring – are more and more requested and needed. Such needs have emerged through the Living Labs experimentation showing to be cross-cutting to different user typologies.

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Innovation Strategy for the Capital Region of Denmark | Denmark

Stephanie Joy Hansen (Danish Design Centre)

*In 2017, DDC conducted a strategy process for the Capital Region
of Denmark framed by design thinking and design management methods and driven
by the regional administration?s desire to support innovation environments that secure consistently high levels of quality when new knowledge are implemented. Development of a new innovation strategy for the Capital Region of Denmark, which DDC co-created with staff and decision-makers in regional agencies and business units as well as the regional administration (the regions in Denmark are in charge of the health care).*

What is the project/initiative all about?

In Denmark, the primary task of the five Regions is healthcare. In 2016 and 2017, the Danish Design Centre (DDC) conducted a strategy process for the Capital Region of Denmark ('the Region') framed by co-creation and design methods and driven by the regional administration's desire to support innovation environments that secure consistently high levels of quality when new knowledge and new solutions are implemented. The vision was to engage in innovation efforts that would ultimately result in improved patient care, greater employee motivation, more economical healthcare services and added business growth in the Region – all done in cooperation with knowledge institutions, companies and municipalities in the Region.

The focus of the strategic effort was on developing a stronger ecosystem to increase the number of successful innovation projects that are implemented and scaled across the organisation. This was to be done by 1) promoting business-critical and radical innovation, 2) promoting employee-driven innovation, 3) scaling innovative solutions across hospitals and other institutions to a much higher degree, and 4) promoting cooperation with private companies and knowledge institutions aimed at developing new value-adding solutions. The ambition was to involve more staff members in innovative thinking in order to spark additional projects and promote the implementation of patient-centred ideas. Underlying

the innovation approach was the assumption that the development of new ideas for innovation had to take place in environments close to patients and their families that is among the healthcare professionals who work with patients and their family members on a daily basis. It is in this interactive space that needs become apparent, and where it is possible to work with patients in order to move quickly from idea to a solution that is ready for implementation. Thus, the focus of the strategy was on creating support structures for patient-close ideas to come forward, be further developed, prototyped and scaled/disseminated.

The focus of the case is on tackling the societal challenge of 'Health, demographic change and wellbeing', and the case addresses the cross-cutting themes of innovation procurement and public-private partnerships – and, naturally, has strong links to regional policy. Innovation in the Region was understood as radical innovation that transcends the existing framework and has the potential for considerable value creation across the organisation, but which also requires investments with regard to time, equipment, IT and/or funding, and which involves a risk that the outcome of the specific innovation project falls short of the investment. A condition for achieving radical innovation in an organisation is having a strong and sustainable ecosystem for innovation that supports the individual employees in having their ideas developed, tested, implemented and scaled. It is the exception, rather than the rule, that an idea is hatched as radical innovation – and it therefore takes special competences and processes to go from idea to innovation to radical innovation.

Context and environment: Where does it all take place?

The Capital Region of Denmark (which Copenhagen is a part of) is the region with the highest number of inhabitants (1.8 million). The Region had a vision of being among the three most innovative healthcare regions in Europe, and in 2016, it was stated in the Region's budget agreement that 'there is a need to strengthen innovation across the Capital Region of Denmark, in particular the employee-driven innovation at the individual hospitals and the use of good ideas across hospitals. Therefore, the parties want a presentation at the beginning of 2017 on how the work with innovation can be improved'.

FACTS: THE CAPITAL REGION OF DENMARK

• runs 5 large hospitals and has more than 40,000 employees
• manages hospitals, performs research and provides services for the disabled and undertakes environmental responsibilities
• cooperates with municipalities and the business community on developments concerning traffic, business and education
• is a public authority headed by democratically elected politicians

The push for an innovation strategy thus came from the policy level of the Region. The reason for the call to strengthen innovation is also stated in the agreement: 'New solutions will be necessary for the Region to be able to solve its tasks within the framework in the future. Therefore, it requires basic cultural work so that innovation is not an exception to the operation but becomes part of the operation. In the future, the Region will be challenged in relation to, within the same economic framework, providing treatment for more elderly people and paying more expensive medicines and new treatments. To meet the requirements for patient care of the highest quality, the Region's research and innovation activities needs to be put into a higher gear'.

In Denmark, public healthcare is free (people don't pay to go to the general practitioner or to the hospital), it is financed through the taxes. In the extract from the budget agreement above, the increasing number of elderly people as well the need to pay for more expensive medicines and new treatments are mentioned as the primary reasons behind the call to strengthen innovation. The developments put a pressure on the Region as the Region in the near future will not be able to provide the same quality in patient care within the same economic framework. Strengthening innovation is seen as a solution to keep providing the same quality – or even increasing quality – even though the demographic development is challenging and that no more money will be set aside for the area.

Brief outline of the project/ initiative's pathway

The initiating moment of the case can be tracked back to the end of 2016 where the Region's budget agreement pointed to a need to strengthen innovation and the innovative culture,

mindset and capabilities. At that time, part of DDC's funding came from the regional level, and it was decided to collaborate on an organisation-wide strategic effort to meet the call for action described in the previous section. This decision was somewhat driven by talks between the CEO of DDC and the Region's director of Centre for Regional Development (the centre in the Region in charge of the project).

As will be described further in section 5, the work with the strategy can be divided into four phases: 1) Focus, 2) mapping, 3) goal and vision, and 4) innovation in the future (development of the strategy). The work was kicked-off with a workshop in December 2016. The workshop was facilitated by DDC and the participants were civil servants in the Region who were going to work with the strategic effort in 2017. At the workshop, products, milestones and target groups for the effort were identified and dependencies and timing were discussed.

The current innovation practices in the Region were mapped to make clear the barriers and opportunities for achieving the Region's vision for innovation. The mapping led to four *insights* about the different phases in the innovation process (for example about how ideas are generated in the Region). This phase of the project relied a lot on co-creation and design methods with engagement of employees at the hospitals and companies in the Region. On the basis of these insights, a number of *needs* were identified (for example a need to make sure that the employees and companies in the Region know how they can proceed with an idea and get support to develop it). To address these needs, seven *dogmas* were developed that should lead the Region's innovation effort (for example 'Put the patient in the centre'). The six specific *initiatives* to strengthen innovation in the Region were developed on the basis of these dogmas. These are directed at 1) governance, 2) innovations teams, 3) innovation pool, 4) innovation hub, 5) idea competition, and 6) skills. The concept catalogue with the initiatives was finished in September 2017. From here, the Region was responsible of carrying out the next steps and DDC was no longer part of the project.

Management & Organisation: Who interacts how to facilitate co-creation?

As is already clear, the two primary actors behind the strategic effort were the Region itself and DDC (some tasks were subcontracted, including a pre-study of innovation in the Region which was conducted by the anthropological research company Gemeinschaft). DDC is the national design centre of Denmark and works on a number of initiatives for public and

private actors in areas such as health, innovation and cities with an objective to promote the value of design for Danish businesses and industry. The main way they do this is by giving companies and organisations an opportunity to test how design practices can boost innovation and development.

In the framework agreement for the collaboration, it is described that the tasks of DDC are to guide and advise the Region on the development of the strategy and to develop and prepare material – and that tasks are defined and specified on an ongoing basis as needed. As described in the previous section, the Region and DDC had continuous collaboration before the work on the innovation strategy. To some extent, the Region already had some knowledge about and experience with co-creation and design methods even though this was not systematised in the organisation. The Region was very open to the approach and could see the potentials in working this way. The director of Centre for Regional Development was especially open to this and he was very much the driver behind the collaboration and the use of co-creation and design methods. At times, the whole approach and mindset were met with some resistance from some of the key actors within the organisation and the director thus became an important ambassador throughout the project.

At DDC, a project manager (from the platform Future Health) was appointed to lead the project and have the contact to the Region. In the framework agreement, it is stated that the project manager had to be in regular dialogue with the Region about the tasks and the progress as well as about communication, reporting and evaluation. Eventually, also a programme director from DDC was engaged in the project (after returning from maternity leave) and a number of other employees at DDC were also engaged in some way, including the CEO and different project assistants. To maintain a focus on the Region's overall strategic aim throughout all of the phases and to ensure the necessary support for the innovation strategy at the management level, meetings were set up quarterly between the CEO of DDC and the Region's director of Centre for Regional Development.

In the Region, a programme manager was responsible for the progress of the project. There were many other employees (civil servants) from different departments of the organisation involved in the project, among these departments working with test of welfare solutions, HR, business development, research and intellectual property rights. The programme manager was responsible for the engagement of these actors in the project, but it was at

times hard for the programme manager to align the many different interests, motivate them, understand their stakes and create a common understanding of the aim.

What are the concrete processes and practices of co-creation?

The strategy first and foremost focuses on strengthening innovation by creating support structures for patient-close ideas to come forward, be further developed, prototyped and scaled/ disseminated. This focus was chosen on the belief that idea generation in relation to innovation should take place in the environments close to the end-user – with the employees who everyday work with task solving in relation to patients, relatives and colleagues. The employees (not least the doctors and nurses at the hospitals) were the primary target group, and together with the Region's programme team, they were engaged in the development of the strategy. The strategy was developed in a co-creative process and involved four general steps:

1) FOCUS: Based on a strategy workshop with the programme team, step one in the effort to promote innovation and innovation power was to highlight and identify possibilities and challenges and to ensure a focused innovation effort by letting the Region's programme team make decisions about where the potential should be utilised and enhanced.

2) MAPPING: Next, to ensure a coherent and shared understanding of how innovation took place in practice in the Region at that time, DDC then mapped and analysed how ideas travel (service journeys) and what challenges and barriers were encountered along the way.

3) GOAL AND VISION: After mapping and analysing service journeys for innovation in the Region, DDC then carried out a strategic goal workshop for the regional administration's decision-making organ FIRU (Forum for Research, Innovation and Regional Development). The workshop resulted in a common vision and ambition for the innovation effort. The strategic goal workshop, the mapping process and the strategy workshop served as the basis for the development of a model for how the innovation effort was to happen in the future – the to-be image.

4) INNOVATION IN THE FUTURE: In cooperation with the programme team, DDC then developed a concept catalogue with a proposal for an ecosystem to enhance and anchor the innovation, including definition, decision-making structure, process model for innovation, organisation of new and existing support functions and specific initiatives. The ecosystem

was to contribute to the development of shared language, conceptual framework and common understanding of innovation and innovative solutions within the organisation. The goal of the ecosystem was to increase the number of successful innovation projects that are implemented and scaled across the organisation. Overall, the goal was to put in place a process that provides inspiration and forms a basis for making strategic decisions and implementing the innovation strategy.

It's also interesting to look at the specific initiatives described in the concept catalogue. One of them was about setting up idea competitions (once or twice a year). Employees could send in their ideas, and a number of these would be selected for a qualification and then three would be selected as winners. The three winners would go through a prototype phase (where the employees coming with the ideas would be giving time of their usual jobs to work on these). The concept was tested during the development of the strategy. The headline for the competition was 'You are genius'. 86 ideas were submitted and over a year, the winners got to work together with the Technical University of Denmark (DTU) to develop their ideas.

Specification: What tools and instruments are/ were used to co-create?

At the kick-off workshop for key employees (civil servants working with innovation different places in the organisation), a number of design tools were used. Among other things, personas representing different target groups for the strategy were used. The participants then had to formulate quotes for the personas about how they would like them to talk about their work with innovation in 2018.

The following mapping of current practices was primarily carried out by anthropologists who examined how innovation unfolds in the daily practice of employees and companies in the Region. This was done through qualitative interviews which allowed for a close look at the actual situation, providing insight into how people experience and act in a given context. The mapping created a common understanding of how innovation unfolded in practice and ensured that decisions were anchored in a real-life perspective and in the daily work with innovation in the Region. There was a good representation among the 33 interviewees across profession (clinical staff, management, consultants and companies), geography and type of innovation. On the basis of the interviews, DDC created a number of stop-go analyses for personas representing different employees in the Region, focusing on

the barriers for innovation. Where in the process was innovation hindered? After the current practices had been mapped, they were visualized and presented to the Region.

Towards the end of the project, a prototype workshop was conducted with civil servants in the Region as participants. The prototypes were about how ideas should travel in the future. Four prototypes were made with different kinds of basic materials (paper, pipe cleaners, etc.) and these were tested on personas representing different employees in the organisation.

Which learnings emerged?

A key learning from this project is that in a collaboration like this, it is very important that the actor subject to change (in this case the Region) is getting 'overboard' and sees the potentials of working with co-creation and design methods so that the work in this direction will continue after the end of a time-limited project.

The support of the management and decision makers is essential. As described in a previous section, the director of Centre for Regional Development was very supportive and open to the use of this mindset and approach. Just after the concept catalogue was finished, the director left his job at the Region. This meant the loss of an important ambassador that could create support in the organisation and ensure that the work would continue. The support of the management is essential but thus, it is also important that the lower levels of an organisation subject to change feel ownership and buys in on the mindset and approach. With a project initiated in the top of the organisation, effort should be made to engage people and creating support for the project. Co-creation can be a method to this.

DDC had a lot of responsibility in the process and might have been too big a driving force behind it all when not being part of the implementation phase. The Region was an active part in the development of the strategy (for example, employees in the Region conducted interviews themselves of nurses and doctors when mapping the existing practices). But it was DDC who did the analysis and development of the concepts and initiatives, which might have led to a lack of feeling of ownership from the civil servant's side of the Region.

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Access to unpublished material

Interview

Anne Danielsen (Danish Design Centre, senior service designer)

Sara Gry Striegler (Danish Design Centre, programme director)

PIKSL – Person-Centered Interaction and Communication for More Self-Determination in Life | Germany

Jennifer Eckhardt (TU Dortmund University) and Tanja Klimek (TU Dortmund University)

The case aims to provide barrier-free access to information resources and media, especially for people with disabilities. These people are actively involved in the co-creation process. Focus is to facilitate (digital) participation in society and enable a self-determined life by providing PIKSL labs with an open space for inclusive exchange, learning and co-developing. The labs are accessible for everyone, but the focus is mainly on people with learning difficulties. It is a Dusseldorf-based Organisation, run by a welfare organisation.

What is the project/ initiative all about?

'PIKSL – Person-centered interaction and communication for more self-determination in life' is a German organisation based in Düsseldorf. PIKSL is not a timely limited project as it is attached to a charitable organisation with the clear goal to be a permanent institution that scales up its idea in terms of opening up new labs all over Germany. This case study refers to the PIKSL 'mothership' in Düsseldorf and the activities of co-creation that take place there. There are currently five PIKSL labs: Düsseldorf (2011), Bielefeld (2015), Dortmund, Kassel (both 2019) and Osnabrück (2020). All of the PIKSL labs are public educational places where people can access digital media, acquire digital skills and gain Internet experience in open settings as well as in courses. They are an open space for exchange, learning and co-development of solutions to reduce the complexity of the digital world. The goals of the PIKSL concept are to provide barrier-free access to information resources and media, especially for people with disabilities and to reduce digital barriers and complexity in everyday life. Therefore, people with and without disabilities are working together to develop products and services for all people. A special characteristic of this place is that

people with learning difficulties are the lecturers and experts. In PIKSL co-creation can be seen as an overall working principle in the everyday work as well as single co-creative activities that are very topic-specific and targeted. E.g.: If the lab needs new furniture or new technical equipment, co-designed decisions are preferred over a top-down management instruction. On the other hand, single activities are carefully planned; especially when external experts are called in. In the labs, co-creation happens between the target group and experts from business and science. This principle is reflected in the diverse collaborative partners from all societal sectors. Through their open, resource-oriented offerings and the new forms of learning, the PIKSL labs contribute to inclusion, participation as well as digital and social participation. An overall aim is to create a barrier-free world while concentrating on the three following working fields: 1) education, 2) research and development and 3) consulting.

Therefore, the case is centred on Responsible Research and Innovation and Policy Making. With the PIKSL concept issues of boosting inclusive, innovative and reflective societies are addressed, as well as it is tackling the digital divide. In line, it is dedicated to developing new solutions in digital participation and media skills with the cross-cutting issues open access and data management, ethics, gender, diversity, inclusion and intersectionality as well as links to regional policy and innovation procurement. The managing director, who was asked to clarify the answers once more, pointed out the importance of links to regional policy. To him, personal contact and an overall understanding of the local relevant actors appeared to be a major driver in making PIKSL more prominent and to attract new users. In the immediate process of co-creation, single citizens and interest groups, civil society organisations like nongovernment/non-profit organisations and makerspaces, consumers and users of a specific products, businesses, employees and volunteers, people without digital access or knowledge and affected populations like people with disabilities and refugees are involved. This will be deepening in section five of this case study, which is dedicated to describe co-creation in PIKSL in detail.

In 2016, a scaling process of the PIKSL concept was initiated which is supported by 'PHINEO', an independent, charitable analysis and consulting firm for social engagement and the 'SKala Initiative', which promotes charitable organisations. For this purpose, a separate department has been set up within PIKSL: the PIKSL Management, which is responsible for the dissemination process, administration as well as for all managing procedures. This department is not directly involved in co-creation activities. Co-creation

happens in the labs, in the development of new digital and analogue solutions, including the furnishing and equipment of the labs – other responsibilities, especially in the administrative structure, are rather not a subject to co-creation. The following principles nevertheless characterise the basic attitude and working method of PIKSL:

- Equality

- The focus on individual skills, resources and strengths

- The understanding of disability as a core competence, rather than a barrier

'In der Gemeinde leben gGmbH (living in the community) – IGL' is the umbrella organisation and developer of PIKSL. It is a german limited liability company whose income is used for charitable purposes and whose two shareholders in equal parts are the 'Diakonie Düsseldorf' and the 'v. Bodelschwinghschen Foundations Bethel (vBS)' – two big German welfare organisations. IGL is a regional company in the field of disability assistance and offers both, inpatient and outpatient assisted living. Part of this concept is to extend assisted living in own homes and alternative forms of support, with the aim of enhancing the freedom of choice in line with a strictly needs-based and individualised approach to rehabilitation. 90 % of IGL is funded by public funds, usually the service fees through assisted living arrangements. The costs of the lab in Düsseldorf are provided by IGL and covered by its own income. Possible surpluses are used for the formation of reserves. The PIKSL management will be funded by the SKala initiative during the funding period and will be covered with the income of the PIKSL network from 2021 onwards. This consists of own labs as well as labs of partners. The costs of the management therefore correspond to three types of income:

- Public service fees for recognition as an alternative provider of employment for people with disabilities

- Annual fees from partner labs

- Donations, research funds and surpluses of own labs

Context and environment: Where does it all take place?

PIKSL Düsseldorf is located in a neighbourhood close to the main train station, which is characterised by a rather multicultural and lively street-life. The PIKSL manager told us that a close relationship to the neighbourhood is very important to him and that the lab

developed to be a contact point for all kinds of people – from seniors willing to socialise, to children doing their homework. The area is considered as rather disadvantaged, for example the unemployment rate is above the city average[1]. But the municipality is taking effort to enhance the overall quality of life. In particular, the northern part of the urban area has developed into a cultural and shopping district and is referred to as a trending district[2]. A low threshold and general character of a 'walk-in institution' is regarded as highly important from several PIKSL stakeholders (source: group discussion on PIKSL's unique character). As an important driver the organisational structure was described to hold good conditions to develop social innovation as the employees are open to try new things and are also courageous to do something 'against the odds', sometimes also against all organisational constraints or regulations. The staff is in high movement and visits several events per month to disseminate their ideas. Sometimes the staff is fully booked for weeks in advance. In the discussion they mentioned that sometimes they are afraid to not be able to manage their daily work.

In the questionnaire, the digital divide as well as the overall digital progress were named as crucial driving forces of PIKSL Düsseldorf. In addition, new German legislative regulations related to ambulantisation in the welfare sector were an important boosting factor. An important international development was the ratification and implementation of the UN Convention on the Rights for Persons with Disabilities (CRPD). Furthermore, PIKSL is influenced through modern forms of work and the ongoing discourse related to it. With the digitalisation of work spheres, electronic media are becoming more and more important and the risk especially for marginalised people to be excluded from society as a whole and the working world specifically is rising. PIKSL wants to help closing the gap in digital participation opportunities, also with regard to these issues. Despite the explicit statutory provision in Germany that all people should have free and open digital access, as also demanded by the (CRPD), several million people are not part of the 'digital society'. These include refugees, people with low educational backgrounds, seniors and people with disabilities. Especially people living in care homes often do not own digital devices and have very limited access. The advancing digitalisation and complexity of the digital lifeworld are making access even more difficult. Of course, the social sector is also affected by digitalisation, but is very slowly catching up. Due to increased ambulantisation in the welfare sector, the need for clients to maintain social contacts is also increasing. Clients of IGL expressed a desire to use digital media and to learn how to deal with them. Alongside, the demand stems directly from the affected population.

In closer examination, during the interview, the manager explained how the traditional structures within the church related umbrella organisation are often a further impeding factor that is tangible on multiple dimensions. Firstly, it is not easy to act against entrenched ways of organisational procedures. This regards notably politics of hiring people, documentation and methods of operating. Secondly, Germany's welfare system is highly characterised by old welfare organisations that tend to fear for their dominant position in the field – especially regarding new social entrepreneurships popping up. Thirdly, inflexible hierarchies within the umbrella organisation are completely contrary to what PIKSL actually wants. But on the other hand, these traditional structures also provide access to a broad and well developed infrastructure and an overall 'good reputation'.

Brief outline of the project/ initiative's pathway

The initial motivation and 'kick-off-moment' dates back to 2011 and derived directly from the clients of IGL, who live either assisted by the organisation in their own homes or in sheltered workplaces run by IGL. They expressed a desire for digital participation and reported about missing digital opportunities. In their respective living environment digital devices were neither available nor was the level of digital competences sufficient to use computers, tablets or mobile devices. The people wanted to use the internet and social media but had no access and no real idea of how to do so. It is not possible to go into further detail on these processes within this case study, as additional face to-face interviews with other actors would be necessary. The financial support of a private sponsor was important for the further process, as this enabled a project manager to be hired. Another important point was the involvement of future users and all partners from the very beginning, for example from science, who deal with the topic of digital participation. The project manager sees the kick-off workshop, where the initial ideas and concept of PIKSL were developed, as an 'initial spark for the project, where many steps have been set'. In summary, the initial funding moment can be attributed to several factors: the personal commitment of motivated single persons, such as the managing director and some clients, the anonymous financial donation and the employment of the project manager who, as a designer, deals with different living environments and modern participatory methods.

The next step was the further development of initial ideas and the submitting of funding applications and project proposals. The funding from an intermediate foundation as well as

other donations from an IGL institution have contributed to the financial basis of the pilot project. The participatory design of the lab in Düsseldorf with future users and a professional design bureau as well as the subsequent opening were the next milestones. The first courses and training concepts were developed together with some PIKSL users. Through public relations, word of mouth, advertising within the neighbourhood as well as in surrounding workshops and working groups, more and more people got to know PIKSL. Collaborations and research projects with universities, but also with companies, have been and continue to be an important part of the PIKSL concept and history. Through numerous awards, PIKSL gained a high level of public interest, both nationally as well as internationally. For example, PIKSL was selected as one of 54 projects through the 'Zero Project' – an internationally leading forum for enforcing the UN Convention on the Rights of Persons with Disabilities.

The next phase was marked by the verification of the sustainability of PIKSL ('Does the idea of PIKSL work beyond the pilot project?') and was initiated by the end of project funding in 2014. The refinancing of the PIKSL lab became a central topic. In order to ensure financial sustainability, the project leaders tried to implement follow-up projects. Due to the complex application process and the time resources, this was difficult according to the people interviewed. This led to an increased focus on courses and collaborations, which developed into 'supporting pillars' of PIKSL. At this stage, lecturers of the courses were hired as volunteers. In addition, there was a further development of participation opportunities at PIKSL. Another offer, PIKSL mobile, was developed at the request of clients of the stationary facilities of IGL. According to the people interviewed this phase has been a difficult process in PIKSL, because during the project period many aspects of financing were neglected, the complexity and organics of PIKSL were underestimated and the refinancability of PIKSL offers was considered late.

The next phase involved the further development of the approach and the dissemination of PIKSL as a social innovation. Another lab in Bielefeld was opened and a business economist was hired to conduct a feasibility study. Within the standardisation processes, a manual, a product- and service portfolio were developed.

The organisation is now in the middle of a scaling process to make the concept known beyond local borders and to reach more people. For this purpose, a scaling team, based in Düsseldorf, was formed to identify new locations and thus create a nationwide network of PIKSL labs. The process is funded by the SKala initiative. Scientific support and evaluation

take place to accompany the scaling team and equip it with perfectly fitting instruments of (self) evaluation that can describe the progress of the process.

Management & Organisation: Who interacts how to facilitate co-creation?

PIKSL thought quite late about following a certain management approach. They always had very flat hierarchies and an open and very honest atmosphere, but never thought about formalising these practices. When Marius, the current manager, joined the team, they started professionalising their approach to managing a PIKSL Lab. This has to do with their effort to scale up the PIKSL idea. In this course they started thinking about what other PIKSL laboratories should compellingly fulfil to have the right to call themselves a PIKSL lab. In workshops the core-team identified an open management structure and also a present managing team as crucial.

In its work, PIKSL receives support from more than ten partner organisations from science, teaching, education, communication and the private sector. The support is from financial character and funding related, as well assupport in lobbying from external partners. Furthermore, personnel and staff support is received. As the interview partner explained, staff support means that partners in the non-profit sector look out for possible 'talents' that might be a successful addition to the PIKSL team. Especially in its scaling efforts there is a continuous search for possible team members.

Support in knowledge provision and idea development is coming mainly from partners in academia, from all disciplines. One academic partner is located in robotics and artificial intelligence. PIKSL cooperates in being co-constructive in developing solutions in the field of simplifying workplaces. The academic partner located more in social sciences does evaluative work for the organisation. Furthermore, PIKSL has a 'learning-teaching-practice cooperation' with the Faculty of Rehabilitation Sciences at TU Dortmund. It can be seen that multiple vibrant partnerships are uphold in the PIKSL case, which is on the one hand a huge driver, but can be overstraining on the resources of the PIKSL-staff on the other hand, as the managing director stated in the interview. The network needs to be taken care of and contacts need to be uphold. In the PIKSL team are little personal resources to guarantee a seamless maintenance and enhancement of the multiple partnerships and networks. In their cooperative partnerships, they put high emphasis on transparency and mutual

recognition of the specific expectations from one another. This refers also to making clear statements regarding what everyone can and cannot deliver.

The several external partners are also engaged in upholding dissemination structures and provide necessary infrastructure to PIKSL. In this interdisciplinary setting, PIKSL works with its partners from science and teaching on a wide range of problems centered on barrier-free solutions for their products and services. Up until now there were no real conflicts with partner organisations. Sometimes a contact just fades out, because new shared level could be found or the perspectives were just too far apart from each other. For the concrete processes of knowledge production, further research is necessary as our interview partner was not able to answer this question.

A lot of encounters could be described as 'chance' – the manager describes it i.e. as a series of fortunate coincidences how the contact to the partners in Berlin came about. When visiting a congress in Berlin, a mutual friend introduced the social media manager of PIKSL to the board member of a Berlin based NGO. She spread the PIKSL idea in her surroundings, whereby her colleagues recognised the same need for digital participation within their clients in their Berlin based organisation. They then started to think about implementing an own PIKSL lab in Berlin.

In summary, the exchange and cooperation with the various partners from science, teaching, education, communication and the private sector represents an important pillar of the PIKSL idea. This large network accompanies and supports PIKSL in its goal of creating digital participation.

What are the concrete processes and practices of co-creation?

As explained in the previous section, co-creation is a fundamental part of the development of the PIKSL concept. An important prerequisite was the commitment of the managing director to take full account of the wishes of his clients and to involve them in decision-making processes. As an important driver the organisational structure was described to hold good conditions to develop a social innovation as the employees are open to try new things. Furthermore, the employment of the designer as the project manager has also supported the modern and participatory forms of work at PIKSL. From the beginning, the future users and all relevant partners from the following sectors were involved: academia,

civil society, private and public sector. All phases of the co-creation process were also completed: problem identification/ understanding, ideation, prototyping and verifying/ testing. The initial involvement of relevant stakeholders happened by personal appeal and by advertising. A peculiarity, especially in the context of welfare, is the target group as a major part of the co-creation process through all phases. Instead of a deficit orientation, people with disabilities are seen as experts, knowing best what matters to break down barriers to deal with digital media and developing new, universal solutions. In addition, they also impart their knowledge and skills to other people in courses. The basis for all activities is the place. The PIKSL labs are open and accessible places for inclusive exchange where all people can come together. They are the result of the joint work of PIKSL users and a designer office. The labs are embedded in the middle of the neighbourhood and have a low threshold and general character of a 'walk-in institution'. The courses and training concepts have also been developed in collaboration with the PIKSL experts and they also take part in workshops and meetings. The experts find their participation opportunities very satisfactory, so it can be confirmed that the co-creation process reaches the stage of feedback and iterate. The opportunities for participation and the right of experts to participate is an integral part of the PIKSL attitude.

The initial engagement of stakeholders varies from between the different activities of co-creation. When the furniture was developed, the PIKSL team asked the regular visitors to be a part of a joined workshop in the Lab. This time slot of the workshop was planned carefully. Special notice was taken to find a good date. Everyone was well informed on the desired outcomes of the workshop, whereby the visitors already reported about defect furniture before. The professional designers were friends of one of PIKSL's staff-members. While they received a representation allowance, the PIKSL visitors did not receive any gratification.

Another co-creative activity took place during a workshop at a conference in Berlin. The goal was to bring developers of the digital world (Siemens in this case), people with disabilities and actors from municipalities together to talk about digital solutions in delivering citizens services. The initial engagement was very targeted and directed directly towards the participants, whereby everyone knew each other from other preceding encounters. There are also processes, which could be described as 'natural co-creations': When a decision has to be made, joint decision making is the preferred way.

Specification: What tools and instruments are/ were used to co-create?

Many different tools and methods are used in everyday life of PIKSL. These include the following co-design tools and methods: In the first phase (problem understanding and definition), (Silent) Brain Dumps are used to collect, visualise, share and structure ideas. Sometimes this happens first in individual work, before the ideas are discussed in the team. This can be completed with Research Planning as well as the planning of the further procedure. In the second phase (Need Finding & Formulating Synthesis), Desk Research (simple internet research, evaluation of relevant information, documents, projects, …), will be used as well as Interviews (like focus group or narrative interviews with users or stakeholders with open ended questions – 'how', 'why', 'what', 'why are you doing that', 'what happened then', 'what would be an ideal solution' … - it must be noted that there are no wrong answers, that every detail can be important, also non-verbal, the interviewee is not influenced and talks as much as possible, about 20% speech share, 80% listening), Stakeholder Maps (analysis and visualisation of all involved stakeholders of the ecosystem of a question) or Storytelling (narrate method). In the next phase (idea generation), Brainstorming will be used and the ideas will be further developed (IdeaShaping). In addition, Thought Experiments are designed (e. g. description of the successful path of change). In phase four, the ideas are being made tangible by developing visual output (e. g. audio clips, drawings, writing, photo diaries, installations …). In the last two phases (prototyping, testing and co-creation) prototypes of the solutions are designed, tested and then improved by reflection and feedback. In the joint working process, attention is paid to visualisation, simple language, simplicity and accessibility, as, for example, classical teaching methods do not meet the needs and opportunities of many people with disabilities. In summary, the tools and methods mentioned represent examples from a large pool of methods. The guiding principle of the design-thinking process is 'from people to people'. The tools and methods must always be flexibly adapted to the respective situation. The reflexive assessment and the learnings concerning the co-creation process as well as the usage of tools will be given in the following section.

Which learnings emerged?

In terms of the co-creation process with many different stakeholders, a good preparation and follow-up are very important. Since formulations and language can generally be major

barriers, all important information, such as context, goals, purpose, agenda and so on, should be explained in a simple language. Visual representations like icons and pictogrammes can be used in a supportive way. In addition to a simple language, visualisation and flexible spaces, all components of the co-creation process should be simplified and barrier-free as much as possible. Classic lecture methods, for example, do not meet the needs and possibilities of many people with disabilities. More flexible, especially design-thinking methods are necessary for co-creation and are preferred as a solution for the design of joint workshops and lectures. Furthermore, sufficient time should be scheduled, because the process can be very time-consuming. This is a main barrier. Participation does not only mean changes in content system, but also relies on further pedagogical settings. The atmosphere should be open and appreciative. Hierarchies and power inhibit creative co-creation. The composition of a creative and interdisciplinary team and empathy are also important factors because they allow different perspectives. A resource-oriented and human-centred attitude is a prerequisite, because if you trust people with disabilities and actively involve them, they can develop their potential, self-confidence, sense of responsibility and competences. Instead of discussing how to balance disability and deficits, opportunities should be created to bring in skills and resources.

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Interview

Dr. Marius Mews (PIKSL, Management Team, Finance and Research)

Boxing Future Health | Denmark

Anders Kold Nielsen (Danish Design Centre)

This initiative centres on the question of future possibilities for future healthcare. Boxing Future Health consists of four physical scenarios that take the form of four cylinders, which can be entered to feel, smell, and listen alternative futures for healthcare anno 2050. It allows to thin differently about the current solution in practice. The scenarios are designed as a future laboratory in which stakeholders from private industries and public organisations discuss strategic business development, radical transformation or design-driven innovation. It has been developed with 100 experts from the field of healthcare.

What is the project/ initiative all about?

Together with experts in scenario development and future research, as well as actors from the health care sector and industry, the Danish Design Centre (DDC) took the initiative to develop a number of visual and tactile future scenarios that would draw a picture of the health care sector in 2050. DDC is the national design centre of Denmark and works on a number of initiatives for public and private actors in areas such as health, innovation, cities and much more, with an objective to promote the value of design for Danish businesses and industry. The main way they do this is by giving companies and organisations an opportunity to test how design practices can boost innovation and development. This case is an exemplification of one of these initiatives.

The initiative started in 2016, and the scenarios were designed in such a concrete fashion that they themselves form the framework for a number of strategic debates, political dialogues and innovative development processes. All of this were designed to ensure a better dialogue and decision-making basis, a better healthcare system and a strengthened economic growth and value creation. The products were designed to show a number of plausible scenarios of the healthcare sector, all of which draw a picture of 1) the human development and the individual's timely desires, behaviour and needs, 2) the system's cross-sectoral relations and internal logistics, and 3) patient empowerment and new technologies.

The main objective has been to investigate how concrete and tactile future scenarios can strengthen the future of private companies and public actors. The goal is to, continuously, create future scenarios in which the healthcare sector's key players, leading businesses and designers meet and discover new markets, develop new business models and jointly prepare for the future. The case tackles the societal challenges of 'Health, demographic change, wellbeing' and 'Europe in a changing world – inclusive, innovative and reflective societies'.

Boxing Future Health is developed in a systematically designed process so that participants are introduced to and get acquainted with the use of co-creation and design methods. The purpose is that the target group to a greater extent uses this approach after the course and by this is to be able to ensure greater accuracy in the development and prioritization of new products, services and collaborations. The process is iterative and gives participants the necessary resources to co-create processes internally and with external actors.

A wide range of partners have been involved in the project. Partly in a project group (DDC, Public Futures and Fokstrot) and partly in a steering group (NHN, The Children's Hospital Copenhagen, CP, AAU and the medical industry). In addition, over 100 workshop experts have been involved in the development of the scenarios (public actors, private drug and pharma companies, experts, researchers, etc.). DDC has invested 400.000 DKK in the initial funding for the project. In addition, four partners have each invested 200,000 DKK for the development of the scenarios. DDC was first responsible for the initiation of the project.

Context and environment: Where does it all take place?

The initiative originated from an incentive towards working on large-scale societal challenges that, to a large extent, counts both demographic changes, policy incentives, and an overall motivation towards demystifying new technologies and innovative ideas. The main drivers that helped to unfold the potential of the initiative were, first of all, the urgent needs and demands present in the healthcare sector and the overall innovative environment present in Denmark. In addition, both financial resources, governance and politics have all been necessary drivers in the realisation of the initiative.

DDC, where this initiative was developed and where it most often takes place, is located in central Copenhagen in the new building BLOX. BLOX is a multifaceted structure that

combines and connects actors from architecture, design, construction and tech with global decision makers, scientists and citizens. This, partly, takes place through the innovation network BLOXHUB that facilitate necessary dialogues across sectors through exhibitions, debates and summits. These conditions make for a strong sentiment toward a collaborative environment, in which actors are brought in to co-develop, facilitate and collaborate on a range of initiatives. This collaborative environment has a solid presence in the building as a whole, as well as in the office of DDC, where methods of co-creation are applied on a daily basis.

When the scenarios were completed, they were installed at DDC, in part because the facilities inspire to work creatively in itself, but also because DDC would like to invite their partners and stakeholders closer to DDC as a partly public funded organisation. In thinking about where the actual workshops and scenario-walkthroughs were to take place, several options were discussed. DDC conducted the workshops in connection with the development of the scenarios in locations that were partly of contextual significance (Medical Museion for the inaugural workshop, where they looked at historical developments in the health field) and locations which were partly designed for the purpose (their own workshop rooms where they had to work exploratively and in groups).

The location of the Boxing Future Health workshops has been both adjustable and interchangeable. Mobile scenarios have since been developed. The materials needed for these co-creation workshops are minimal and they are easy to produce and transport to the desired location. The workshops have nonetheless mostly taken place at DDC. Workshops conducted with the mobile scenarios have also taken place in other locations such as The People's Democratic Festival (taking place every year on the island of Bornholm), a meeting between people and politicians, and a venue for Danish politicians to debate current political issues. Here, the Boxing Future Health initiative was utilised as a way of starting dialogue on the future of the healthcare sector and was discussed in a panel debate involving both the public and several Danish politicians present at the meeting. Together with the Danish Regions (the interest organization for the five regions in Denmark), DDC held a Boxing Future Health workshop that lasted a whole week.

Overall, the desired political support towards the project has come as the project has progressed. A future lab is an abstract size and it has been difficult to convey definite results before they had the final product. After its launch, Boxing Future Health has formed a framework for workshops for the Capital Region, the Danish Regions and the National

Board of Health, as well as a debate presentation at the Health Policy Summit. The framework is inspiring and has become a neutral zone for companies to discuss their own future by removing hierarchies and habitual thinking.

In their work, DDC constantly find that most people in their ecosystem are not at home in doing design work. This means that throughout the process, they had to work pedagogically and clearly with the use of design methods to ensure that everyone understood and was continuously engaged in the work. Boxing Future Health has also been used as an example of working exploratively and collaboratively with design in other activities and in the general communication at DDC.

Brief outline of the project/ initiative's pathway

The kick-off moment dates back to late 2016 and was initiated by the project managers responsible for the initiative. Managers from DDC initially saw a potential in bringing a new resource into play in the dialogue on the future of healthcare. Furthermore, the overall mission of DDC has been to create the best possible assemblies between both the supply and demand sectors in this field through systematic experiments with design as a means of value creation in the companies. Here, the Boxing Future Health initiative has been both a great tool, an operative resource and a framework for further collaboration. In the beginning of the initiative, projects managers invited healthcare actors to join the initial development of the project and subsequently used their input in the conception of the project scope. Several of the aforementioned actors already managed projects or activities in which the future plays a significant role – for example education of health skills, construction of a hospital building and development of innovative business ideas in a pharmaceutical company.

In developing the large network of partners and participants in the project, project managers reached out to their network and held meetings with several relevant actors. In addition, they drew attention to the project via SoMe and through other activities at DDC. In connecting with the 'right' stakeholders, the only difficulties were that this part of the process was both time consuming and that it could have been done in a more systematic way. One of the ways to engage stakeholders was by holding a scoping event, where the project managers invited a broad audience to hear about the project, and subsequently invited them to be a part of the process. Through continuous collaborations, word of

mouth, and advertising to potential stakeholders and participants within identified target groups, more and more companies (public and private) still get to know the Boxing Future Health initiative.

Ideas on building mobile scenarios were developed at the request of stationary facilities from the healthcare sector, such as hospitals and healthcare professionals training facilities such as nursing- and midwife schools (at the University College Copenhagen, among others). Later, the initially developed scenarios were moved to the University College Copenhagen, and more or less mobile and flexible scenarios are to be developed for the office of DDC.

The financial support from both private and public stakeholders was important for the further process as this enabled the associated project managers and supervisors to be involved. Another important factor was the engagement of stakeholders from both the private and public healthcare sector from the beginning as they are the ones engaging in the actual alteration of the sector and the ones able to fulfil this transformation in a constructive manner. Not only are they the ones who are, in some way, responsible for securing that the future healthcare sector are sufficiently robust to handle the expected increase in patients, as a result of the expected age increase, but they also have an internal organisational obligation to turn this increase into an advantageous and profitable endeavor. The responsibility is, of course, also dependent on political initiatives and subsequent policy alterations.

The initiative has, since the commencement, scaled, and has now involved over 3,500 participants (and thus co-creators) in the process of going through the scenarios. Boxing Future Health consists of four physical scenarios that take the form of four cylinders which you can enter to feel, smell, and listen to alternative futures for healthcare anno 2015. The scenarios work as future laboratories where stakeholders from private industries and public organizations discuss strategic business development, radical transformation and design-driven innovation. A book on the initiative, comprising the thoughts and tools of the initiative has been developed and is shared as an open-source material. The goal has, from the beginning, been to future-proof the healthcare sector, and to instruct stakeholders from this sector in how to develop the needed skills for this transition by utilising future thinking through tangible scenarios and co-design methods.

Management & Organisation: Who interacts how to facilitate co-creation?

The project's steering group has consisted of the CEO of DDC as well as a management person from each of the five partner institutions (NHN, the Children's Hospital Copenhagen, KP, AAU and the pharmaceutical industry). The CEO of DDC has had overall responsibility for communication with the project's steering committee. Project managers have had daily responsibility for communication with the other actors in the project. These have held several steering committee meetings throughout the process where the overall decisions have been made and the overall direction set. Project managers throughout the process have been in charge of both daily operations and planning. As part of the team, programme managers have contributed with input and sparring. The art director of DDC contributed with graphic and visual production in the process and to the design of the scenarios themselves. In addition, two external suppliers have taken on specific tasks in the development – Public Futures has developed the four scenarios as text descriptions and the design company Fokstrot has built the physical shells for each of the four scenario installations.

As far as we know of, DDC is one of the first organisations to work with scenarios in the intersection between design and scenario development and, thus, also one of the first to put these two skills into play in the same project. They have therefore had to work exploratively with external partners. Along the way, they have been in dialogue with and have consulted several experts in the respective areas. However, the specific partnership agreements landed with Public Futures and Fokstrot. Both of these have been considered subcontractors and have been paid for their work. The more than 100 experts who participated in workshops participated in-kind and were not paid for their time. They have themselves invested in the participation in order to gain new knowledge and access to a large network. Collaboration are mainly formalised in the fashion that contracts have been drawn up with the steering committee members and with the subcontractors. At the beginning of the process, DDC also made statements of interest with the experts, but as the expert group grew, they stopped doing so.

As the project is one of the first of its kind, the managers often had to make decisions as the problems (and possibilities) arose. DDC has taken a highly exploratively approach throughout the process and announced the premise clearly to the project partners and participants along the way. With the knowledge that the project team has today, many decisions could have been different in the light of hindsight. As an example, they spent a

long time describing the shape of the four scenario installations and spent unnecessary hours and financial resources in involving external actors in that process. The actual involvement of external actors (which ended up being a very large group) could have been more systematic and communication could have been more streamlined. In this way, they would had saved a lot of time and acted more professionally in their interface.

What are the concrete processes and practices of co-creation?

The participants were briefed on the goal of the specific co-creation processes they were going through via the initial invitation just as each activity started with a thorough introduction to the purpose and goals of the activity. However, it has been very important to DDC, throughout the dissemination of the initiative, to emphasise that the process would be explorative and that they could therefore not accurately describe the individual outputs and concrete results. The briefing took place both before and after the actual co-creation and scenario-walkthrough. After each activity, everyone has been informed about the output of the individual activities as well as the further process in the form of mail chimps with links to evaluations, pictures and articles. This was done mainly to maintain engagement among the participants and to ensure that the participants would also be project ambassadors. Several of the participants and stakeholders involved have worked actively to spread knowledge of Boxing Future Health in their own organizations, in articles and publications, and others have even put the resource into play in their own company or team, subsequently.

Few barriers and mismatches emerged during the co-creation activities. When you work exploratively and involve many actors at the same time, it is always a challenge to clearly communicate where the project is going and what the concrete results will be. Communication efforts could have been more strategic and have been coordinated more thoroughly throughout the process. In addition, in some parts of the process, the need to co-create conceivably took a little too much time away from more strategic communication efforts. They could have been able to implement parts of the project faster by making decisions and completing work internally and without external resources. However, in involving external resources, new perspectives, drivers and invaluable lessons learned have surfaced.

An example of the co-creation process was at the 2019 People's Democratic Festival where DDC guided 200 participants through the four scenarios in teams of 20 participants at a time. This activity was a collaboration with the Danish Regions, where the aim was to create a dialogue across different population groups and disciplines about where the health of the future is heading. Participants were first introduced to the four scenarios in small interactive installations and with audio narratives in the Danish Region's tent, and then invited to vote on what future they hope for and believe in. Each guided tour lasted half an hour, bringing new perspectives and initiating new discussions across the participants.

Specification: What tools and instruments are/ were used to co-create?

Some of the tools used in the co-creation processes were interviews (focus group interviews and narrative interviews with end-users), prototyping/ testing and visual and physical outputs such as audio clips and drawings. Others involved creating personas, making videos, and using artefacts to both create and support the narratives. In utilizing these, users were invited to take on co-creation roles throughout the design process.

The case is highly based on co-creation methods and principles, involving a large range of actors such as academia, the civil society, as well as both private and public sectors, in both the problem identification (the general understanding and communiqué of the problem), the ideation and prototyping involved in the initial phases, and the verification and testing of the proposed hypotheses. This quickly resulted in a process with a co-creative phase of both feedback and iterative initiatives. In general, design methods have been used throughout the process. That is, very visual tools and methods that have been put into play in group work at workshops. Among others, the use of reflection cards, scenario pictures and polling signs. One of the most important tools has also been the physical scenario installations themselves, which precisely convey the alternative future in an interactive and sensory way through the use of sound narratives, smells and taste sensations.

During the process, evaluations have been made after each of the activities in the form of NPS (Net Promoter Score) and a constant dialogue with a large number of project participants, who have given constructive feedback on sub-elements of the process, have been managed and taken into consideration.

In summary, some of the general learnings regarding the use of these tools, is that it is highly valuable to use design methods in this kind of explorative work. Both the physical forms and sensory instruments have helped to dilute hierarchies and provide a solid basis for discussing the future on the basis of new knowledge. The sensory elements also contribute to an often very abstract narrative of the future becoming very concrete.

Which learnings emerged?

The Boxing Future Health initiative has given DDC, as well as the included participants and stakeholders, an opportunity to think radically differently about healthcare in 2050. There is a tendency for health policy to be mostly a matter of providing billions for cancer treatment and not about how we can create services and solutions that mean that illness becomes a secondary element of life. This makes it difficult to address the deeper discussions. With Boxing Future Health, DDC has created a resource that can bring together actors across sectors and disciplines to discuss some of the key health issues. At the same time, relatively large groups can be engaged in a relatively short time to make them understand separate alternative scenarios.

For most of the stakeholders, both the methods and the tools have been new. The vast majority of participants do not have design experience and have not previously worked with design tools and sensory installations. DDC has used the tools in the past, and therefore has a lot of experience with which methods and visual instruments that work best for exactly this kind of project. In Scandinavia, the typical approach to human-centered design research is practiced through a 'participatory design research' wherein the project is generally led by design research with the user as a partner (and in part a 'co-creator') in the process. In this case, in addition to viewing the role of the user as co-creator, the designers themselves are involved as potential co-users. In this sense, the case has a unique approach, and transcends different levels of creativity.

Participants in the Boxing Future Health initiative all have different levels of expertise, as well. As mentioned, design is for some a new and virtually uncharted chapter. For others, design methods are used on a daily basis. All of these levels of creativity are both stimulated and applied in the co-creation processes of this initiative.

References

Interview

Anne Danielsen (Danish Design Centre, senior service designer)

3.3.3. Case studies in Policy Making and RRI

NESTA - Everyone Makes Innovation Policy - 10:10's Heat Seekers' Quest | UK

Melanie Smallman and Trupti Patel (UCL)

NESTA aims to explore ways to recycle wasted heat through a 'heat seeking quest' where the public were invited to walk through the streets of London with thermal cameras measuring areas of heat loss. NESTA funded 5 projects to help show policymakers the value of engaging the public on these issues as well as demonstrate a range of interesting and exciting ways this can be done. One of these was the named 'heat seeking quest' proposed by the charity organisation 10:10.

What is the project/initiative all about?

NESTA funded five projects to help show policymakers the value of engaging the public on these issues as well as demonstrate a range of interesting and exciting ways this can be done[1]. One of these was the charity 10:10 who organised a 'heat seeking quest' where the public were invited to walk through the London borough of Islington with thermal cameras, recording where (waste) heat is being wasted and how it may be recycled. The aim was to approach the issue of decarbonising heat as an issue that people can connect with and not simply a technical or policy problem, but a fun, cultural experience[2].

The activity was organised by 10:10 and funded by NESTA. 10:10 is a charity focussed on energy consumption in the UK and is best known for its organisation of the 10 % campaign to get people to reduce their carbon emissions by 10 %[3]. 10:10 were the organisers of the events and used them to raise awareness of heat loss and possible recycling possibilities[4] and NESTA funded the work in order to demonstrate how public involvement could be useful in developing more effective innovation policy[5]. Co-creation only takes place within the problem definition and exploration phase as well as the beginnings of ideation. Co-creation is an overall working principle in the case. The call was opened in February 2018

and closed in March 2018 with grantees announced in April 2018. The launch event was in May 2018 and the heat seekers quest project began in June 2018 and a final event in which all funded projects presented took place at NESTA in December 2018[6].

Brief outline of the project/initiative's pathway

10:10 climate action is a charity with a mission to speed up action on climate change. They run positive, practical projects focused on tackling climate change at the community level, and turn these local actions into a force for bigger changes. 10:10 is interested in heating as most heating In the UK comes from fossil fuel boilers and one third of all greenhouse gas emissions comes from heating[7]. At the time, Islington council was conducting the Bunhill Energy project, which aims to provide cheaper, greener heat to over 800 homes in the Bunhill ward and Finsbury Leisure Centre, Ironmonger Row Baths and offices on Old Street (all in London)[8]. Launched in November 2012, the heat network is fed by the local energy centre on Central Street which produces both electricity and heat in a combined heat and power plant. The energy centre uses the heat created from producing electricity to create hot water that is piped into people's homes, making it more efficient than a normal power station, for which the heat is a waste product. Phase 2 of the Bunhill Heat and Power network involves building a new energy centre at the top of Central Street, connecting the King's Square Estate to the network and adding capacity to supply a further 1,000 homes. The core of the new energy centre is a 1MW heat pump that will recycle the otherwise wasted heat from a ventilation shaft on the Northern Line of the London Underground network, and will transfer that heat into the hot water network. During the summer months, the system will be reversed to inject cool air into the tube tunnels[9].

10:10 wanted the public to engage with this project in an interactive, fun, stimulating way. Thus, they used the money to run a heat-seeking quest. The project was developed by Dan Walker when he was at 10:10, but who now works at Greenpeace. The project was initially funded for one heat seekers quest but then won further funding for an additional three quests. The first was a trial event at NESTA involving the staff, the main initial quest was one in Islington and centred around the Bunhill Heat Centre. The further three were one in Manchester, another in North Wales and another final heat seekers' quest again at NESTA.

Context and environment: where does it all take place?

The initial funding was to do one heat seekers quest in Islington, starting at the Bunhill Energy Centre and a trial event at NESTA. Following further funding, there were more follow-up events at Manchester, North Wales and a further one at NESTA.

The first trial quest took place at NESTA London offices, with the first full activity taking place in the streets of Islington, and in particular started on the site of the Bunhill Energy project with London Underground. A mixture of indoor and outdoor places was chosen as well as a place with a variety of buildings. In doing this, the heatseekers had more to explore. In addition, it took place in the evening in the winter as the heat differential shows up more prominently on the camera. It is easier to run these events in winter for this reason, thus no further quests have been planned until winter. When the heat seekers went outside, they interacted with their environment and involved other people on the street as well as in shops, public buildings and public transport.

As the images of later events were stored on peoples' phones they were able to share them via social media, so even though others were not at the events, the use of social media meant they were able to see the images produced and be involved in the discussion.

Management & Organisation: who interacts how to facilitate co-creation?

NESTA is an innovation think tank in the UK. They have an initiative called 'Everyone Makes Innovation Policy' which funds projects which demonstrate creative ways of engaging members of the public in issues relating to innovation policy[10]. The inclusive innovation team at NESTA looks at who gets to benefit from government investment in innovation, and how policies and institutions can be improved so that the risks and rewards of innovation are more equally shared[11]. Their work focuses on making the case for an inclusive approach to innovation policymaking, developing policy ideas and collaborating with partners to test them and their agenda consists of three main strands: broadening participation in the innovation economy; ensuring the benefits of innovation are shared by all; involving the public in the shaping of innovation policy[12]. This project focuses on the latter of these three aims and was thus funded through the scheme.

The project by 10:10 which was funded was developed and coordinated by Dan, Max Wakefield, Leo Murray and Alice Bell. Several 10:10 staff was involved as team leaders at the events including those already mentioned and Neil Jones.

What are the concrete processes and practices of co-creation?

10:10 invited a mix of people interested in engineering, cities, policy, environment and some who were just brought by their friends. The events started with a talk about the Bunhill Energy project, and in the case of the Islington event included a tour around the centre. The attendees were split into 'heat seeking' groups and each team was sent out with cameras in the streets, to explore just what heat looks like in an urban environment. To get started, the teams thought about innovative ways to recapture heat lost in the urban environment.

The heatseekers were set challenge questions, such as what's the hottest thing you can find, what's the weirdest, what made you ask questions? Indoor, people were asked to see whose phone charger was the most wasteful. After the quest, the heatseekers were brought indoors to discuss what they found and two speakers were invited to talk about different aspects of heat including novel technological solutions, and problems like fuel poverty. Some food and drink was provided. A competition with prizes was also run for the funniest, hottest and weirdest thing found on the quest.

The organisers from 10:10 said they based the events on the 'theory of change' which states that everyone has to have a stake in the solutions. Thus, co-creation is built into the project through this theory. The point was to stimulate discussion about heat as people only tend to talk about it when there is something wrong with it, for example it is too hot or cold. They wanted to do this using a novel method. The fact the participants were on the street meant interest was generated within other observers. One group took the cameras onto a bus which got the bus driver interested in emissions from vehicles and 'hot spots' within the bus. A dog owner became interested in the amount of heat emitted from their pet's faeces and finally, during the quest in Manchester[13], one group took the camera to a local kebab restaurant and got the owner interested in alternative methods of cooking in order to waste less heat.

Specification: what tools and instruments are/were used to co-create?

This project does not go through the whole co-design cycle – only ideation, but is mainly an engaging activity using thermal cameras as a method to stimulate discussion and wider thinking about decarbonising heat. The advantage of thermal cameras is that it brings alive something which cannot be seen into visual documentation which makes heat loss from objects more tangible and understanding by the attendees – it allows abstract ideas to be reframed through the use of visual images. One of the participants said 'Thermal cameras are a real eye-opener'[14].

After the first heatseekers' quest the charity got a refund from the company which lent the cameras as they didn't arrive on time, only a few hours before the event. Due to this, during the first event the team leaders did not have enough time to familiarise themselves with the cameras, thus there were a couple of 'mishaps' in the first event. As they managed to get a refund because of the late arrival, the charity was able to buy some thermal imaging cameras which attach to peoples' phones for future events. They chose these types of devices as opposed to normal thermal cameras, as they were more suited to the participants because they were more familiar with phones. In addition, they proved to be a lower-cost option. When these were first used there were some issues with compatibility with certain phones, but eventually these were resolved with software. As the cameras produce visual images stored on participants' phones, many people tweeted and posted them on Instagram which allowed the popularity of the events to grow and increased awareness. Since, schools and scout groups have asked about the 'toolkit' produced by 10:10 so people can run their own heat seekers quests.

What learnings emerged?

By putting people into setting groups out and letting them set their own path, each participant discovered their own part of the heat puzzle. They also talked to each other about their experiences. One of the organisers found that it was better to have a variety of indoors and outdoors and a variety of buildings so the participants have a lot to work with. When you hold the event depends on who you want to come, e.g. after 6pm for people coming from work. It was found that it can be a good idea to set a challenge to help get your heatseekers thinking creatively - e.g. what's the hottest thing you can find, what's the weirdest, what made you ask questions?[15] However, it was found that it was important not

to be too prescriptive. It was important that the challenge be the stimulus but not the purpose of the entire event. In the first quest there was only one hot water bottle hidden in the room but during the second, there were many more as well as ice packs - it was found that many participants became too motivated in simply finding the hot and cold objects instead of the broad theme being discussed. One of the organisers commented that it was good to think of a venue for after the quest – 'It's good to find a space where you can bring people together to talk about what they've found'.

From the feedback after the first events in NESTA and Islington, the charity decided to remove the initial two academic presentations as it was found that the discovery and discussion after the quest was what people got the most from.

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Neil Jones

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Ecomuseo Casilino ad Duas Lauros (Rome) | Italy

Chiara Buongiovanni (APRE)

The project aims to involve local communities in the preservation of local cultural heritage through community's maps, co-creation labs and collective storytelling initiatives. It is a project based in the eastern suburbs of Rome. Through the knowledge and recognition of the local cultural heritage, the project is aims to involve the communities to build a new governance of the territory, based on innovative models of sustainable development and urban regeneration.

What is the project/ initiative all about?

Ecomuseo Casilino ad Duas Luaros (in this document 'Ecomuseo Casilino') is a completely bottom-up initiative, based and developed in the eastern suburbs of Rome, Italy, officially born in 2012. Through the acknowledgement and recognition of the local cultural heritage, the initiative works to actively engage the neighbourhood-based communities in building a new governance for the territory while enabling innovative models of sustainable development and urban regeneration. Through the Ecomuseo Casilino approach**,** local communities are directly engaged in the identification, preservation and promotion of local cultural heritage through a variety of co-creation activities such as community maps, co-design labs and collective storytelling.

Envisaged within the context of Torpignattara neighbourhood in Rome and based on a collaborative research approach, Ecomuseo Casilino aims to become the hub for a larger network of place-based co-creation initiatives, with a view to exploiting the model and

sharing methodologies and results, while maximising the impacts. The Ecomuseo Casilino aims to activate co-creation processes on two levels: on a vertical level referring to a given neighbourhood and on an horizontal level referring to diverse neighbourhoods which get together to work on a common agenda, sharing the approach and methodology.

Ecomuseo Casilino adopts a co-creation approach in order to get an impact on the three following areas: Collective imaginary, Public policies and Local development models. Collaborative research is at the very core of the Ecomuseo Casilino model, ensuring relevant impact and community ownership through the entire process. At the moment, six research trajectories are in place: cultural heritage, memory and history, archaeology, community anthropology and territorial transformation, urbanities and landscape, contemporary art and Shape of the Sacred.

Ecomuseo Casilino works along the above mentioned research trajectories under a thematic scientific coordinator and with a dedicated research team. Each of those research paths is autonomous, yet in relation with the others. Once the ground hypothesis is set, the thematic research team works to get in touch and engaged with local organisations and institutions which are active on related areas of interest. The view of the Ecomuseo Casilino at this stage is to set a co-creation process for defining the research agenda on a participatory basis.

The Ecomuseo Casilino is legally shaped as an Italian not-for-profit association, financially sustained through crowdfunding by direct beneficiaries of the delivered activities, e.g. touristic seminars and tours as well as through international philanthropic donations linked to specific projects. Part of the funding also derives form support services provided from Ecomuseo Casilino to other local groups for setting their own co-creation processes. As a choice, Ecomuseo Casilino does not rely at all on public funds. Researchers as well as professional contributors are regularly paid while specific agreement with hyoperlocal funders and providers are exploited.

Context and environment: Where does it all take place?

The Ecomuseo Casilino experience takes the move from a well perceived discomfort, as progressively felt and experienced by the inhabitants of the Torpignattara neighbourhood (eastern suburbs in Rome).

Over last decades, Torpignattara has been going under a desertification process, rapidly taking the shape of a 'non-place': a dormitory neighbourhood not truly belonging to those communities used to be there, rather perceived and lived as a place strictly functional to the working routine. Given the socio-economic as well as the urban landscape, sense of ownership and acknowledgement of public spaces as such were totally missing. A sort of deep, sentimental disconnection was affecting the entire social fabric. Such a background has also been a result from a multiannual storytelling about the neighbourhood, as featured in the media and literature: a fringe, suburban place with no interest at all.

As a consequence, such a perception from the outside has resulted in a severe disconnection with the neighbourhood experienced by the inhabitants themselves. Therefore, the Ecomuseo Casilino started to solve this double-faced issue: the local as well as the general perception on the neighbourhood as a disagreeable non-place. In doing so, a double targeted work began, recognising the deep link among those two dimensions.

On one side, a process was activated, aimed at enabling the access and spreading the knowledge about the local cultural heritage among the community itself with a view to creating a shared consciousness on its relevance from an historical, cultural, archeological and spiritual point of view. At the same time, specific initiatives were taken targeting the media, with a view to influencing and progressively reframing the mainstream storytelling.

The need for such a reversing process to be in place was strongly emerging from those, both individuals and families from the different ethnical communities who have been living within the neighbourhood for a while. An urgency was detected to react to the complete desertification of the informal places, green areas, not built areas. Such a lack of interest and protection gave the green light to property speculation activities. Therefore, the very first action by the Ecomuseo Casilino was aimed at driving attention to the territory from a cultural point of view, to make evident that the neighbourhood relies indeed on a relevant cultural heritage, so it could not be exploited through property speculative initiatives.

Ecomuseo Casilino has been shaped as a completely bottom-up initiative, the behind reason being very simple: lack of projects, grants, programmes or initiatives able to reach any relevant result in terms of services or cultural impacts.

Such a context forced the local community to react, bearing in mind a spectrum of possible social reactions, running from community depression to collective action. For the time being, in the Torpignattara neighbourhood the two registers cohabit. It is observable that

part of the local population tends to assume a depressive approach, feeling unable to react, while other groups of locals tend to come together and get organized. It is observed that it is quite common for formal or informal groups of people within the neighbourhood to come together and take practical imitative to reverse the trend, for instance by gardening and taking care of a green area, organizing and managing a public library, a service or other kind of cultural event, monitoring the neighbourhood for preventing and discouraging uncontrolled bulky waste.

In such a context, co-creation becomes an antidote to the neighbourhood neglect. As an effect, a number of autonomous co-creation nucleus have emerged over time: small co-creative communities, yet not by default keen to come together and merge efforts. This fragmentation of a very positive effort is a collateral effect of the community's take up over problems.

Given the framework, Ecomuseo Casilino is going for this: enabling emerging spontaneous groups dealing with cultural activities and cultural heritage preservation to network and co-create in order to maximise the impact. Adopting such an approach drives to the building of a co-creation ecosystem, gathering in a larger and interconnected network of single and diverse co-creation initiatives mainly dealing at different levels with urban planning, new welfare configurations and territorial development. In doing so, Ecomuseo Casilino is strongly inspired by the core values of solidarity, proximity and democracy. It is explicitly inspired by the constitutional so called 'horizontal subsidiarity principle', as stated by article 118 of the Italian Constitution: 'The State, regions, metropolitan cities, provinces and municipalities shall promote the autonomous initiatives of citizens, both as individuals and as members of associations, relating to activities of general interest, on the basis of the principle of subsidiarity'.

Brief outline of the project/ initiative's pathway

The story of the Ecomuseo Casilino started in 2010, when a citizen committee worked to present a litigation about a 140 hectares green area within the Torpignattara neighbourhood named Comprensorio Casilino, willing to prevent from using it for building speculation actions. In 2014 the committee succeeded in stopping the building process, by providing evidence for a public interest to be in place for cultural and historical heritage preservation for that specific place.

Around such a disputation, a place-based network took shape, including neighbourhood committees, observatories, informal groups and associations. Among those grassroots players, the Torpignattara Neighbourhood Committee was specifically tasked with the design of a proposal supporting the protest. The view was not just to prevent the building to take place but to propose an alternative, shared vision.

Consequently, at the urban level, the construction plan was stopped. As an alternative, a new territorial plan was proposed to the municipality of Rome as a resulted from an extensive participatory lab. The working question was: 'What do you see here?'. A set of different visions and perceptions were collected and an alternative proposal for urban planning was defined and presented to the municipality of Rome, asking for it to be included in the general urban development plan as a variation. The view was then affecting the policy of the city level as well as the regional one. Over the years, an important result was reached at the regional level: the initiative gained the status of Ecomuseo Casilino ad Duas Lauros. From a policy point of view, this resulted to be an extremely relevant gain, affecting the political vision on the related territory. In brief, the Ecomuseo status has officially recognised that 'such a territory is characterised by its own relevant cultural heritage'. This happened quite recently, through a regional resolution dated back in October 2019 (Determinazione della Direzione Cultura e Politiche Giovanili n.G13389) inserting the Ecomuseo Casilino ad Duas Lauros within the regional official list of Ecomuseum.

Ecomuseo Casilino has translated its own vision into a triple-sided approach, working simultaneously on collective imaginary, public policy and renewed development model. The final aim is to implement a new model for local development based on cultural heritage, able to radically change the vision about the territory. The idea is to develop cultural centres altogether with a pervasive slow tourism offer. Interesting results are already on track, with an increasing trend in visitors, growing from about 1,500 visitors in 2017 to 4,500 in 2019. Numbers seem to show a growing interest towards the Ecomuseo, while the slow tourism approach lets visitors live and experience the neighbourhood, stimulating curiosity and further interest. Such an approach has proved so far to have an impact both on the local economy and the social life as well as in the way locals themselves perceive their own territory. The cultural tours designed and offered by the Ecomuseo Casilino were recently presented at the Rome Municipality within the official public communication for tourism, overcoming the very local, bottom-up approach while

representing an important institutional recognition. The sustainable development model, as implemented by the Ecomuseo Casilino, works on a vision aimed at preservation of the cultural and environmental heritage and based on zero soil erosion. The enforcement of such a vision has been observable within the broader context of the Municipality where the Ecomuseo Casilino is based, beyond the Torpignattara neighbourhood where the story started. The middle term vision is to work together with several entities and experiences which are taking shape within the territory, with a view to transforming the territory into a cultural district, freeing it from any predatory and unsustainable economic growth approach.

Clearly enough, the Ecomuseo Casilino co-creation process would be finally a bi-folded one: on a vertical level it is about mining, networking and coordinating within the Torpignattara territory, on an horizontal level, the Ecomuseo works to enable and support co-creation among different neighbourhoods and even municipalities.

How does the co-creation process take shape?

As framed in paragraph 1), the co-creation process is deeply rooted within the six Ecomuseo research trajectories, namely: cultural heritage, memory and history, archaeology, community anthropology and territorial transformation, urbanities and landscape, contemporary art and Shape of the Sacred. Each research trajectory is facilitated by the Ecomuseo Casilino team, through a thematic coordinator and his/ her research group involving the locals, shaping a research co-creation process. The collaborative research takes place through interdisciplinary research labs.

Once a new research lab within the neighbourhood kicks off, the process can follow two different paths:

In the case of a research topic with no well shaped and recognisable community to rely on (e.g. public space gaming), research coordinator and team work directly with the locals in order to collect interviews, meetings, ideas exchange, pictures, any useful material, building the community from scratch.

In the case of a research topic dealing with existing, well shaped and structured thematic community (e.g. religious, artistic), the facilitator from the Ecomuseo Casilino tightly works with the identified facilitators within the community itself. The view here is to transfer the model, empowering local communities.

Briefly, within the co-creation lab activity, the Ecomuseo Casilino team plays a duplex role: direct actors and enablers for community-based co-creation labs to take place. The co-creation methodology is prototyped and left to the local communities, which are free and welcome to exploit through autonomous activities. As reported by the Ecomuseo Casilino president Claudio Gnessi, this is something which is already happening: several communities are designing their own co-creation activities, applying the transferred model, while referring to the Ecomuseo Casilino team for any specific issue or further support needed.

Following this specific approach, co-creation becomes an antidote to abandonment and fragmentation. The Ecomuseo Casilino approach woks to prevent and reduce the side effect of multi-centered co-creation ecosystems where any co-creation nucleus tends to be quite autonomous from the others still working on the same territory, concretely experiencing some difficulties in merging the effort. The Ecomuseo Casilino challenge is to enable the networking of the diverse co-creative communities on the topic of cultural heritage related activities. It has been so far observed that where a given experience or community has been working to open-up to the other actors from the Ecomuseo territory, interesting links have been set for further developments.

Management & Organisation: Who interacts how to facilitate co-creation?

Ecomuseo Casilino coordination team are ten people: a general coordinator and six thematic research coordinators, one per each of the identified research trajectories. The research team is supported by few professionals, such as video maker and communication specialist. For the time being, the team is composed of Italian people, yet it is undergoing a specific training for enlarging the team making it a multicultural one. The team is keen to identify those persons within the neighbourhood willing to become active subject within the research team.

Beside the coordination team, Ecomuseo Casilino scouts among university students and post university researchers who, once selected, are regularly paid for carrying out their research activity. Research assignments run from six to twelve months.

As previously described, the entire Ecomuseo Casilino mission is about building and reinforcing networking for enabling co-creation processes and initiatives to take place and

gain impact. Connect and amplify the model is something deeply envisaged by the Ecomuseo Casilino team. Such a view translates in a double circle organisation model where at the very core there is the research coordination team while in the second larger circle organisations, local institutions, parishes, schools and citizen groups.

Ecomuseo Casilino closely works with local small businesses. For example, the ongoing cultural tour 'Domeniche all'Ecomuseo' (Sundays at the Ecomuseo) ends with a community lunch within one of the local restaurants, bars or groceries. Ad hoc signals explaining history and cultural facts occurred within the neighbourhoods and have been set, in partnership with the local small businesses, as the entire project is willing to engage with the neighbourhood-based shops rather than the big players on the territory.

Ecomuseo Casilino team works to tap those initiatives, groups and organisations which share the same mission: preservation and promotion of the territory. The idea is to enable networking with a view to boost relations among the actors, at the same time maximising the impacts of the multiple initiatives taking place. The vision is to build up a soft infrastructure: a large 'Network Pact'. Such a 'Network Pact' (which is a cooperative legal format in Italy, i.e. Patto di collaborazione) would allow any organisation from the territory to autonomously manage its own local activities, while the Ecomuseo Casilino would coordinate, providing methodological guidelines and support and manage ad hoc resources, where available with an optimization view.

Ecomuseo Casilino would progressively become the immaterial infrastructure that enables small local hubs to connect and exploit the network, thus overcoming the very Italian attitude for organisations to focus exclusively on their own acting. Such governance would enable the single entity to maintain its own identity and approach, still sharing guidelines, data, activities and assets on a win-win basis.

What are the concrete processes and practices of co-creation?

Every project at the Ecomuseo Casilino starts with the setting of a thematic research group, which works autonomously and is still integrated within the overall model. Once a first research objective has been set, the circle is enlarged and researchers get in contact with those organisations, entities and groups active on the topic. At this stage the goal is to co-create the research agenda.

Giving the Ecomuseo Casilino overall approach, a variety of stakeholders is involved in the co-creation activities: single citizens/ interest groups; CSOs; businesses, employees and volunteers, NGOs and non-profit-organisations, schools and parishes.

Taking the year 2018 into consideration, Ecomuseo Casilino worked with 36 organisations, which co-created the research agenda and took part in the activities supporting the research. The basic working question for engaging with stakeholders was: how would you exploit such research project? During the process, specific activities, such as reading and theater labs, were organised and managed by the local organisations in connection with the research trajectories. Basically, the Ecomuseo Casilino research team presented the skeleton, with general timing and objectives, while each stakeholder's group brought its own expertise and, by doing so, the skeleton itself resulted slightly modified trough new perspectives and insights.

Interesting enough, in such a model when researching on a topic or a phenomenon, a preeminent dimension cannot be theoretically inferred once for all, as it is changing from neighbourhood to neighbourhood, no matter how close they are on the urban map. Intercultural dimensions can play a key role within a neighbourhood, while the religious one could result to preeminent in another neighbourhood. This concretely translates into a different implementation of the overall Ecomuseo Casilino model as in relation with the context of application. This basically means that all six research dimensions can be applied or, according to what emerges from the interaction with the territory, the quest for research can focus on one dimension more than the others or even a brand new quest for research can emerge.

Being framed as an Ecomuseo, the model cannot be a static or mono-dimensional one, working with such a living subject as the 'culture in action'. As being observed by the Ecomuseo Casilino research teams, quest for research within a community tends to show up as a problem. Saying it in other words: where a problem arises, a quest for research is in place as there is space for analysing and understanding the phenomenon through a multidimensional lens.

The co-creation process as described encounters the most preeminent barriers in a pervasive, widespread parochialism, quite present within the Rome civil society organisations ecosystem. As stated from the Ecomuseo Casilino president, Claudio Gnessi: 'We face a spread inability in perceiving one's causes as another one's success'.

This translates in a quite 'Italian' phenomenon: such a poor collaborative approach results in co-creation processes which are unable to scale up beyond the micro level towards a larger co-creation ecosystem. This is mainly due to a kind of chronicle emergency status affecting the third sector, both small as well medium- larger sized organisations, constantly under a political and financial pressure.

Another crucial issue is the deep gap between politically independent organisations versus political driven ones. While the first category tends to be quite indifferent to the political storms, the second category, which definitely accounts for the most, is alive thanks to the political endorsement. Those are perceived as preeminently opponents to collaborative approaches as cooperation is seen as a threat to the status quo, working to unhinge the political parties' presence within the grass roots organisations.

Given these premises, for the Ecomuseo Casilino to grow up in terms of reputation, impacts and relevance has not resulted to be an easy task. Nevertheless, independence from any political influence is at the very constituency of the Ecomuseo itself. The aim is to proudly be in the position not to ask for money or support from the institutions but to propose them to work together adopting a peer to peer relationship. In a genuine co-creative process, all actors are envisioning and creating, not merely executing the willing or the vision of somebody else's.

Specification: What tools and instruments are/ were used to co-create?

The Co-Heritage initiative can be taken as a reference to better explain the way co-creation takes shape within the Ecomuseo Casilino urban district.

Co-Heritage is a research project started in 2017, aimed at shaping a common cultural heritage as perceived from all the communities within the Ecomuseo territory in the east suburbs of Rome, namely the neighbourhoods of Torpignattara, Centocelle and Quadraro vecchio,

In such a research project, several trajectories are integrated: Cultural heritage, memory and history, archaeology, community anthropology and territorial transformation, urbanities and landscape; contemporary art and Shape of the Sacred. Research trajectories to be worked out within the Co-Heritage initiative were results of the co-creation with citizens. The starting question being: 'how could we interpret our territory?'.

Each research trajectory has been interpreted beyond an Italian-centric perspective, taking into consideration the way each of them is perceived and can affect all the communities living in the neighbourhood.

Those trajectories were therefore developed adopting a multicultural perspective and embedded within the research plan: which is our common heritage? Through which lens do we analyse our common heritage? A set of clusters through which looking at the territory and investigating it were created.

In practical terms, as a first step, the coordination team tested these six trajectories. Secondly, a monthly informal call was launched, asking questions of such the following kind: 'How could we read the history and memory related issues using a multicultural perspective within the neighbourhood?' For developing such a research trajectory, for instance, labs with the schools were performed. 'Stumbling stone paths' were co-designed and urban transformation labs with elderly associations were conducted. The relevant stakeholders were contacted using open invitation, per mail open advertising, personalised invitations, personal appeal to relevant target groups as well as one-on-one communication.

With such a view in mind, the coordinator of the Cultural heritage, memory and history research trajectory has been working with schools, elderly and local communities as she recognised the need to interview citizens for framing the research work itself. Taking this as an example, it is clear as a research trajectory can have different intersection points with daily life (in the case three: school; elderly and local communities). The final perspective on the research work itself varied as a consequence of interaction and activities performed with the engagement of the above mentioned actors. A set of clusters through which looking at the territory and investigating it were created, and, as a result, the research focus was switched from the firstly supposed 'nazifascim' to the 'childhood and youth of the elderly during the 60s'.

The objective is to read the territory, starting with a hypothesis for interpretative keys to be tested, with the willingness and promptness to eventually change them. Such a co-creation process takes place in each of the four phases: Problem identification/ understanding, ideation, prototyping and verifying/ testing and it does include iteration. Co-creation takes place through interview techniques, such as focus group interviews or narrative interviews

with the stakeholders, prototyping and testing, co-design tools, visual and tangible outputs, such as audio clips, drawings, writing, photos and diaries.

Another example can be provided by the Archeology trajectory within the CO-Heritage initiative. The archeological heritage of the neighbourhood resulted in the development of a new branded perspective about Rome, pushing to read the city archeological sites from an unconventional point of view, changing the centre-suburb's perspective. In doing so, the thematic coordinator and her team worked with the [Superintendence](#) of Cultural Heritage, the archeological site Catacombe e Mausoleo di Santa Elena, schools, theatre groups and cultural associations, in order to better define the research trajectory. Once the first hypothesis was defined, it has been communicated to the foreigner's communities living within the neighbourhood, taking their own perspective on board on the monument. 'How do you live it and perceive it?' was the working question here.

The Archeological research trajectory within the Co-heritage initiative makes the need for repositioning the concept of 'universal' itself within a local, multicultural community clear. Such a path for instance made clear that some so-defined 'minor' monuments are actually perceived from the foreigner's community as the most relevant ones, as they are much closer to their feelings and history. From such a co-creation process on the heritage research axis, it has resulted that some assets are actually conceived as key from all communities, while others are mainly perceived as such by the Italian community and others from the Bangladesh or the Chinese one. The object of the research would be a common general cultural heritage, yet including subgroups, identified by different ethnical and cultural communities which register different level of affection to a given part of the heritage, in relation with their own history, culture, memory, education.

As the larger community within the territory is not all the same, different groups tend to perceive things and experiences differently, and according to the Co-Heritage approach, this is a way to renegotiate the 'social identity' concept for the neighbourhood itself. Such an identity will be constantly under daily reshaping, through the activities of storytelling, usage and active involvement into the cultural and religious life within the neighbourhood. This is clearly meant to be an ongoing process, not necessarily driven by an Italian-centric point of view.

Which learnings emerged?

The co-creation process as described and implemented by the Ecomuseo Casilino defines policy actions on three levels: policies for the preservation of tangible and intangible assets, places and storytelling, policies for a diverse local development taking into account preservation and low impact businesses and policies for enabling and empowering networks. The basic idea is that the promotion of sustainable local development can take place only if diverse actors come together and work cooperatively.

Talking about preservation, the Ecomuseo Casilino approach is an holistic one: putting together all kind of local heritage. Such a holistic perspective can fully be enforced through research. Collaborative research results to be the only effective way for realising a bottom-up policymaking process, willing to enable the emergency of a multisided vision and vocation of the territory itself.

Real participation of citizens together with the duration of the process seems to be key features to be addressed for designing a sustainable and impactful co-creation process. Projects of co-creation are often experiments that do not last long and exclusively involve a very specific and motivated group of people. According to the Ecomuseo Casilino view, the real result of a participation process is rather about 'creating the application for participation', which should not be confused with either the protest or the desire to 'express one's opinion'.

The Ecomuseo Casilino activity resulted in quite a strong 'political' message for the public administration. Its work enabled the emergency of a deprived situation in terms of public and welfare services within the neighbourhood on one side, a great participation and quite a lively multicultural community ready to take action on the other. The emergency of such a framework prevents the public administration to intervene with a simplified top-down approach, suggesting the need to work on both the dimensions.

Interesting enough, the result achieved so far by the Ecomuseo Casilino is mainly about the generation of a co-created political agenda which brings to light new assets for local development. Those assets result to be quite different from those previous urban developments, where the planning was based upon, provoking the cultural and social desertification of the neighbourhood over the years, as previously described.

From the Ecomuseo Casilino experience it seems recommendable to work on a national policy based on rewards mechanisms for cooperation and participation, the keywords being convenience and advantage. According to the Ecomuseo Casilino president, Claudio Gnessi, it should be designed as a win-win policy, making clear that by cooperating a mutual enabling process, shared values and impacts will be provided.

The result affected the cultural level, focusing on the mentality and bias people are familiar with, with a genuine and radical empowerment perspective.

At the same time, a more radical independence should be proudly pursued by the civil society organisation, adopting a stronger civic attitude.

Coming to the co-creation process itself, power asymmetries and ideological mismatches seem to be something to work on in order to set the right conditions for impact. At the same time, a quite common disillusionment feeling on the real impact of the co-creation process should be addressed. Coordinator of the co-creation process should be intimately convinced that no points of view are not interesting at all or useless. The co-creation process to be effective should be designed with a view to adapting to changing local needs. Co-creation and user centered designs are tools that create citizenship, while cultural heritage could be interpreted as a powerful tool to overcome prejudices and counter racism.

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Smart Kalasatama Well-being Centre | Finland

Ines Vaittinen (ENoLL)

Co-Designing wellbeing project brought together Kalasatama Health and Wellbeing center, corporate partners and startups to co-develop and innovative health and wellbeing solutions of the future. 5 Agile pilots engaged all the parties and 450 users to co-create and learn from real-life experiences. The aim of the piloting programme was to co-develop and experiment new solutions that improve the residents' well-being. The Kalasatama Health and Wellbeing Center, corporate partner Kesko's occupational health and the residential district served as a Living Lab.

What is the project/ initiative all about?

Smart Kalasatama

The Smart Kalasatama project in Helsinki, Finland is coordinated by Forum Virium Helsinki, an innovation unit within the Helsinki City. The project is financed by the innovation fund of the City of Helsinki. Smart Kalasatama is a smart city district for pilot projects: it develops new digital services and urban innovations in cooperation with private companies, the City of Helsinki, other public sector organisations and Helsinki residents. The idea for a smart city district for pilot projects - a neighbourhood purpose built to supply proof of concept, was initiated in 2009 by Helsinki city planners. Today this area is a work in progress, but that progress has been prodigious. By the time it is completed in the 2030s, the district will have created 10,000 jobs and will contain 200 football fields worth of new housing. Smart Kalasatama offers an authentic real-life environment to test and develop services.

Agile piloting

Smart Kalasatama is an 'umbrella project' that operates on many different domains, including even more projects, and further, even more pilots or experimentations in the area. The vision of the smart district is to create services in the area that will lead to saving one hour of time for each citizen's daily life. Following this common vision, together with stakeholders, the thematic areas for experimentation were created for agile pilots that could explore the different areas of smart and sustainable everyday life. The urban living concepts developed in Smart Kalasatama embrace smart mobility, sustainable energy solutions, circular economy, advanced waste management technology, health and wellbeing and other resource efficient lifestyles. In all of these areas, residents are key to the development both as testers and initiators of concepts.

The key idea embodied in Smart Kalasatama is the agile piloting programme. The aim of the programme is to accelerate smart city development through quick and agile piloting – achieving concrete examples of new smart services in less than six months. The experimentative nature of the Smart Kalasatama area makes piloting such services visible and accessible, something that citizens and stakeholders can take part in – a neutral space for shared development. At the same time, the programme offers a platform for innovators such as start-ups, SMEs and even local communities to try out their ideas, develop solutions together in a real-life environment. The district offers valuable possibilities to connect their services to city infrastructures, while at the heart of the idea of experimentation is of course learning, maximising the learning that can be gained from the experiments and getting everyone involved, including public authorities, companies and citizens. Citizens can act both as testers of the solutions in a real-life settings, but also initiators of new technologies and smart services.

Health & wellbeing centre

In this case study, the focus is on the wellbeing centre, where the aim of the piloting programme is to co-develop and experiment with new solutions that improve the resident's wellbeing. The centre combines public health services and social services under one roof. The Co-Designing wellbeing project brought together Kalasatama Health and Wellbeing centre, corporate partners and start-ups to co-develop and innovative health and wellbeing solutions of the future.

Societal & cross-cutting themes

The societal challenges in the Kalasatama Health and Wellbeing centre focus on the societal challenges of Health, demographic change and wellbeing. The cross-cutting themes addressed by Smart Kalasatama involve collaboration with small and medium-sized enterprises, innovation procurement & public-private partnerships.

Context and environment: Where does it all take place?

Smart Kalasatama

The Kalasatama health and wellbeing centre was opened in February 2018; however the collaborations between the various stakeholders began already prior to the opening of the centre. For example, the definition of the themes for agile piloting were defined in collaboration with the social health care professionals, and Laurea University of Applied Science was assigned to define a framework of development and the themes to be taken up further. Defining the right themes was crucial in reaching the aim of the project: to promote health and wellbeing solutions that help people to lead healthier lives through activities, such as exercise and other relevant areas. At the same time, different kinds of pilots were already initiated in the area together with residents in order to bring in the culture of experimentation. This work, prior to the opening of the centre, laid the grounds for building up the Helsinki social and health care sector towards the ability of being an innovation platform for new services and solutions. Smart Kalasatama had therefore become the home for these kinds of activities already before the actual centre was opened. During the start of the Kalasatama Wellbeing piloting programme the physical centre had finally just opened its doors, the real life experimentation space for the health and wellbeing services. The city was eager to open the centre to serve as an innovation platform, opening it up for companies and others, to enable professionals to work together with small developers and others in experimentation and working as a Living Lab for new solutions.

Demographic of the Smart Kalasatama district

Today the Smart Kalasatama district is still under development. At the moment there are about 4,000 people living in the area, by 2040 there are expected to be 25,000 people living in the area. The area consists mainly of families or couples, around the upper middle class,

or near retirement age looking to move from big houses towards the city centre. At the same time, however, there are new rental housing built at the moment so that there will be a wide range of different kinds of housing available within the district. At the same time, the location of the district is near the centre of the city, and as such the price of the housing in the area is quite expensive with certain demand for the properties.

However, the socio-economic structures of the inhabitants at this moment are not seen as extremely relevant, also because the wellbeing centre serves around 100,000 inhabitants from the surrounding districts as well. In this way, inhabitants from other areas of the city with different socio-economic structures are visiting the centre daily. In addition, the services offered range from basic health care to dental care and for example physiotherapy.

Regulatory contexts

Regarding regulatory contexts, the regulative measures in connection with a health and wellbeing intiative were already well known and therefore taken into account by the project team. In this way, such regulations have not been viewed as barriers, although it had to be taken into account that some aspects of the projects will be time consuming. In addition to time, the private and public collaboration aspect always brings up the question of funding, and different partners have different limitations when it comes to funding. The format of the agile piloting program enables the different players to pilot new services with an agile and therefore fast and cost-effective way.

Living Lab

Bringing together all of the different actors in the piloting programme has created transparency and understanding between the different parties. The Living Lab structure of Smart Kalasatama is a way to push the concept forward and to ensure that activities are running on a frequent basis. Through the establishment of the Living Lab structure and a piloting programme the continuity of the activities is ensured and running activities on a frequent basis engages wider networks – bringing the collaborators together, creating common understanding, facilitating collaboration and building up transparency between all.

Brief outline of the project/ initiative's pathway

<u>Smart Kalasatama</u>

The City Council in Helsinki recognised the opportunity of a former harbour and industrial area (175 hectares of waterfront) near the city centre for a new construction site, but at the same time envisioned this as a district that would serve as a new model for smart city development.

While conventional smart city programmes often focus on long term infrastructure projects, the agile piloting programme that runs in the Smart Kalasatama area focuses on rapid experimentation including all quadruple helix stakeholders, including the citizens in the area but also businesses, public services and research. This also allows for the smaller companies – start-ups and SMEs – to participate in the development programmes. Bringing together public and private organisations has become the key factor specifically in the health and wellbeing project. This collaboration between the private and public sphere has already shown that often small companies do not understand the city and its needs very well – and the same is often true for large companies as well. In the case of Smart Kalasatama, Forum Virium serves as an intermediary – through co-creation it also facilitates the city's understanding of the companies better. In this way the programme has been successful in creating shared understanding between the different stakeholders by bringing people to work together, looking at problems together, and co-creating towards solutions together.

<u>Agile piloting</u>

The agile piloting programme runs pilots in six month period intervals, where start-ups and SMEs are invited to co-develop and test their services in the real-life environment. External projects, the city of Helsinki, corporate partners and other actors act as funding partners. In addition to funding, the programme offers tools to innovate, co-create and experiment with new services, as well as the structured access to stakeholders and citizens to participate in the process.

At the beginning, there were some crucial learnings as always when people are involved in a process. For example, when a city is involved projects are often slower especially when talking about the opening of a large centre. At the beginning, the pilots run within the healthcare centre did not start as fast as hoped for and the start-ups became very anxious.

At the same time, some pilots were run within large corporate partners such as (Kesko's) occupational healthcare. The experiences were various; resulting in lessons learnt from successes as well as challenges faced along the way - however, the central theme of the methodology focused on learning from the different experiences. Following the experiences and learnings at the health and wellbeing centre the Social and health care sector decided to form a dedicated team in charge of identifying new thematic areas for running pilots and engaging companies for open calls and co-development. From these learnings it is clear, that experts have been deployed for the purpose of identifying needs of the professionals and of the centre. The planning and allocation of resources has been challenging at times, especially relating to the time allocated to the different members of the team for such activities. In the future the city is planning how to organize their innovation platform activities - or Living Lab activities - accordingly.

Management & Organisation: Who interacts how to facilitate co-creation?

Smart Kalasatama

The methodology is based on a facilitated model: running co-creation sessions with stakeholder groups, finding synergies between the pilots and finding ways on how the different parties could collaborate. Through the agile piloting programme besides funding, also expertise in end-user engagement, as well as user centered design methodologies are offered. Forum Virium Helsinki's Smart Kalasatama team is dedicated to orchestrating the innovation process with the start-ups and SMEs ensuring that end-users and citizens are engaged, always focusing on the value created for the end-users – throughout all phases of the development and innovation process.

Agile piloting

Since the adoption and successful running of the agile piloting programme in Smart Kalasatama the model has extended – the city of Helsinki has adopted the programme with several pilots (reaching above 50 pilots so far) running in Helsinki city – beyond the Smart Kalastama district. In addition, it belongs to a programme called 6Aaika, where the six largest cities in Finland have adopted the way of working. The Finnish government has embraced the Smart Kalasatama agile piloting programme, calling it 'everyday experimentation' – experimentation has become a wider topic in Finland. It is a great

success that the multi-ministry in Finland has endorsed and further, started to drive the process of this experimentation culture.

Through the Nordic smart cities network the concept has also been extended to Stavanger in Norway, where the city of Stavanger has also taken the agile piloting model as a way to work with start-ups for their smart city. The pilots in Stavanger have started in the fall of 2019. The aim is to reach a wider scale, starting within the Nordic cities. At the same time, the hope is to communicate and bring something new to the process that can be used across the different cities.

Health & wellbeing centre

The financing for the Kalasatama Wellbeing programme was secured from European Regional funds and corporate partners participating with their own resources. Funding for the different projects running in the centre have come from innovation fund financing instruments, corporate partners and Laurea University covering their own co-financing as a partner in the project. Importantly, no financing is provided by the city of Helsinki but rather, corporate partners are involved in order to fund the pilots. This new type of financing model has created uncertainty in the beginning but has proven to be a successful model in crossing the borders between private and public funding.

Currently, larger companies are not yet engaged to the fullest extent – although there are some experiences with for example the last mile challenge programme where large companies were involved in co-creation, the aim is to involve large corporations in more depth in the future. Lately the Living Lab 'tool' has been developed, as the agile piloting programme model aims to address and engage the corporate partners in addition to start-ups– not only as the way to work with the health and wellbeing professionals and users, but also to develop the model in a new way.

Forum Virium, the Kalasatama Health and Wellbeing Centre, corporate partner Kesko's occupational health and the residential district of Kalasatama, together, formed a Living Lab. The health and wellbeing centre is not run by Forum Virium, but the centre is serving as a platform for agile pilots related to new kinds of solutions for health and well-being services. Currently the piloting programmes are run by the city of Helsinki and Forum Virium Helsinki's Smart Kalasatama is supporting the city, while the health & wellbeing centre works as a lab for pilots.

What are the concrete processes and practices of co-creation?

<u>Agile piloting at the Health & wellbeing centre</u>

The co-creation process focuses on the engagement of the quadruple helix: companies, residents, city officials and researchers. While start-ups may have innovative ideas they often look for support for executing pilots in real-life environments and getting feedback from users. Co-creative processes are at the core of the agile piloting process at the Smart Kalasatama health and wellbeing centre, supporting the pilots by providing them with methods to co-creation, access to citizens and city infrastructure, networks, markets and overall visibility.

The process began by defining the challenge, gathering corporate partners plus the city and the Living Lab team. The challenge was formulated together with the professionals of the city of Helsinki, as 'how can the residents to better take care of their personal wellbeing and health on a daily basis?'. The key was to involve co-creation already at the earlier phases of development.

Following a challenge definition, an open call was launched (January – February 2018) to which more than 30 start-ups applied for piloting their services. The expert jury (including the representants of the partner companies and the city) selected 10 pilots following a set of criteria. The selected start-ups were invited to a co-creation jam, an event that allowed them to gain a better understanding of the aims of the collaborating partners, as well as the start-up's goals, enabling them to finetune their pilot ideas. Collaboration opportunities between the different teams were identified.

Business model and value proposition, experimentation goals and user experience were central themes of the co-creation jam, following which the start-ups pitched their ideas for the next step selection process – five pilots were selected following the jam. An essential criterion for selection was to identify the real-life platform for each pilot, enabling a quick start for the experimentation phase.

The five pilots selected represented healthy nutrition and wellbeing, stress management and better health for daily life. The Smart Kalasatama Living Lab supported the pilots through all phases: from defining themes to the open call, selection of pilots, experimentation and evaluation. Each pilot received a funding of maximum 8,000 € each – not a large amount, but from the viewpoint of the start-ups interesting to experiment with

and to gain new learnings and contacts, in addition to the non-financial support, expertise and experimentation platform offered by the programme.

The process included regular stakeholder meetings where the closest stakeholders have been able to follow up on the pilots. This has created synergies, learning and sparked collaborations between the different actors. The pilots have used this opportunity to start discussing potential partnerships with the larger players, for example. Two sessions were hosted during the experimentation phase where the key players met to understand what is happening and to share learnings – good and bad – between one another. Here, the Living Lab worked as an orchestrator to facilitate the sharing of such learnings that are emerging between the pilots. When the pilots are running at different phases, they can also teach one another about the different stages and learnings related to the different phases, helping each other through the process.

Also, larger events were held, where the learnings were opened amongst a wider audience and bringing the wider themes of the pilots together, feeding insights from their experiences. These events served as dissemination but also as learnings for next steps. After the programme, some of the activities have continued with other partners outside the Living Lab. The events also served as an important platform to discuss topics that are relevant for all – such as data and privacy, for example.

Specification: What tools and instruments are/ were used to co-create?

Agile piloting at the Health & wellbeing centre

The agile piloting programme is the main tool for the co-creation in the Smart Kalasatama health and wellbeing centre. Within this programme, many activities are included that bring stakeholders together in co-creating solutions for better health and wellbeing in the area and beyond.

The process began with workshops together with social and health care professionals, in order to define the current status, identifying needs and challenges. Collaboration with healthcare professionals and other stakeholders began already before the opening of the centre, working together with residents and professionals from different quadruple helix stakeholder groups. The sessions were designed specifically for the pilots in order to tailor each two hour session to meet the needs of the pilots where different ideation techniques

were used. In addition, the co-creation Jam packed such co-creation sessions in an intensive working session. Service design students from Laurea University were also involved in facilitating persona building, allowing the pilots to understand their end users better.

The work with value propositions was conducted together with the teams but also with other collaborators. An experimentation canvas was used, helping to think about how to work within their pilot cases during the experimentation period. These tools were coming from service design but always included some adaptation and customisation in order to tailor the general techniques to specific needs.

In terms of evaluation of the process, the process of the co-creation and orchestration of the collaboration was intensive and benefits from an external evaluator. The partnership with Laurea University of Applied Science provided this resource in acting as the evaluator in the process. This collaboration was successful because the university could focus on following the process, assessing the pilots but also assessing the activities of the co-creation process and the agile piloting programme in general. This provided some crucial learnings into what worked and what did not work. The overall impression of the co-creation jam shared by all stakeholders was positive; however the jam was experienced as a little heavy. This learning was taken up on the next opportunity, when the organisers designed a session for a different thematic area last summer - involving fewer teams and more time.

The agile piloting process and co-creation activities within this process are therefore constantly evaluated and redesigned following the learnings emerging from experience. Here the support from the evaluation partner, Laurea University, is crucial in the collection of learnings and evaluation of the process along the way.

Which learnings emerged?

Smart Kalasatama & agile pilots

The start-ups have been satisfied and positive visibility in the media for the pilots has been appreciated. The engagement of corporate partners in the process allows them to offer technologies or platforms and to connect with the start-ups, city, and the residents. The residents gain an understanding of future solutions and the opportunity to explore and

affect the development of new services. For the city, the pilots are a way of getting a sneak peek into the future, and to anticipate forthcoming changes.

<u>Health & wellbeing centre</u>

Running a pilot round requires intensive facilitation work from the Living Lab. Facilitation of the experimentation process is about leading networks, communications and hands on work. The most effective use of resources is achieved when pilots are run together as a programme. There are many synergies when the various stages of instruction, facilitation and evaluation are carried out simultaneously with several pilots. A crucial task is the creation of trust among the various players. In addition to the managerial activities related to innovation processes and resources, mediation among stakeholders and activities is needed to create trust and shared meanings enabling shared learning, a shared vision and shared value creation among the multiple actors needed in Living Labs.

In terms of end user engagement, the experiences showed that it is challenging to reach end users for attending workshops. Although survey answers would show that there is a lot of interest for a certain service for example, it is difficult to get citizens attending sessions for working out solutions together. However, the health & wellbeing centre and occupational health provide natural environments and situations to interact with users.

The real-life experimentation with simulated services for people to test the service as-would-be proved to be a very successful model. For example, in the case of a grocery bag delivery service piloted in a month's time, deliveries were organised once a week. People were able to try the service, ordering their bag, paying for their groceries as in real life service – even before the commercial launch of the service. Although the start-ups and companies sometimes expected more it was important to convey that this is still an experiment and not a launch – the idea is to learn something from the experiences from the experiment. It is therefore important to manage expectations from all parties to understand what an experiment is, what it can and cannot deliver, and what the aim is – what can be learnt at the end, and therefore why it is important to run such experiments. On the other hand, such experiments also demand a lot from the consumers – they must take the step to try something new for a short period of time, to find the time and schedule in their lives. In the end when the period is over it may be that companies had expected more, but also residents had expected the service to continue, so it is a balancing act between the different stakeholders' expectations.

Co-creation jam

One of the co-creation tools deployed by the Health & wellbeing centre during the agile piloting programme was a co-creation jam, a one-day intensive event to propel the pilots further onto next steps, while making a jury selection of the 10 participating pilots down to 3-5 pilots to be run in the programme. Following feedback on the programme, that described the overall impression as positive yet intensive, a new plan for the Jam was created. The improved version of the Jam consisted of one day run by an accelerator partner focusing on business models, second day concentrating on the Living Lab activities and the end user needs. The third day focused on pitching and selection of the pilots. This new programme for the jam worked very well, although demanding a lot of time, it incorporated co-creation within the process in new ways and therefore was a proof of successful development of the process, integrating learnings gathered along the way.

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Social Innovation Lab Kent (SILK) | UK

Eva Wascher (TU Dortmund University)

The Social Innovation Lab Kent (SILK) is a small team based within Kent County Council set up in 2007 to 'do policy differently'. Our early projects led to the development of a human-centred methodology and toolkit which draws on tools from social science, community development, business and design. By working in a participatory way across sectors and disciplines, the SILK approach is able to address seemingly intractable and complex problems. It can be applied to strategy, service design and sustainable community projects.

What is the project/ initiative all about?

The Social Innovation Lab Kent (SILK) is a small innovation unit based within Kent County Council, the regional government of Kent County in Great Britain. The lab was set up in 2007 as an experiment to work in a participatory way across sectors and disciplines and to 'do policy differently'.[1] Throughout the first pilot projects of SILK, the team developed a human-centred methodology and toolkit which draws on tools from social science, community development, business and design inspired by Design-thinking. The two demonstration projects worked on Social Care and on Families. The design frameworks tested during these projects informed the creation of the SILK Diamond Framework and the Method Deck. This approach helped to address seemingly intractable and complex problems for different stakeholders in County Kent.[2] The SILK approach was applied to different subject areas such as families, housing, reducing re-offending, young people, dementia, and migration. Furthermore, the SILK approach can be applied to municipal and regional strategy projects, service design and sustainable community projects.

Today, SILK is based within the Strategic Commissioning Directorate in the Strategic Business, Development and Intelligence team and is continuing to work across the whole of Kent County Council. After more than ten years of experience with service design methodologies used for a great variety of governance problems within the region SILK has demonstrated the benefits of working in a different way. Even though SILK continues to work in a mindset of government innovation labs its role has changed to provide a qualitative research function within the team for Strategic Commissioning within Kent County Council. Therefore, the SILK team cannot work as open and inclusive as it did with previous projects. Hence, some of its research findings are not meant to be shared publicly.

In the spirit of government innovation labs and inclusive stakeholder management SILK works closely with respective actors such as families, friends, volunteers, and frontline workers. People with lived experience on a particular issue are relevant to be involved at all stages of co-creation projects. Therefore, the SILK Methodology 'provides creative and innovative ways to approach projects, and enables a collective ownership and responsibility for project design, delivery and outcomes.'[3]

SILK has been set up as an answer to tackle complexity in today's government and governance problems. It was established within the regional government of Kent County Council on purpose. Its role is to find and test new ways to work together and to complement the 'traditional rigid planning approach' of government. Government innovation labs all over the world are recognised to be spaces and processes that use agile working methods and are capable to relate to multidisciplinary contexts to solve problems together. Social Innovation Lab Kent was one of the first regional government innovation labs worldwide. For SILK, social innovation is about to recognise collective value and to engage a community to become innovative to change culture and create shared experiences.

Context and environment: Where does it all take place?

Setting up the Social Innovation Lab Kent has been a result of a discussion about forms of public sector innovation in the UK starting in the early 2000s. In contrast to current managerialist approaches to public sector modernisation a new narrative about what people want and need from public services arose. Instead of insisting on bureaucratic hierarchies and silo thinking the demand to work cross-departmental and cross-sectoral was spelled out. For progressive public services people and places are put in the centre, not targets and key performance indicators (KPIs).[4] New approaches of public service innovation need to encounter a new vision of longterm wellbeing that can partly be provided through public services. Furthermore, a new methodology in achieving these goals through 'service design' is required. Hence, a 'service design' methodology tries to shape services around the experiences and interactions of its users.

This new narrative of public sector innovation including new approaches to service design relates to a discussion about co-creation in government as well. Organisations like Demos UK, an independent, educational charity, as well as NESTA, the UK National Endowment

for Science, Technology and the Arts, have been important platforms for fostering discussion about different ways of public sector innovation. A general understanding was that involving the public as designers of their own services is a key element of reform. User-driven design leads to better services which include improved outcomes and greater legitimacy for the public sector and the government.

This form of co-design is a source of innovation itself. 'While most departments have signed up to the principle that co-design processes can make existing services better, there are far fewer examples of governments embracing co-design processes as part of a broader innovation strategy.'[5] Furthermore, in practice civil servants are often hesitant towards using co-creation methods or getting involved in these kinds of processes. Embedding co-design in approaches to innovation at a systemic level requires the acknowledgement of some principles. On the one hand, it is about a shift in mindset. Changing mindsets and culture about the ways in which strategies are developed and what is seen as innovation and how this is nurtured. Models of management and processes by which policy is developed and implemented would need to change radically if user-driven or citizen-centric innovation was taken seriously.[6] The change required can be called quite radical because government at all levels (municipal/ local, regional and national) will need to open up and to become more 'porous'. Previously closed systems of policy-making become partly transparent and give entry points to let service users into policy development cycles at much earlier stages. This includes partly to give up more power to the public but on the other hand, increases legitimacy of public service provision.

Caution needs to be taken upon the 'consultation overdrive' since the late 1990s. Citizens that have been engaged in public participation processes and have experienced empty promises during this kind of consultation feel disappointed if not even enraged. If bottom-up deliberation results in no real impact for stakeholders co-design processes fall under general discredit.

Implementing new service design approaches to policy-making requires the combination of different aspects which might produce an opportunity for a genuine shift. This includes 'the entrepreneurial connecting together of a series of possibilities, a combination of inspiration and perspiration in the quest to bring about improvement, change and transformation.'[7] The occasional moment for setting up Social Innovation Lab Kent derived from the community around organisations like Demos and NESTA. Though, service design for public sector innovation was still an undertheorised space. In practice, inspiration

could only be drawn from corporate examples around 'skunk works'. With one major exemption which was MindLab, based in Copenhagen Denmark. For the SILK founder, Sophia Parker, the exchange with MindLab staff was very important. She made a couple of study visits to MindLab and different approaches towards innovating policy through design were discussed with Christian Bason and his team. This 'learning partnership' inspired Sophia Parker to engage in setting up a government innovation lab in the UK. As a contrast, MindLab's work evolved around using design for transforming public services and policy-making. This included to have dedicated office space for 'service design'. In contrast, the work in the local government quarters at Kent County Council aimed at using service design to deliver citizen-centric services and thereby being driven by a social justice agenda.[8] Finally, Social Innovation Lab Kent was set up in 2007 by Kent County Council, the regional government of County Kent in the UK. Kent County Council (KCC) has around 35,000 employees and the county has about 1.5 million residents to date.[9]

Kent County is located between London and mainland Europe. Its relation to mainland Europe is especially important because of the ferry connection of Dover to Calais and Eurotunnel train connections from Brussels via Calais to Ashford and London. Kent faces certain societal challenges such as an increasing population, poverty, unemployment and violence and environmental degradation. Demographic change in the region impacts the tax base that is available to all citizens. This results in competing issues that the government needs to work around. For example, there is an increased demand for public infrastructure and public services in housing, transport and education as well as family and child support, disability services and aged care support. Furthermore, Kent experiences increased pressures on individual, family and community wellbeing arising from the continuing and widening gap between rich and poor. 'In some ways, it is a microcosm of England as a whole, with much the same full range of social conditions.'[10] Kent County Council has a conservative majority for many decades[11]. The council acknowledges an increasing demand for changing the role of local government that arises on the one hand from national government demands for public sector reform and on the other from requirements for local, community based responses for policy-making that are more desirable than centralised service delivery mechanisms.[12]

Brief outline of the project/ initiative's pathway

SILK was set up as an experiment to test a new approach towards service design using the government innovation lab as an organisational structure. The overall aim was to reconnect policy and decision makers with peoples' day to day lives. SILK is characterised by its methodology including co-creation and co-design with citizens. The lab does not have a physical 'lab space' within the County Council except for the ordinary office space of the SILK team.

Discussions around setting up a government innovation lab in Kent County Council started already back in 2006. The Assistant Director of the Council wanted to recruit a new Head of Policy and came across the work of Sophia Parker who was working for Demos at that time. Conversations began between Parker and the Council about ways of public sector innovation. The Council was aware of her work around co-production and service design. Finally, the Council decided to see how these approaches could be applied in the context of KCC. For Parker, it was a perfect opportunity to practically work on the ideas she had written about. This included most importantly two Demos reports about 'Unlocking innovation. Why citizens hold the key to public service reform' and 'The journey to the interface. How public service design can connect users to reform' together with Joey Heapy.

In 2006, the Strategic Development Unit was created which was explicitly charged with formulating, capturing and developing innovation. Within this unit, Social Innovation Lab Kent emerged a year later. From the beginning, the unit worked closely together with the 'Change Through Innovation' team, which focused on eGovernment solutions, meaning new technologies and techniques that could be used internally and externally for Kent. In this context, user-centric and user-driven design was seen as an essential element for innovation itself.

Overall, the Council had the reputation of being quite innovative and Parker saw a chance to put into practice what she had theoretically worked on before.[13] The organisation supports innovation and empowers its staff to be innovative. Learning from other organisations as well as to provide space for experimentation and taking a 'pro-innovation' approach to risk was key to be progressive in that respect. For example, Kent County Council was the first council to set up a Public Service Board[14] as a way of coordinating and bringing together the great variety of public services across organisations in county Kent.[15]

Nevertheless, the work of SILK was even more ambitious. On the one hand it was about developing policy in a different way, meaning to use service design approaches. Therefore, pilot projects were chosen to test the methodology. The main principle here was to start with people's real lives on issues such as social care, housing, and 'just coping' families. On the other hand, the ambition was to bring an innovative culture to the whole of the organisation of Kent County Council. Doing this, SILK had to face and to cope with the same challenges as other approaches to public sector innovation have to work around.

Initially, SILK aimed at creating and communicating a 'mandate to innovate' for all policy-makers and civil servants working within Kent County. For example, they produced pledge cards for staff which described their role as innovators. Furthermore, SILK sponsored the Kent 'Year of Innovation' in 2007 to 2008. During this time, SILK was able to show some of its early project results and to encourage government staff and citizens to 'to spread good ideas and reinforce the permission we want to give people to follow their good ideas and develop new practice'[16]. In the beginning, SILK had to make considerations about how they could apply a person-centred approach in the context of local government. For that reason, two pilot projects were chosen to develop and test a SILK prototype for a user-centric service design methodology. The first pilot 'Just coping' focused on families at risk in Kent. The second pilot 'Aging well' focused on how people access information about social care, and the role of our online directory of providers in this.[17] The pilots were used to test many aspects of social innovation lab processes starting with approaches and techniques from the worlds of design, business and ethnography, to a more structured way to idea generation, including to set up diverse teams and to bring in a range of perspectives. By applying different methods in the two pilots the SILK team learnt a lot to develop into a combined 'SILK approach'. Very important in that phase was the cooperation with Engine Service Design, a design agency that mostly worked for private business. The team created a person-centred project planning tool which does not provide a rigid methodology, but helps project leaders to better plan. The tool consists of different projects phases and offers a wide range of other tools and methods in order for the project team to gather insights engage with people and generate new ideas. This in-depth service-design based project planning was unique in local government at the point in time. Furthermore, the pilot projects have impacted the work of the council and beyond in many ways. For example, the work on families has shaped both the strategic plan of KCC's Children, Families and Education Directorate and has strengthened the focus on the elimination of poverty and the development of resilience. A number of follow-up projects have resulted from the pilot

projects. E. g. a project with children's centres in East Kent to redesign their services for fathers and another project about how new technologies might reduce isolation and loneliness, in collaboration with the Digital Inclusion Team at the department of Communities and Local Government (CLG). The 'Aging well' pilot resulted in a broader initiative with the South East Regional Improvement and Efficiency Partnership, the Young Foundation and NESTA to develop an online resource to help people plan their care in an era of personal budgets and self-directed support.

Last but not least, the pilot phase of SILK projects created a wider conversation around the council about the importance and the potential of user-driven innovation. Based on these discussions, the council hosted the first 'Public Office' event in local government. This was a two-day installation that used video ethnography and facilitated conversation among over 100 of KCC's senior managers together to reflect on the issues.[18]

Management & Organisation: Who interacts how to facilitate co-creation?

Today, SILK is based within the Strategic Commissioning Directorate in the Strategic Business, Development and Intelligence team within Kent County Council. The SILK team today has two permanent members of staff but no senior lab management lead. During the past ten years, even though SILK continues to work in a mindset of government innovation labs its role has changed to provide a qualitative research function within the team for Strategic Commissioning within Kent County Council. This is due to restructuring within KCC and a change in culture. As a consequence, the SILK team cannot work as open and inclusive as it did with previous projects. Hence, some of its research findings are not meant to be shared publicly. Still, the small team is agile, responsive and well-connected, yet significantly part of a large and diverse network from across Kent and beyond which includes specialists and generalists from all fields in a professional and voluntary capacity.

If the lab is to realise its full potential, it cannot operate in isolation. Within the council, relationships will need to be built across all directorates and within Kent County, further work needs to be done to create links across the Public Service Board and with SEIEP (South East Improvement and Efficiency Partnership). Furthermore, networking is important beyond Kent County. Some of these are about learning from and helping to shape the national agenda as outlined above.

In the beginning, SILK worked closely together with Engine Service Design, a design agency.[19] The SILK team wanted to establish strategic partnerships with their design partners rather than procuring different consultancies. Furthermore, they tried to build a network with stakeholders such as the social sciences departments and design schools of universities as well as a local government innovation collaborative and a technology partner.

In the early years SILK aspired to offer development opportunities to senior civil servants identified through the KCC Talent Management Programme and to develop a network of SILK associates and senior associates to create an active network within Kent.

Core roles and tasks of the SILK team include[20]:

- Leadership for programme direction, prioritisation and strategy including project facilitation and programme management;

- Designing and running SILK projects;

- Expertise in qualitative and quantitative research methods;

- Maintaining and building the SILK framework and toolkit;

- Capacity building in service units;

- Brokering relationships with skills suppliers (e.g. designers, ethnographers);

- Supporting directorate staff skills development;

- Adding expertise to directorate-led projects;

- Admin and design support: Supporting events, finance and communications Production and dissemination of materials.

Overall, the SILK core team can be expanded or contracted depending on the extent to which KCC wants other projects to evolve. All projects involve setting up multi-disciplinary and multi-agency teams. One of the key features that make SILK distinctive is its networks to other organisations and individuals who have competencies that are not often used in local government. To conduct projects, SILK requires extra budget to support the procurement of these diverse forms of expertise. Therefore, for every project KCC would need to supply a dedicated programme budget to cover the costs of bringing in forms of expertise not currently in existence within local government (for example, designers, ethnographers and innovation experts), as well as the costs associated with hosting large

events, producing reports, and tools. For the pilot projects, SILK has attracted more than 50 % of its budget from other government departments. SILK only contracts other actors if a particular expertise is required and cannot be provided by the project's members. For example, SILK commissioned an author/ illustrator/ film-maker for the Dementia Diaries book. The project group consisted of young carers and families living with dementia who wanted to share their stories in the form of a book. SILK always tries where possible to use the experience and skills of the project team and this helps to keep costs low. For every project, SILK includes people with lived experience in the team who also assist in all aspects of the project including proof-reading, design, filming, analysis, user testing etc.

People engage with SILK projects on a voluntary basis either in their own time or as part of their job. This means that people get involved only if they really want to and feel that they have a stake in a problem. Furthermore, people from all parts of the council can become part of the projects and will have differing levels of involvement depending on their role. Some civil servants may become quite involved and learn about the SILK approach through the whole project cycle. Others may only be involved with receiving regular project updates. All people who decide to work on SILK projects appear to be motivated by positive change whether they are participating in a voluntary and/ or professional capacity. Each person is seen as a contributor and as an asset to the collective project goal. This mindset literally reorganises people away from hierarchical silos towards a multi-disciplinary and cross-sectoral community asset model.

One major assumption in the work of SILK is that bringing together new groups of people yields new collaborations and supports new perspectives, challenges stereotypes and creates new solutions. A further assumption of the work is that if diverse groups of people have genuine and collective ownership of a project, the 'group grows in resilience and there is increased confidence to challenge the status quo'. But a positive dynamic can only evolve if problem constitution and further project progress are a result of reciprocal exchange and participation in shared experiences. The strapline 'Starting with People' is taken seriously for every project and means that the SILK team starts projects by talking to people who are closest to the issues.

During SILK projects a range of people become involved. This includes residents of County Kent as well as experts working in the particular field etc. At the beginning of a project, a broad stakeholder mapping is conducted to identify and make contact with all the relevant people and take a network approach to finding out who needs to be involved in a particular

project. Working in a cross-departmental, multi-stakeholder environment, SILK puts special focus on managing expectations as a priority in every project. This includes a clear and bespoke communications strategy for all those with an interest in the project. Different audiences are distinguished and reached out to with different instruments. 'Some people like to come to meetings, some people use Twitter, some people like email and some people prefer a good old chat.'[21]

What are the concrete processes and practices of co-creation?

One of the co-creation processes conducted by SILK was a project about 'Engaging fathers - Developing support services with and for fathers'.[22] It was based on the network that had been built along the pilot process on 'coping families'. Acknowledging the importance of active participation by fathers throughout childhood, the aim of the 'engaging fathers' project was to develop tailored support services for dads. Research shows that active parenthood for both parents' results in better peer relationships among children, higher self-esteem, fewer behaviour problems, lower criminality and substance abuse. Within Kent County, the Kent Children's trust strategy for supporting parents has committed to doing more to engage and support fathers and male carers. This includes redesigning and improving services for both mothers and fathers, for communication of staff and for how to understand and differentiate between the issues that dads have as parents.

The project was conducted by Social Innovation Lab Kent and Kent County Council together with Engine Service Design and Seashells, a Children and Families Centre located in Sheerness, County Kent. Among all partners there was a shared commitment to ensure that those who are to benefit from services should be involved at every level in the planning, delivery and evaluation of those services.

The aim of Seashells is to deliver high quality and integrated services to the children and families of Sheerness. Seashells responds to a very dispersed community on the island, poorly connected by public transport, with a core set of tailored services for children and families including information, childcare and various activities, classes, and groups. All of these services are principally delivered from within the centre. More than 23,000 contacts are made every year but less than one sixth of the adult contacts are with dads and other male carers. There was only one well established and regularly attended 'Daddy Cool' fathers' group. But for all other services, visitation of fathers was low.

Starting point of the initiative was to identify the unique needs of fathers. Therefore, the project was an exploration of those needs through direct collaboration with fathers in the development of more responsive services. The problem context of the project settles around discussions that fathers often feel invisible towards service providers and are not targeted in a way that mums are (e. g. concerning the environment, staff, the presence of too many women). Furthermore, courses and other services tend to be offered at times were fathers are not available.

Seashells opened itself up to reflect on its current delivery methods and to consider completely new approaches, services and delivery partners. The organisation wanted to find new ways to connect with and support more fathers in meaningful ways. Key questions for the project team have been:

- How do fathers prefer to engage with their children?

- How can we support them in doing so?

- How do fathers understand and perceive their role within the family?

To answer these questions a user centred approach was adopted that involved actively engaging fathers both inside and outside the centre. The project team worked with a core group of 12 fathers. Because the fathers became actively involved as project team members they felt welcome and were encouraged to stay on board. Throughout the development stages Seashells captured critical insights around the fathers' needs and developed a variety of possible services with them. The following methods were used in the different project stages:

1) Planning: Stakeholder mapping, stakeholder prompt cards, black book, communications analysis;

2) Insight: Topic guide, interviews, observation, community mapping;

3) Idea generation: Personas, idea templates;

4) Improvement and evaluation: Pen portraits, evaluation form, voting, curry night;

5) Modelling and definition: Word of mouth, desktop walkthrough.

Beginning with a design brief the project identified unique service aspects identified by dads and captured them in a service specification document useful for implementation. Following a period of user research, staff used a topic guide to structure a conversation with fathers. Valuable information was captured around fathers' preferences for the way

they spend time with their children and how they perceive their role within the family. The discussions also surfaced an important series of needs. While some were very practical such as access to information and activities fathers could do with their children, others defined a set of conditions for the type of support they were looking for.

A series of workshops were held at Seashells after working hours. Each night included a particular set of goals and outputs. The tools and exercises used within these two-hour sessions facilitated a discussion amongst dads that generated more specific insights about their daily lives. The details that emerged began to define important service characteristics, particularly around ease, cost and convenience. A diverse set of solutions was generated by using the needs for inspiration. Fathers evaluated the value of each one based on their individual preference and impact for all dads. Once this selection was weighed against organisational capacity a single proposal was taken forward and refined through an active walkthrough that helped to add more detail and build momentum necessary for making the service real. Key stakeholders were invited to participate in the final session as part of an effort to test and model the service's potential.

The collaborative development with fathers produced opportunities that ranged from mobile satellite units for isolated areas of the island to an event for educating expecting fathers about the road ahead. More than just identifying services the sessions also highlighted proposals for changes to the way the 'Sure Start organisation'[23] connects with its users. Although varied, the results can be understood as a collection of ideas to be prioritized and linked for greater effect.

Interestingly, many of the services that emerged were not explicitly father oriented. Instead they were defined by features that address barriers such as inconsistent work schedules and difficulty in accessing information. Responding to the dual needs for information and activities was a clear opportunity to combine the delivery of information with the promotion of activities. The individual services also prompted thinking around new methods for improving the centre's ability to collect feedback to support service design and redesign. As a follow-up Seashells is considering the follow next steps: [24]

- Put in place mechanisms to ensure that the views and opinions of dads are heard, captured and acted upon.

- To include unobtrusive attendance at Daddy Cool by key staff as well as casual, unstructured meetings outside the centre.

- Appointment of dads' worker to dedicate time just to ensuring dads' views are heard and to ensure dads have a powerful advocate within the staff team.

- Explore off site and on site services in collaboration with fathers – both those generated via this project and be ready to consider more radical and unconventional ideas to engage with dads that are not yet mentioned.

- Optimise the collection of data about dads through informal conversations with mums and by changes to the registration documents to enable dads' details to be captured (NB there are important data protection issues to be considered here).

- Regular programme of updates for dads via text letter, Fathers Facebook page, and Seashells newsletter articles written by and for dads.

- Accept that since women are invariably the primary carers Seashells work will be geared more towards them and there will always be a disparity between the numbers of mums and dads with whom we work. But that is no reason not to optimise work with dads and to commit resources to them.

- Ensure that our learning is made available widely – and at the same time we must be ready to hear about the experiences (positive and negative) of others.

Specification: What tools and instruments were used to co-create?

The SILK Toolkit consists of the Diamonds Framework and the Method Deck. The SILK Methodology covers three main areas: Strategic and Policy, Service Re-design, and Creating Sustainable Communities:[25]
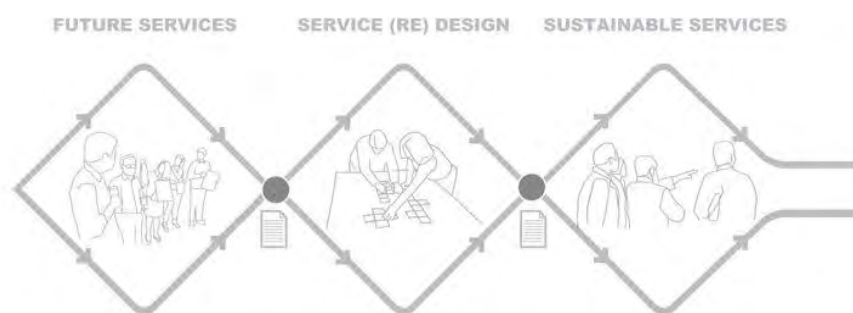
Projects are then broken down into four phases:
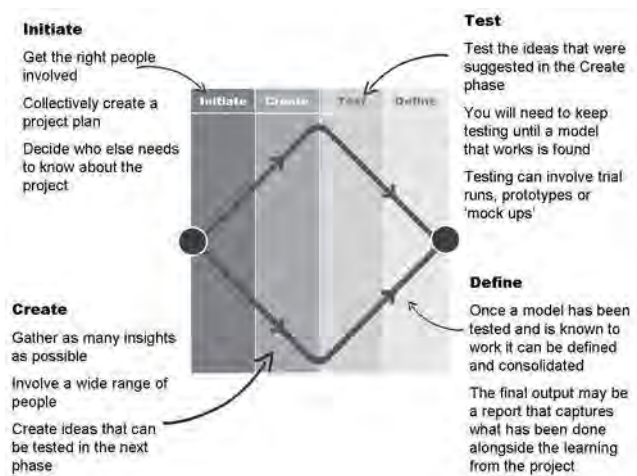
Figure: 1 Diamond with arrows

The Method Deck can then be used to choose which methods should be used during each phase of the project:
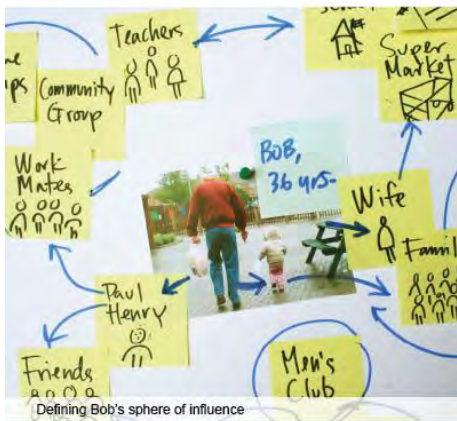
The Method Deck and Diamond allow for the project to be planned collectively in groups, with everyone having ownership over the decisions and course the project will take. It can also be used retrospectively to record what happened during a project.

The SILK method deck is a handy collection of methods, principles and prompt cards, which can be used by project teams, designers, project managers, social science researchers, community and economic development experts alike. The Method Deck is used most effectively as a complimentary tool for use within our SILK Methodology.[26]

From the variety of methods used for the 'engaging fathers' project there is a brief description given for one single method within each stage in the project line:[27]

<u>Planning - E. g. Social Circles</u>

Defining Bob's sphere of influence

Insight - E. g. Community Mapping

Community mapping

During discussions about local issues, places or potential changes to the local environment this tool provides a way for generating an understanding of what is important, based on people's experiences within their community.

Maps are a familiar resource that people can relate to quickly and can be easily adapted to different cultures and environments. They are a good mechanism for unlocking and capturing a great deal of practical and local information in a clear way. The map itself becomes a visual record of what was discussed. Used with a diverse group it can help to focus a discussion around a particular set of resources or themes.

Mapping parenting resources on the Isle of Sheppey

Insight Version 1.0

Idea generation - Personas

Personas

Personas are fictitious characters that are created to represent the different user types within a targeted group of users. They help to focus the conversation on the need, goals and behaviours of a real user group. They can include photos, background and key quotes collected during interviews in order to inspire thinking on projects and present insights in a structured format.

Personas act as a constant referral during the service development process, helping to focus on users' states of mind, behaviours, attitudes and perceptions around the use and delivery of services.

Cards to stimulate discussion around the needs of fathers

Design Version 1.0

Improvement and evaluation - Voting

Voting

This is a democratic way of deciding on project direction or content. It gives all participants a voice and is intrinsic to collaborative engagement. It builds a shared understanding that whilst all ideas are good, only those preferred by the majority will be taken forward.

This method often follows an idea generation activity where many ideas have been created and involves 'tagging' the most popular ideas in order to identify those ideas that the group identifies as the best. Voting can be particularly useful during times of indecision and to re-emphasise peoples' commitment to a project, as it respects individual opinion.

Gary selecting his favourite service idea

Workshop   Version 1.0

Modelling and definition - Desktop walkthrough

Desktop walk through

To better understand any service idea it is important to take time to consider how it would actually work if put into practice. A walkthrough that focuses on the details around delivery and use will help bring to light examples of where the service feels more robust and where it might need further consideration. Although you might have intended it to work a certain way, it is useful to explore ways in which it might be misused and what the consequences of those actions might be. This tool will produce a list of actions for further development.

Detailing sign up, use and promotion of a new community club

Design   Version 1.0

Over the years SILK has adapted the application of the Toolkit since it was designed in 2008. For example, SILK changed Sustainable 'services' to Sustainable communities as a recognition of terminology and language when working across cultural borders. Initially,

the Method Deck was designed as a project planning tool but is now primarily used as a prompt when planning. The Method Deck can be used to record a project process in a consistent way within the framework, along with a narrative. It is important to note that there is no right or wrong way to use the toolkit. The stages of 'Initiate', 'Create', 'Test' and 'Define' are transferable across strategy, service design and sustainable community projects.

Which learnings emerged?

Social Innovation Lab was created to fulfil two purposes. First of all, it was meant to experiment with a 'person-centred' approach and involving citizens in the innovation process to work on quite intractable social problems. Second, it aimed to change part of the organisation culture of the Council to make all staff aware of citizen-centric service design approaches. Both ambitions were difficult to handle. Although the latter one is even more complex and contentious than the first one.

SILK succeeded in committing KCC to provide financial and human resources to 'making innovation someone's job'. This meant that the person-centred approach to public service design could be carried out and SILK had the capacity to fulfil its core target. On the other hand, 'making innovation everyone's job' within the council requires a major shift in institutional mind-sets and was probably too ambitious for SILK to reach. Especially when it came to navigating decision-making through the local government this was quite challenging for the team. Using service-design approaches and working with external stakeholders meant to be more open, work on probably contentious issues and to be a bit risk-taking. Even though there were new formats in place like Local Area Agreements and Public Service Boards cooperation between actors was difficult. I. e. cooperation meant most of all more meetings and more paper work, but did not result in 'real progress' for the SILK team. Furthermore, the way that SILK generated knowledge through qualitative research and using methodologies like design thinking was not appreciated by certain actors. Instead, the usual way to do gain evidence to inform policy-making was through research. 'The richness and nuance of qualitative data was seen as anecdotal, rather than a critical part of the picture when it came to developing evidence-driven policy'.[28]

However, SILK created energy, space and a sense of possibility that things could be different for all people that have been and still are involved in innovation processes run by

SILK.[29] For a long time, the SILK team was equally eager to do its project work in a sense of an internal innovation consultancy and to succeed in effecting culture change to help staff to take a perspective of 'genuinely starting with people and their lives'.

With the projects carried out, SILK made some interesting findings. For example, the team that worked on the 'coping families project' identified institutional barriers that can stand in the way of 'seeing and hearing' citizens. They realised the importance of family and friendship networks, the desire of some citizens to avoid public services, and the impact of a very poor physical environment on accessing those services. As an important lesson learnt, the team became apparent that the public service assumptions about empowerment, independence and personalisation would need to be rethought. Methodologically they learnt that public institutions do not have strong skills in ways of gathering citizen insight. The council is often overly reliant on survey-based data and feedback from only those citizens and other actors who are the most articulate. This can be simultaneously superficial and misleading when compared to results based on service-design approaches. Finding ways of complementing this mass information approach with one based on insight and deeper understanding is essential, but it takes hard work and commitment.[30] Concluding from that, the SILK team hoped that its real potential will be delivered when the person-centred approach becomes part of the mainstream 'way of doing things'. After the pilot processes in the early years SILK aimed at embedding its methodology in the toolkit they produced for the Comprehensive Engagement Strategy. Furthermore, they tried to provide content ant method for certain staff development programmes, such as the talent management programme and the Kent County graduate programme. With this, SILK tried to make its approaches to become part of the core 'curriculum' for staff and of the management development courses at KCC.[31]

Finally, SILK impacted the development of innovation units in other local governments just by its existence as a best-practice example. This opened up the space for other local councils to try something similar and it also increased the amount of intermediary organisations such as innovation agencies that started offering service design approaches for the public sector.

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Ilona - Robot Brings Joy in Elderly Care | Finland

Claudia Iasillo (APRE)

Within Lahti Living Lab, a case study was conducted to identify the impacts and acceptance of care robot implementation among users in elderly care services, care personnel and elderly customers with the help of the Human Impact Assessment approach. The data was collected in elderly care services in the city of Lahti, Finland (in two round-the-clock serviced care homes and a geriatric hospital) in 2015 and 2016, when the service robot Zora was introduced to these organisations. A follow-up study was conducted in early 2019.

What is the project/ initiative all about?

Ilona is a service robot introduced in elderly care services in the city of Lahti, in Southern Finland, in 2015 and 2016. The robot, whose official commercial name is Zora, was re-named to Ilona – a Finnish female name referring to the word joy – by the city of Lahti representatives to smooth the way for the robot's users and help establish an emotional connection with the robot.

The implementation of the robot lasted from December 2015 to April 2016 and Ilona was introduced in the only two public care homes with 24-hour services and in the only geriatric rehabilitation hospital in the city. An analysis to identify the impacts and acceptance of care

robot among users – care personnel and elderly customers – was conducted within the Lahti Living Lab[1]. The lab focuses on developing and studying innovativeness and productivity in the public sector and its main activity is to integrate the users' perspective into the innovation processes of public sector service development.

The robot, produced by Sotftbank Robotics[2], is one of the first commercially available humanoid robots sold as care robot. Ilona is controlled via a tablet or a computer and it deploys a specific software to enable application in the healthcare field. Ilona is described as a 57 cm tall humanoid robot, which can be used for rehabilitation and recreational assistance with exercise, playing music, performing dances, storytelling and playing interactive memory and guessing games[3].

The end users of Ilona are care service personnel and elderly customers, and they played different roles which were taken into account during the study to evaluate the impacts of the robot. The data was collected during focus group interviews and 27 sessions (Figure 14) lasting about one hour during which either the robot was introduced to the customers in special session or as a part of regular activities of the care homes.

The case study of Ilona is an example of co-creation focused both on Responsible Research and Innovation and policy making, related to the Societal Challenge SC1-Health, demographic change and wellbeing. Nevertheless, cross-cutting themes such as social sciences and humanities, ethics, gender, diversity, inclusion and intersectionality played an important role. For example, as far as it concerns the gender aspects, women usually live longer than men and, therefore, they are often overrepresented as care-service's clients. This applies also to professional caregivers, as they are often women. Moreover, the way of approaching technology may somewhat be different, and often it requires some encouragement and orientation, avoiding stereotypical perspectives.

Figure 14 - The robot in action during an exercise session (photo: Satu Pekkarinen)[4]

Context and environment: Where does it all take place?

In Finland in 2015 were over 1.1 million people older than 65 years, which was the sixth biggest share among the EU28 countries[5]. This statistic shows that Finland, as many other countries, is also facing the demographic challenge of ageing population, which put elderly care system at the centre of debate for the Finnish society. Elderly care has been strongly affected by digitalisation and by various technical devices and systems, such as information systems, e-services, service robots, and other technologies that assist physical and mental well-being[6] [7]. Technologies can be of great help in facing the challenge of sustainable elderly care, from a socio-economic point of view, but the implementation of different technologies has to take into account different issues, both from a technological and social perspective. The social aspects related to the introduction of new technologies in health care can be tackled thanks to the increasing patients' and citizens' engagement, and through participatory activities.

As described by Pekkarinen et al.[8], in Finland, social and healthcare services traditionally have been the public sector's responsibility, mainly that of municipalities. Currently, financial resources for social and healthcare services come from various sources, from which they are channelled to service agencies via different providers. The principal resource providers for healthcare services include central and local governments, the

Social Insurance Institution of Finland, households, employers, wage earners, and private insurance companies. Social services mainly are financed by the central government, local governments, and clients themselves.

At the moment of Ilona implementation, the Lahti municipality was responsible of the public elderly care system, while now is assigned to autonomous regions larger than municipalities. Lahti is a city of 119,951 inhabitants situated in the Päijät-Häme region in southern Finland and it has no university on its own, so the input of research is not very high. However, the region has promoted a network to facilitate innovation policy, such as the Lahti Living Lab. The region has about 200,000 inhabitants, and, therefore, is large enough for piloting user centred applications for the public services. Furthermore, it has favourable conditions and structures for the development of the public sector, as shown by the fact that the first public utility of social and health care in Finland was founded in the Päijät-Häme region[9].

To enable care technology innovations is essential to maintain a balance between technology-driven and care-driven approaches, and to take into account the role of clients and users, namely elderly patients and care professionals. The use of robot as assistance technology in elderly care requires acceptance from both groups of users. Based on a large-scale European survey[10], 65 % of Finnish citizens over 55 years old find robots positively, and 87 % of them think robots are good for the society as they help people. About two out of five citizens over 55 years old accept using robots to care for elderly and infirm people. Getting first-hand experiences and understanding of the benefits of care robots is important in increasing their acceptance. The implementation of Ilona robot, explained in more details in the following sections, is a good example of involvement of end users of novel technologies for elderly care to promote their acceptance.

Brief outline of the project/ initiative's pathway

The idea of using Ilona robot in the elderly care services of the city of Lahti was of the municipality, and, in particular, it was the result of the strong motivation of two people working there. They had a strong interest in the utilisation of new technologies in care systems, and one of them had a background in nursing, and, therefore, a good understanding of the main needs and challenges in the care systems, and how technologies could help. The turning point for deciding to experiment the use of robots in the two care

homes and the rehabilitation hospital was the unexpected availability of funding coming from the will of resident of Lahti who left some money dedicated to the purchase of new technologies.

As they had the funding necessary for the purchase of Ilona from the technological company responsible of importing the robot in Finland, they started engaging other actors involved in the implementation of robot. In particular, they engaged the Lahti Living Lab, representing the research actors, who was in charge of the assessment of the impacts of Ilona on the final users. The Lahti Living Lab consists of different stakeholders and is coordinated by the Lappeenranta - Lahti University of Technology LUT, Lahti Campus. The involvement of the Lahti Living Lab since the early stages of the implementation of Ilona was meant to ensure to have the right approach while bringing Ilona into use by finding appropriate ways to use it and orient personnel toward its use. The Lahti Living Lab had received funding within a project, funded by the Academy of Finland's Strategic Research Council, called Robots and the Future of Welfare Services – ROSE[11]. Within this project they had enough freedom for their research, so they could include the assessment of the impacts of Ilona implementation in their research activities.

Although Ilona was the first robot to be used, the municipality had already shown interest in new technologies in elderly care system and they were pioneers in this regard. As described in the methods section of the paper called *Impacts of Robot Implementation on Care Personnel and Clients in Elderly-Care Institutions*[12], the Ilona implementation period lasted from December 2015 to April 2016 and it included different steps (*Figure 15*) . The robot was first introduced in two care homes and a geriatric rehabilitation hospital. The selected sites were (at the time) the only public service care homes with 24-hour services and the only rehabilitation hospital in the city. The municipality selected such sites also considering:

- The perceived potential of the robot in such sites;

- The availability of competent key persons;

- A physical environment in the facilities that enabled the robot use.

The robot was used for two weeks in the first care home; four weeks in the second; and for a month at the hospital. The municipality also wanted the involvement of care students in the early stages of the process through the involvement of the local Lahti University of Applied Sciences. They reckoned as very important that the future care professionals, still

in their applied university studies, could have contact with the robot and see how they are actually used in real circumstances. In fact, Ilona was really the first robot in public elderly care services in Finland, so they wanted to give the opportunity to students to become acquainted with the possible future technologies in elderly care. Students were mainly involved at the beginning of the whole process, because of the limited amount of time available for them, free from their studies, and also because it was decided that only the care givers operate the robot in real circumstances in the care homes to safeguard elderly patients, who may be in poor health conditions.

In the care homes, a group of two to four physiotherapy or nursing students operated the robot, in collaboration with the staff. In the hospital, the permanent nursing staff operated the robot. The robot facilitated exercises, played music, told stories, performed dances, and played interactive memory and guessing games with elderly clients. The robot also approached the clients by walking towards them and shaking their hands while they sat in a circle. The robot could also be held in one's arms. The types of activities depended on the participants as not all types of physical exercises were considered suitable for every patient[13].
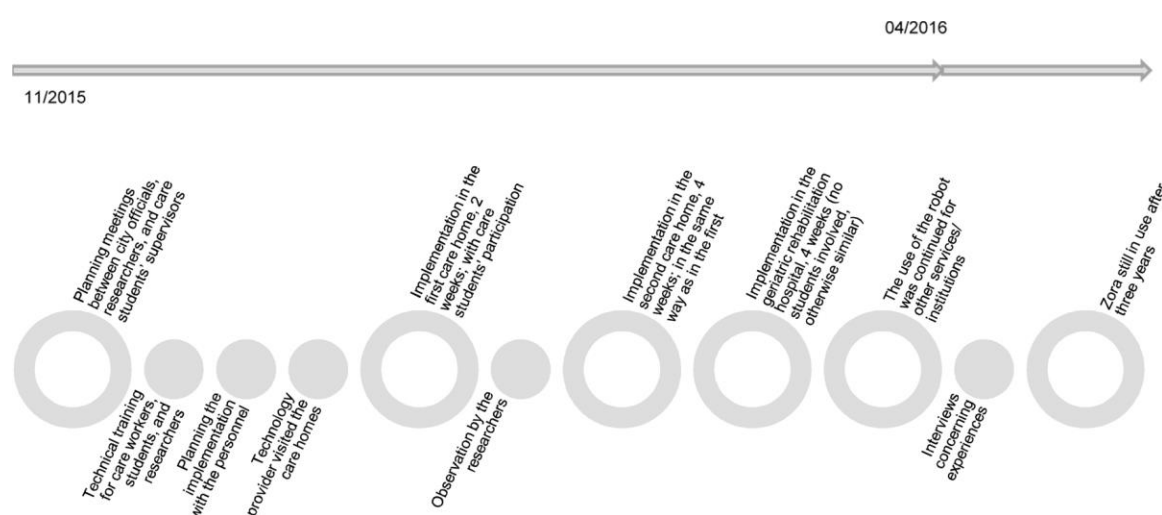

Figure 15 - The implementation process of Zora in 2015–2016 (and subsequently) and the data collection[14]

Management & Organisation: Who interacts how to facilitate co-creation?

The implementation of the Ilona robot was the result of a collective effort. The starter of the initiative was the Lahti municipality, which were involved since the early stages, the Lahti Living Lab represented by LUT University for the assessment of the impacts of Ilona implementation, and the other stakeholders, namely the care homes and the rehabilitation hospital, and the care students from Lahti University of Applied Sciences. According to Helinä Melkas, professor at Lappeenranta - Lahti University of Technology LUT, Lahti, Finland, and one of the representatives of the Lahti Living Lab team in Ilona case study, '*the Ilona implementation was not traditional piloting, in the sense that since the municipality purchased the robot, they took the robot into direct use right away. The municipality wanted the care clients and the care givers to be involved from the very beginning. There were also some care students involved based on the municipality desire and the Lahti Living Lab supported them because from the research studies we have been previously involved into, we have seen very clearly how important it is to involve all kind of stakeholders*'.

In managing the whole process, there was a precise share of the responsibilities. The municipality was in charge of directing the whole process, while professional care givers and the care managers of the facilities involved were responsible of the individual implementation period in each organisation. The research activities were under the Lahti Living Lab supervision, and they were attending the majority of the special sessions when the robot was used. Finally, the university was responsible of the participation of the care students. In building the partnership, the most important value taken into account was trust. The Lahti Living Lab and the public authorities had already had other collaborations in place in the past and this was a strong point, as they trusted each other and the respective way of working. They had established a specific document defining the ethical standards of the collaboration, as the research involved elderly people, but a proper contract could not be defined to formalise the collaboration, as they both agreed that they did not need it, considering their long-lasting cooperation.

The involvement of care homes and the rehabilitation hospital did not need any special incentive, probably because it came directly from the municipality and all three facilities were willing to cooperate and bring Ilona into use.

Communication among all the actors involved was also going smoothly, and, as Helinä Melkas explained, '*as a researcher, you have to find a common language and do not use research concepts and language all the times. It is important to do not try to dictate anything to anyone, but the conversation really needs to be based on trust and understanding of different competences and value of the collaboration*'.

Another actor, only involved in some stages of the Ilona implementation, was the technology company providing the robot. A small Finnish company had imported the robot in Finland from a Belgian company who had developed the technology. The people from the Finnish company were providing training to the care givers through dedicated sessions at the beginning of the process. The trainers had a background in physiotherapy, and that made the communication easier with the care workers, as there was a real understanding of their needs. The private company was also involved in later stages, if there were any malfunctions with the robot. They could go directly in the care homes and interact with the elderly patients, showing a good level of interaction and communication, thanks to their background. '*In many projects we have seen that if the company people only know about technology and they have no understanding about care system and ageing process, then there could be problems in the communication and then the training may not correspond to care professionals and clients' needs, but Ilona was not one of this case*' stated Helinä Melkas.

Overall, the partnership built for Ilona implementation is a good example of collaboration between actors representing different interests and perspectives, with a clear distribution of the roles and responsibilities and a good cooperation built around trust and transparency values.

What are the concrete processes and practices of co-creation?

The implementation of Ilona was a flow of co-creative activities, and co-creation was used at different stages of the whole process, and in particular:

- Ideation phase – the definition of the issue on how to improve technology-assisted care for elderly people, through the use of specific robots;

- Design phase – the definition of the actors to involve and the steps to be taken;

- Implementation/ production phase – bringing the robot into use in the two selected care homes and in the rehabilitation hospitals;

- Impacts' monitoring, measurement and evaluation – assessment of the impacts of Ilona on care services through the research conducted by Lahti Living Lab (LUT University).

Different stakeholders were involved in the process and as described in the section 4 about partnership, they shared responsibilities and different roles. The involvement of the robot's users in the process is especially noteworthy. They represent two groups:

1) Elderly patients;

2) Care workers (i.e. care managers of the facilities and nursing staff).

It is worth to underline that care workers had a double role within Ilona implementation. On one hand they represented one of the final users of the robot, as the robot was having impacts in their daily work, on the other hand they were the ones implementing the activities within the facilities and operating the robot during the dedicated sessions with the elderly patients. For this reason, they were also involved in the design phase of the process, while the elderly clients were involved in the implementation and in the assessment phase.

During the implementation phase, ethical standards of the activity were ensured and the safety of the participants was thoroughly taken into account and the robot was used with clients only under appropriate, competent control and supervision of at least one care worker. The clients were never left alone with the robot. Furthermore, special training session with trainers from the private company providing the robot were taking places to train the care workers in how to operate the robot. Furthermore, the robot was able to perform different tasks (e.g. different games or exercise programmes), and that was also adapted to the clients' groups attending the sessions with the robot.

According to Helinä Melkas '*while working with care professionals it was important to keep in mind that their work is enormously busy and that their days are always different one from another, as they are working with the elderly people affected by various diseases. So, we briefed them about the whole process, but we also tried to not burden them too much with the research technicalities in the background because they had to focus on the clients in their care homes*'.

The details of the methodology applied by the Lahti Living Lab for the assessment phase are available in the recently published research paper of Melkas et al.[15]. Researchers were observing 27 activity sessions of about one-hour each during which Ilona was introduced to

the clients in a special session or acted as part of regular group activities (e.g. exercise or literature groups) at the care homes or the hospital. In each session, 5 to 20 clients and 2 to 10 staff members were attending the sessions during the 10-week implementation period. Overall, about 60 elderly clients and 50 care workers participated in the activities. Some clients attended multiple sessions, depending on their health condition. The Lahti Living Lab conducted a series of interviews to both groups, taking into account work shifts, clients' health conditions, daily activities and unexpected events[16].

Thanks to the interviews with the care workers, the researchers were able to explore the attitudes and the perceptions of the users at the end of the implementation phase, evaluating the experiences and challenges faced and the expectations for the future concerning the suitability of the robot for elderly clients. The interviews with the clients focused on their feeling about the robot, the comparison between sessions with and without the robot and their willingness to participate in future sessions. They used a user-oriented approach to identify various impacts on humans avoiding any predetermined framework. They worked to identify positive, negative and neutral impacts on different groups of people. The analysis resulted in six themes for care personnel and five themes for elderly clients (*Figure 16*).

Figure 16 - Impacts of Ilona on Care Personnel and on Clients [17]

Specification: What tools and instruments are/ were used to co-create?

Overall, the process of the implementation of Ilona robot went rather smoothly. In general, the attitude towards the robot is dual and both enthusiasm and fear exist in both groups of end users. For example, some people of the nursing staff at the beginning showed a negative attitude towards the Ilona implementation. This was not due specifically to the

robot utilisation, but rather a negative attitude towards bringing new tools into the daily work of care givers which is already very busy, and a general reluctance due to the feeling of not having enough time to learn.

Some of the main outcomes of the analysis conducted by Melkas et al.[18] are summarised in the following points:

- The care givers highlighted the importance of knowing the clients and their needs well in advance when planning to use the robot;

- The care givers emphasised that ample time for training and orientation for all personnel is required;

- The impacts on participation and perceived opportunities to participate in the decision to purchase the robot also varied among care givers. Some wondered if the needs of the care homes were taken into account by the municipality when they decided to but the robot. Other considered the city's strategy in elderly care services to be technologically pioneering and they showed support by agreeing to use the robot;

- Most of the clients showed a positive attitude by wanting to engage with the robot. The clients considered the robot entertaining, funny, and interesting. Negative reactions included irritation, reserve, and fear;

- The robot's impacts on clients are essentially related to ethical questions concerning robot use.

The research of the Lahti Living Lab suggests that the potential of new technologies and robot in the healthcare is high, but there are still some barriers to overcome. The implementation of Ilona highlighted the importance of a careful planning of the robot's use, taking into account the needs of the users (e.g. orientation, availability of time for the use and motivation). It is also important to provide adequate information on the purpose and on the tasks of the robot to avoid unrealistic expectations. One of the more positive outcomes of Ilona implementation was the change of attitude of some care workers, who were suspicious at first but then changed their views. It is interesting that as the clients usually welcomed the robot with joy, these positive responses from elderly clients affected care personnel's attitudes positively. It was noted that after having personal experiences working with the robot, staff attitudes turned in a more positive direction[19].

Moreover, it is important to highlight a detail mentioned also by Melkas et al.[20], namely the context-specific of the results coming from the study of one city in Finland, although they are consistent with previous literature on the subject.

Finally, it is worth to point out that the utilisation of Ilona continued after the implementation period established, and a fourth facility is also using it. According to Helinä Melkas, a representative of Lahti Living Lab, '*This was a wish in the mind of both the municipality representatives and the Lahti Living Lab, since the beginning. It was a future-oriented aim, but it was not something we had a strategy for. It happened because both care professionals and elderly clients were well engaged in the process and they could their own way to approach this kind of robot and use it. The implementation period was sufficiently long and then there was this strong co-creation component. All these things contributed to the success of Ilona*'.

Which learnings emerged?

The Ilona case study is the result of the strong willingness of a public administration, namely the Lahti municipality, to adopt new technologies for elderly care and provide new services to elderly patients, to better face the challenge of ageing population in Finnish society. Indeed, the Lathi municipality was one of the first organisations in Finland to promote the use of a robot in the public elderly care system.

The strong motivation of the municipality was surely helping the project implementation and the engagement of the stakeholders in the activities was easier as it was coming directly from the public administration. On the other hand, some of the care givers expressed some criticism toward the adoption of Ilona. One possible explanation, according to Lahti Living Lab researchers, could be that the decision of putting Ilona into use quite quickly after its purchase did not give the caregivers the feeling to be well trained and informed about the use of the robot[21]. Although the care givers have been involved in the early phases of the process, they could have benefitted of more support in the starting phase in term of training and orientation to the future activities.

Beside the successful implementation of Ilona robot in elderly care system, it is worth to notice that this is one example of technology application, but its importance goes beyond the single case. The whole process is a good practice showing the pathway to follow when bringing innovation into a delicate and complex system such as elderly care. The involvement of different groups of stakeholders, the collaborative effort in planning the activities since the early stages and the thorough attention the assessment phase, through

the utilisation of co-creative tools, to improve the activity if replicated, are all the stronger points underlining the added value of the this case study.

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<u>Interview</u>

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SMART_KOM. Kraków in Smart Cities Network | Poland

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Aim of the project was to build a strong position of Kraków and its metropolitan area by joining European cooperation networks, dealing with smart city issues. The focus of the project was to build a smart strategy for sustainable and smart city development, including effective management, addressing the needs of citizens, using modern technologies and tools in order to improve the quality of life across the entire Municipality of Krakow and surrounding area.

What is the project/ initiative all about?

The 'SMART_KOM. Kraków in the Smart Cities Network' project was a joint initiative of Kraków Technology Park (KTP), the Małopolska Region, the Krakow City Hall (local Krakow administration body) and two foreign partners, Forum Virium from Helsinki and the Vienna University of Technology. KTP was the main initiator of the project. It was executed from September 2013 to June 2015 and was co-financed from the funds of the European Regional Development Fund and state budget within the framework of the Małopolska Regional Operational Programme for 2007 to 2013. The project aimed to prepare a Smart City strategy for Kraków and the Kraków Metropolitan Area (14 nearby municipalities). Six fields of actions were defined: Smart People, Smart Living, Smart Governance, Smart Economy, Smart Environment and Smart Mobility. The project built on experience and know-how from KTPs previous national and international projects and activities undertaken with local crucial stakeholders as regional administration and IT and ICT focuses businesses. The project benefits from international experiences by joining European cooperation networks operating in this field like The European Network of Living Labs (ENoLL). The concept relies on a user centered approach. First results are a roadmap[1] for further activity and the development and implementation of two pilot projects: Apps4Krk portal and the so-called Micropark. The roadmap also explains the philosophy of the SMART_KOM approach.

The project consisted of three main work packages: First, the fields of action were named by a group of experts. Second, the project team visits cities with functioning smart city strategies to get inspiration for the SMART_KOM project. Finally, in workshops citizens and

experts developed project ideas for the several fields of actions which became the main part of the roadmap.

Brief outline of the project/ initiative's pathway

The SMART_KOM project consisted of three stages, from which the first and third stage were co-creation processes. The first stage of the project included diagnostic workshops conducted for six Smart City areas: Smart People, Smart Living, Smart Governance, Smart Economy, Smart Environment and Smart Mobility. Each workshop was dedicated to an analysis of the region's potential, including SWOT analysis and analysis of stakeholder landscape, according to the adopted methodology. The workshops, eight hours long each, were attended by over 160 people representing different sectors: employees of the City Hall and various municipal units, external experts, representing scientific environments, business and non-governmental organisations. The result of this stage was also the election of the cities to be visited at the second stage of the project.

The second stage started with study visits in the cities which are currently leaders in implementing Smart City solutions in Europe, i.e. Vienna, Helsinki, Barcelona, Saragossa, Tallinn and Tartu. Each study visit was followed by an interim report; presenting good practices in the field of smart city implemented in these cities, in particular areas of their functioning. The reports also included necessary recommendations to be taken into consideration when developing solutions in similar areas in Krakow and the KMA. This part of the project finished with a conference summarizing the first two project stages, which were overall attended by approximately 180 people.

The third stage of the project consisted of ten workshops with the participation of domestic and foreign experts. The main goal of this stage was the development of the SMART_KOM strategy, covering the Smart City mission, the concept of Adaptive City, recommendations for public policies and a catalogue of 24 project proposals, including two pilot projects prepared for implementation, i.e. Apps4Krk project and Micropark project. The workshops were attended by over 200 people from four sectors: administration, science, non-governmental organisations and businesses, as well as all project partners, including Prof. Rudolf Giffinger from the Vienna University of Technology and Jarmo Eskelinen from Forum Virium Helsinki.

As a result, during the two-and-a-half-year period of the implementation of the SMART_KOM project, they managed to gather more than 450 experts representing four sectors involved in development of the city, which overall amounted to over 170 hours of workshop work within the framework of the project. Additionally, the study visits in six European cities allowed to identify good practices in the field of implementing smart solutions in particular areas of the functioning of the city. Also, two foreign experts in the field of Smart Cities were invited to cooperate in the project. Both the first stage and the entire process finished with summarizing conferences. Thanks to all these elements, involved people and creative work during the workshops, it was possible to develop the 'Roadmap' for Kraków and the KMA, with an open bank of 24 projects ready for implementation, including two projects already implemented as pilot projects.

Context and environment: Where does it all take place?

The ecosystem the Smart_KOM project took place in is located in Krakow and the nearby municipalities and seems to provide good conditions for innovative solutions, e.g. by co-creating. Krakow has a large development potential, which is reflected in the published Tholon's report (2017)[2], according to which Krakow is awarded the title of the best destination for the sector of modern business services in Europe for the third time. The city was also featured in the European Cities & Regions of the Future 2016/2017 report, prepared by the Financial Times[3], alongside Hamburg and Oslo, as a major European business friendly city.

The quality of life in Krakow is high as far as the comfort, education, pleasure, entertainment and work is concerned. Krakow achieves high results in the 'individual safety and satisfaction' domain, which results from good safety conditions, as well as relatively positive experience of inhabitants. The Urban Audit Perception Survey, conducted in November 2006 within the Flash-Eurobarometer project of the European Union, has found that 97 % of the Krakow's population are satisfied to live there. Krakow, as an academic centre, offers ahigh standard of educational institutions. For this reason, it is attractive in terms of educational and academic offer. This means that it has valuable resources conditioning an increase of human capital in the city and increase a spirit of innovativeness. The city benefits from scale and maturity compared to other locations in the region. Almost 9 million people live within a 100 km radius of Krakow and the city

delivers 40,000 graduates to the job market annually. The business processes delivered from Krakow are rapidly climbing the value chain and centres are also broadening their scope. This has created a virtuous circle with experienced professionals attracted from other European locations. Over 90 countries are served from Krakow in 34 languages, and earnings in the sector are almost 60 % higher than the national average salary in the private sector.

The average age of the inhabitants of Krakow is 37.5 years (Poland: 40.7 years). Over 60 % of the population is younger than 45 years, and the share of people being 65 and older is 14.9 %. The unemployment rate in Krakow is one of the lowest in Poland and states around three percent. About twenty percent of Krakow residents hold an academic degree of MA or an equivalent[4]. Krakow is a city of over 30 universities and 2,00.000 students a year. It is a home for over 200 start-ups, modern hubs and remains the clear leader in the number of jobs in the sector of Business Process Outsourcing and Shared Service Centres. Krakow's business services centres now have 70,000 employees, which means that the city has a nearly 23 % share in the structure of employment in the industry in Poland. Krakow is highly ranked in the innovativeness reports.

Some innovative solutions were already launched in Krakow. One of the key challenges in the quality of life in the city is the organisation of traffic and efficient public transport. For example, Krakow has successfully implemented intelligent Transport Systems (ITS) to monitor obstructions and failures in the public transport and to inform passengers by using Electronic passenger information boards and to regulate car and pedestrian traffic by allocating green light to pedestrians, cyclists and trams that need to be prioritised[5].

Krakow is a modern and youthful city in comparison to other polish cities. Being part of the EU, there are rarely any legal restrictions. The dominating political party in Krakow is the centre-right Civic Platform (Platforma Obywatelska or PO in short), the country's main opposition party. The nationally ruling right-wing Law and Justice party (Prawo i Sprawiedliwosc, PiS), which provides the government and the president on the national level, is on the second position in Krakow. Although the residents of Krakow vote mainly for the right and the centre-right parties they re-elected a left-wing mayor, Jacek Majchrowski, since 2002[6]. Every year, citizens of Krakow could vote about the use of a part of the city's budget. The specific part of the city's budget is dedicated to initiatives developed by inhabitants of Krakow. For example in 2018, green smog-absorbing walls for each of Krakow's 18 districts were constructed[7].

Regarding the just given information one can state that Krakow as an ecosystem for social innovations developed by co-creation is characterised by a young and well educated population and political power relations which indicate a more progressive impetus than in the most other polish regions; especially in the rural regions. Furthermore, a number of innovations, partly developed by citizens and financed by a specific budget, were executed by the administration. The number of universities and the meaningfulness of the service sector in between the economic structure of the Krakow area provide a fruitful ground for innovation activities.

Last but not least, the main initiator of the project, Kraków Technology Park (KTP), is a main actor in the ecosystem. It was established in 1997 as a joint initiative of city authorities, Malopolska regional authorities and Krakow's three largest universities: Krakow University of Technology, University of Science and Technology and the Jagiellonian University. KTP plays a significant role in supporting regional authorities in creating the positive conditions and ecosystems for economy growth of the region and the cooperation between KTP and regional authorities is strong and productive. The KTP also receives a positive backup from politicians. The main shareholder of KTP is the Ministry of Entrepreneurship and Technology. KTP is very active in enhancing and bringing together varied groups of stakeholders, including citizens in the scope of undertaken activities as workshops, open days, open consultations etc. It plays a key role in the development and growth of the local economy in the area of IT and ICT technologies and e-driven solutions, being a hub for dozens of innovative start-ups and SMEs offering them varied infrastructure, state-of-the-art labs, office space and a vast range of training, information and consulting opportunities for IT sector businesses in a newly open Malopolska Information Technology Park. As Business Innovation Centrer, KTP supports directly over 100 companies (incubators, accelerators, tenants) located in the building, gathers 100 IT & ICT based companies in clusters and the same number in special economic zone. This short inside of KTPs activities shows that KTP is both: main component and active developer of the eco-system.

Management & Organisation: Who interacts how to facilitate co-creation?

All the activities were embedded in a project structure as it is foreseen for projects funded by the European commission. The KPT project team was responsible for shaping the

structure of management, communication and financial reports. Kraków Technology Park as the project leader took the whole responsibility for the project management and project finances. The communication covered among others sharing information and results of the relevant workshops among stakeholders, collecting feedback and elaboration of thematically reports and study visits best practices as well as promotion and dissemination activities. KTP was also responsible for summarising and preparing the final reports after each phase as well as organising two dissemination conferences and follow up activities.

The binding decisions concerning the project process were made by the Steering Committee in which all representatives of project partners took part in. The Steering Committees meetings were organised regularly and a clear list of tasks, followed by binding documents and minutes, was afterwards distributed among the partners.

The main part of Vienna University in the project was the production of a benchmark analysis to compare Krakow with several other cities in the world with respect to elements of a smart city. The benchmarking study performed by Vienna University of Technology was used to create indicators defining the sustainable development of Krakow as an intelligent metropolis as part of the newly created Krakow 2030 Strategy.

Forum Virium Helsinki acted in SMART_KOM project as the Supranational Partner with defined responsibilities and budget allocated to undertaken activities. The role of Forum Virium Helsinki was to inspire KTP, share best practices and know how on smart city concept and using methodology of living lab to strengthen the creation of policy making processes on one side, and on the other products or services development and implementation in real environment with active participation of end and heavy users perspective. The involvement of Forum Virium Helsinki included participation of the FVH expert in PPs kick off meeting, Steering Committee meetings, workshops (within the first and second phase of the project KTP organised 17 workshops/ 8 hours long each), consultation of the partial and final reports, preparation and coordination of study visit to Helsinki, cooperation with Project Leader on preparation of pilot project and consultation of the SMART_KOM strategy, and participation and presentation during Opening and Final Conferences in Krakow.

What are the concrete processes and practices of co-creation?

Elements of co-creation were used during the several phases of the overall process. One can characterise the SMART_KOM project as a prestructured process in which co-creation practices were executed during the single modules of action.

As mentioned above, in six diagnostic workshops employees of the City Hall and various municipal units, external experts representing scientific environments, business and non-governmental organisations were practicing to name the challenges in the areas Smart People, Smart Living, Smart Governance, Smart Economy, Smart Environment and Smart Mobility. The main products were preliminary reports that include the results of the workshops, enriched with statistical data and the results of a comparison of Krakow and already existing smart cities all over the world, done by Vienna University. The first workshops are seen as co-creation (for instruments see chapter 6). The same counts for the second series of workshops. In these workshops representatives from four sectors (administration, science, non-governmental organisations and business) and all project partners, including Vienna University of Technology and Forum Virium Helsinki, developed the SMART_KOM strategy, fixed in a roadmap. Main parts of the roadmap are 24 project proposals whereby two of them are already running.

The attendees of the workshops were recruited in several ways. For the first series of workshops the project team mainly invited experts. For the second series of workshops, dedicated developing the roadmap, open invitations were addressed to all possible stakeholders of the desired process. The project team used different channels to reach potential attendees: open invitations per mail shots/ open advertising, personalised invitations, promotion on specific events and personal appeal to relevant target groups. As mentioned in chapter 3, KPT is a main actor in the Krakow ecosystem and knows the other relevant actors well alongside the quadruple helix (academia, civil society, politics and business), what facilitated the recruiting process.

Specification: What tools and instruments are/ were used to co-create?

The SMART_KOM project used several co-creation instruments during all phases of the project. The main arenas for co-creation were the workshops. KTP as a leader prepared with the support of external expert – university methodologist – the methodology for the

problem identification phase. All the workshops that took place in that phase were structured in the similar way, and the report template was agreed with all moderators of the individual workshops to reach a high level of standardisation and comparability of the presented results. The participants of the workshop were recruited for each workshop individually: through open invitation on social channels and press or invited in targeted way based on recommendations of all project partners. A co-design tool that was used during the workshops was for example a prioritisation matrix. Main outputs of the workshops were handouts, written reports after each workshops, ,'homework', project proposal sheets and a list of criteria to select relevant projects. Interview techniques (focus groups and narrative interviews) were used during preparation phase for defining the architecture of the SMART KOM project. Focus groups also took place during product validation and testing.

The SMART_KOM project covers all phases of an innovation process. For problem identification they used opening circles (presentations or lectures concerning the given subject by participants/ experts), World Cafés and priotisation matrixes. During the ideation phase they worked with artistic visualisation and mapping. The project model canvas, mockup validation and verification, individual interviews and iteration were chosen as instruments for prototyping. To verify and test the new solutions (e.g. the projects solar bench or Apps4Krk) focus group interviews, iteration and bedtests were the mean of choice. Some of the instruments or tools were new to the participants, with some of them they were familiar.

Which learnings emerged?

The co-creation tools and methods which were used in the SMART_KOM project introduced a new quality of work. They motivated and inspired participants to look for solutions outside the box and encouraged them to destroy silos – mainly in the public administration the sector and the silo orientation are very strong and dominate the ways of treating challenges. Thus the co-creation approach empowered the participants to create innovative strategies and solutions towards the implementation of a smart city concept. The co-creation tools and methods supported building synergies between city domains, sectors, approaches.

The protagonists of the project stated that it is important to involve diversified stakeholders from the very beginning in a participatory way. There is a need to have a neutral facilitator (KTP in this case) that balances the atmospheres and leads the co-creation process. It is crucial to start the co-creation process with joint vision of methodology and process structure but to be open for modification and changes. During the whole process participants should discuss and agree about the mode of working. Especially for the problem identification the support of sector/ thematic experts are needed. Furthermore, it is crucial to create an atmosphere of respect and trust so that participants listen to each other and everybody is given space for presenting his/ her point of view. Last but not least, it is important to use the relevant tools and instruments.

The SMART_KOM co-creation process has been reflected by all actors involved. The city of Krakow decided to introduce some elements of the co-creation process for the elaboration of the new strategy for Krakow for 2030. Moreover, a lot of municipalities and authorities from different cities from Poland were asking for advices and know-how concerning co-creation.

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Interview

Agnieszka Włodarczyk (Krakow Technology Park (KTP), Project Manager)

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Library Living Lab | Spain

Ines Vaittinen (ENoLL)

The aim of the project is to create a physical space, build the ecosystem around it and implement the necessary methodologies that allow all stakeholders to jointly explore how technology transforms the cultural experience of people. The Library Living Lab (L3) is an open, participatory experimentative space, fully integrated with a public library in Barcelona Area, Spain. This is done through an authentic implementation of the Quadruple Helix model.

What is the project/ initiative all about?

Library Living Lab (L3) is an open, participatory and experimental space, fully integrated with a public library in Barcelona area, Spain. This is done through an authentic implementation of the Quadruple Helix model where the citizens, academic, public and private actors collaborate together through co-creation. L3 is the result of a bottom up initiative from the citizens of the local neighbourhood: it was born by the restless drive of the local population to improve their area. L3 was ideated jointly between the Association of Neighbours of Volpelleres (the area where the public library 'Miquel Batllori', home of the Library Living Lab, is located) and the Computer Vision Centre, a research institution in Barcelona. The laboratory was further developed as a joint initiative with the Municipality of Sant Cugat, the Provincial Council of Barcelona and the Universitat Autònoma de Barcelona.

'The mission of L3 is to explore how technology can transform the experience of users, enable new services and applications in the cultural domain, and foster research and innovation activity through promoting the active and open participation of all stakeholders in the innovation process.' [1]

Library Living Lab is an actual laboratory and a thematic Living Lab. It is positioned by design and by definition firmly within the culture domain and is defined by the particular context of libraries and archives. The lab's focus lies on technology-based solutions and how technological advances can be meaningfully exploited within the cultural context.

The physical building in which the library is situated is setup as a flexible space, designed and constructed from the beginning in order to host such an advanced infrastructure, responding both to technology challenges (easiness to create new installations) and to

architectural challenges (participation friendly, open to users, respecting the character of a public library).

The Library Living Lab's nature as a public service is important to convey its open and participatory character and foster user-driven, open innovation. L3 is hosted by the network of libraries of the Barcelona Provincial Council (Diputació de Barcelona). It occupies a unique position within this network as it serves as the designated experimentation space within the province network of libraries, designed to host engagement activities, aiming to further innovate public library services. The provincial network of libraries counts with 216 service points, offering services to 5 million citizens (including 2.5 million registered users).

Brief outline of the project/ initiative's pathway

The neighbourhood of Volpellers in which the Library of Miquel Batllori - the home of the Library Living Lab - is situated, is a very young neighbourhood, both in terms of its establishment as this neighbourhood has been recently urbanised, and in terms of the age of the population that consists of mostly young families. The construction of this new suburb of Sant Cugat del Vallés was initiated in 2005 and started being populated in 2008. Volpellers is an example of the consequences of the last decade's economic crisis in Spain. The initial plan for the development of the neighbourhood was halted mid-construction due to the sudden lack of new housing demand, creating an area consisting of half-built, half-abandoned buildings. From the initially planned 8,000 flats, about half have eventually been built in the area. In addition to this, the lack of typological diversity meant that the buildings in the area focused largely on housing and other types of buildings and accompanying services were therefore lacking. In the post-crisis era when housing demand began increasing again, the neighbourhood was faced with a challenge of diversifying the typology of buildings and therefore the services present in the area. [2] [3]

Due to the homogenous typology of buildings and the low critical mass of citizens in the area, that has resulted from the economic crisis and following diminished demand in housing in the area, the establishment of new services in the area has been difficult to achieve. However, the local neighbourhood association has been very active in connecting with the nearby university and public authorities in the creation of much needed services for the citizens in the area. Although the development was halted in the area, and the low

population density made it difficult to convince the provincial council of the need for new services, the association succeeded in convincing different actors to come together for the establishment of new services in the area. In collaboration with the Computer Vision Centre nearby, the Library Living Lab idea was born, a space that aims to experiment with the technologies from the centre with the social and cultural environment offered by a library. Together, between the Computer Vision Centre's aim to connect technology with cultural heritage and social innovation, and the citizens association's aim to develop their neighbourhood with services and activities, the Library Living Lab proposal was born.

At the annual meeting between the neighbourhood association and the Mayor the proposal was accepted, and the initiation of the Library Living Lab began through meetings between the provincial council of Barcelona and the association of neighbours, the Universitat Autònoma de Barcelona and the computer vision centre. The inception of the project took place at the end of 2011, with an architectural competition assigning an architect for the building towards the end of 2013. In May 2015 the Library Living Lab opened its doors to the public.[4][5]

Since the success story of the establishment of the Library Living Lab and the concept that has been co-created behind, 40 more libraries around Barcelona are now applying the concept.

What are the concrete processes and practices of co-creation?

Library Living Lab fully integrates an authentic implementation of the Quadruple Helix model that brings together academia, private and public stakeholders, as well as citizens, in the co-creation and experimentation of innovative solutions. The aim of the lab is to create a physical space, complete with the supporting ecosystems around it and to implement the necessary methodologies that allow all stakeholders to jointly explore how technology transforms the cultural experience of people. The central themes of focus at the Library Living Lab are culture, technology and science, and the lab focuses especially on the interlinkages between education and technology. At the same time, the community aspect is central in aiming to create innovative, reflective and inclusive societies. Library Living Lab was born out of a bottom-up initiative of the local neighbours' association jointly developed with a number of private and public entities. With this, new profiles of users

atypical of public library visitors are being attracted to the library for the first time on the basis of the Living Lab activity.

The importance of co-creation has been recognised across the development of the Library Living Lab from the very beginning, as the need for common understanding of the problem. Today there are still many things to discover about the cultural experiences of people and the social transformation that technology has provided to these experiences. Co-creation has led the process of creating this common understanding from the beginning, focusing on forming a common understanding of the problem from the start.

Similarly, projects presented within the context of the lab follow a co-creation process. The co-creation process deployed by the lab consists of three basic points. In order for a project to be experimented with in the context of the Library Living Lab, an actual current social challenge must be central to the focus of the project. Secondly, a specific innovation action must be formalised, whether it be a prototype, a novel service for experimentation or a new use for a given technology, for example. Third, the outcome must demonstrate a measurable return to society, taking shape in the form of a new service, a novel prototype, an open source code, among others. Once accepted as an innovation project within the lab, co-created and experimented with real-life users, the outcomes can be quickly delivered to the society through the network of libraries, public administration or local companies – guaranteeing scalability of the returns obtained and a direct impact of the achieved results.[6]

The concept of co-creation is central in the concept of the Library Living Lab, recognising that although funding and other supporting structures are required from an infrastructural point of view, the building of trust between the stakeholders involved is a key element in supporting the process of co-creation between the different actors. When task and project flows are not initially known to all parties, and the roles in the process are defined dynamically, a joint profile is formed throughout the process that consists of all the skills and expertise provided by the actors in the co-creation process. This profile orchestrates the innovation process between existing members and all others joining the collaboration throughout the process, and such a profile is important for the sustainability of the project – ensuring that the aims and value created by the joint efforts are aligned with those of the stakeholders involved.

Below, we can describe in more detail the general framework and enumerate three examples of experiences born in the Library Living Lab[7]:

The methodology introduced in the preceding paragraphs results in a list of activities that implement the triplet Challenge-Action-Enter. We must emphasise that this list of activities is always dynamic: once an activity is done in the laboratory (prototyping), all the comments, conclusions and lessons learned by the various actors are collected, and the final result can be (though not necessarily) the viability of a new service, a new tool, etc. It is then when the identification a new challenge will kick out a brand new cycle of innovation, thus keeping active the essence of the creative process and the spirit of the innovation space. The further implementation of an actual product, policy or service from the studied prototype relies then on the specific drivers of the socio-economical impact, the Library Living Lab contributing with its added value to the definition processes.

During the first six months from the establishment of the Library Living Lab, a set of a set of activities were implemented following this vision. Among them we can highlight: 'The Library Visits the Museum', which seeks to break down the walls that separate museums and libraries; 'Interest Group on Educational Apps', which investigates methods and tools for learning by using mobile applications at schools; 'Interest Group on 3D Printing', which collaboratively work to define the role of libraries in the creation trough 3D printers; 'I am my own drawing', which aims to re-define the current service 'Story Time'; 'Scientific experiments', with the aim of advancing in novel models of participative citizen science; 'Workshops for Social Innovation', in order to root the dynamics of creativity and participation at local level; 'Images in the history of the neighbourhood', which puts into correspondence digital collections of public archives and collections from city residents with new tools to access and viewing of multimedia content; 'Nature in HD', which explores how to give value to photographic exhibitions with contributions from users, linking physical photographs with digital content. The following lines describe three illustrative examples: 'The Library Visits the Museum, I am my own drawing and Interest Group on Educational Apps'.

The Library Visits the Museum

Challenge: Breaking the walls between museums and libraries. (Re-)valorising digital collections.

Action: Design and implementation of tools, protocols and activities for access to digital collections of museums.

Return: A prototype service: 'The Library Visits the Museum'.

This fortnightly activity gathers users interested in knowing the contents of large and small museums which have diverse digitised contents accessible via the Internet. It begins with a selection of the museum that is going to be visited, over which the library monitors will prepare a file with the historical and artistic context. Each museum is then analysed in terms of technical possibilities and the best suited choice is selected for each museum: pictorial analysis is possible when HD items can be visualized on large screen format; analysis focused on the physical spaces is an option when a realistic representation of the rooms exhibiting the collections is accessible; the study of the architecture of the building hosting the museum becomes a relevant option when it is possible to navigate into a virtual space, etc. Particularly, it is also analysed the possibility to have direct interaction through the presence of human avatars (Bertrand et al. 2014) performing a visit which is relayed by internet to the library users, who can guide the visit from the Library Living Lab physical space. The result of this experience is a prototype service that is dynamically updated each session based on the lived experiences, by adding new tools and by identifying the dynamics and the minimum requirements necessary to implement such a service.

I am my drawing

Challenge: New paradigms of storytelling.

Action: Programming of a new software and definition of the dynamics of a workshop for collective creation.

Return: An open software with Creative Commons license. A workshop for the children of the community.

The current library service 'Story Time' consists of a storyteller who is exposing during one hour a pre-scheduled tale to a group of children, sometimes using some theatrical interaction. Conversely, in this development a group of children collectively create their own script of a story, then they draw their own characters and scenarios, which will be digitised under the supervision of a library activity instructor. Next, children stage their own collaborative story, which is displayed on a large screen with digitised scenarios and characters. By using gesture detection technology, the movements of the children are translated to the characters shown on screen in order to animate them transferring life to the digitised characters with the movements that the children are performing. The story is recorded and it becomes part of the catalogue of collaborative stories. This experience becomes an innovation action in services from a previously existing service.

<u>Working Group on Educational Apps</u>

<u>Challenge:</u> Defining the role of mobile technologies in educational settings, regulated and unregulated.

<u>Action:</u> Assess the most relevant apps and collect a set of good practices.

<u>Return:</u> Novel learning paradigms for schools and unregulated educational environments using mobile technologies.

A group of users consisting of a number of teachers from different schools in Sant Cugat, and other library users interested in mobile technologies, gather fortnightly to present a selection of mobile apps used in their teaching experiences. The goal is to gather not only the technical issues but also the methodological aspects associated to the mobile learning actives. One of the outcomes consists of the definition of the indicators of an evaluation grid suitable for educational environments, and the assessment of each app regarding the defined grid. The result is a new shelf in the library, in this case a software shelf focused on educational tools with valuable feedback provided by critical stakeholders. The library becomes in this way a repository of apps that provides added value not available in existing repositories and app stores.

Context and environment: Where does it all take place?

The demographics in the area consists mainly of couples in their thirties, having bought a relatively high-value house with a good price tag in the new development area, expecting the prices of the housing in the area to continue to rise in the future. In addition, Volpellers also has a number of public housing complexes for people with lower resources, requiring public context in order to acquire the housing, and there is a good direct connection to the city centre of Barcelona. However, due to the emergence of the financial crisis and the halting of the development in the area, much of the area was left underdeveloped and hugely lacking in services. Presumably due to this need for new development and services in the area, a neighbourhood association was born for improving the services in their area. The citizens themselves have therefore been very active in improving their own neighbourhood. From this bottom-up initiative, the push for the Library Living Lab was born.

Strategically, the timing for the planning of the Library Living Lab fit well within the strategic plan of the municipality, being included in the five-year strategic plan of 2011. In addition, the plan for the Library Living Lab was also aligned with the strategic plan of the Provincial Council of Barcelona, as well as the strategic plans of the Computer Vision Centre and the Universitat Autònoma de Barcelona. The strategic plans of the Library have therefore been aligned with the strategic plans of the entities involved but also vice versa, changing also internal structures of the stakeholders to adapt to the common visions shared by the Library Living Lab.

Contextually, the development of the Living Lab concept has been supported by the aligned visions of the ECIU (European consortium of innovative universities) that measures the impact of the universities on the learnings and training processes of the students, introducing institution reviews in the process. The concept of the Living Lab has been very well received and supported by these and many other actors along the process, the regional government of Catalonia included. The Smart Specialisation focus of Catalonia has been an important factor behind this support, pushing innovation at the regional level. This collaboration with the Catalan Government has contributed to the inclusion of a 'lab' approach for significant funding schemes and calls for proposals in the context of the RIS3Cat, the Regional Smart Specialisation programme.

L3 is also strategically hosted by the network of libraries of the Barcelona's Provincial Council (Diputació de Barcelona), serving a designated experimentation space within the province network of libraries, designed to host innovation activities. The provincial network of libraries counts with more than 240 service points, offering services to 5 million citizens (2.5 million registered users).

A provincial programme called BiblioLab has become the umbrella on co-creation, exploration and innovation towards systemic change, having emerged from the experiences of the Library Living Lab, where digital transformation is explored at the meeting point for the community, a space where innovation can happen. The mission of the Library Living Lab has therefore been successful in contributing to the creation of such a framework, where things like artificial intelligence can be connected with the cultural aspects, bringing technology and people together in innovation. With this, libraries are transformed into new innovation infrastructures for the city and the BiblioLab programme represents the actual instrument for scaling up the innovation approach proposed by the

Library Living Lab at the local level. Importantly, this has brought the inclusion of Citizen Science as one of the current ingredients of the BiblioLab activities.

Other Living Labs present in the region have supported the establishment of the Library Living Lab, in particular: i2Cat Catalonia, Citilab Cornellà and Barcelona Lab.

Management & Organisation: Who interacts how to facilitate co-creation?

The members in the consortium are the stakeholders that have established the Library Living Lab together. The municipality of Sant Cugat offers municipality services in the form of a library, and receives innovative activities and services for the citizens through the Living Lab, as well as an open experimentative space to engage with citizens. The Provincial Council of Barcelona provides a network of libraries and policies linked to these, and through the Living Lab receives an innovation space for prototypes and services to potentially scale-up through its network of libraries. The Computer Vision Centre provides technological and research expertise and assets, potentials to be turned to innovative prototypes, and through the Living Lab obtains a place for fast prototyping with citizens. Similarly, the Universitat Autònoma de Barcelona contributes with research and knowledge as well as infrastructure and through the Living Lab expands its experimentative and research activities beyond the campus boundaries and therefore expands its audience from students to the citizens in the surrounding areas. The neighbours association has achieved its goal of providing more services in the area through the establishment of the Library Living Lab that also provides the innovation space needed for the establishment of further services as well. The association and the citizens of the area have gained a cultural space for activities and cultural development[8].

In addition to the consortium members, Library Living Lab has a signed agreement with Barcelona Lab and participates in an active way in the development of activities in Barcelona in hand with different institutions such as Fundació i2Cat, Fundació Joan Brossa, Hangar, Oficina de Ciència Ciutadana de Barcelona, and has participated in the definition of a framework for Responsible Research and Innovation (RRI) together with Fundació La Caixa[9] and different stakeholders and EU projects.

Further stakeholders are joining the Living Lab's activities on an ongoing basis. In many cases, the participants are knocking on the Library Living Lab's doors, including participant

groups. One example of the dynamic growth of the community within the Living Lab is the collaboration with an art foundation Joan Brossa that possessed more than 1,000 unpublished artworks in their collection. An agreement was signed with the foundation to access the collection and a software was created for an interactive process engaging people, through exhibitions throughout different libraries. In other examples, the visitors themselves are proposing activities. In this way a user with 3D printing experience shared their expertise in proposing 3D printing workshops for creating remote controls, benefiting from the support from the Living Lab in planning and running the workshop – but also leading to a new connection, another user skilled with drawing, that joined the effort. In this way, connecting people together grows the community of people interested in the particular topics. In the end the community grows dynamically with different skillsets that have both the capacity and the autonomy and possibility to create new projects.

In terms of funding, the project received during its second year 1,00.000 € from a project of the Campus of Excellence of the Universitat Autònoma de Barcelona. The funding enabled a kickstart for the project in terms of personnel as well as technology, supplying technology devices for the Library Living Lab. The municipality also provided inkind support and an additional special funding of 40,000 € was provided later by the Provincial Council of Barcelona to hire a person managing the lab. Some funding has been secured also from small companies for specific projects and services. Finally, the Computer Vision Centre and European projects also bring funding to the Library Living Lab, an example of this being an 80,000 € received from the RIS3Cat framework. Besides funding, the collaborative effort between the stakeholders is especially important in co-creating innovation together and the lab has established support structures that accompany the process of co-creation through all the stakeholders involved.

Regarding new or future partnerships that do not exist at the moment, the main aim of such partnerships at the moment concerns the scalability of the projects. Working together with the Provincial Council of Barcelona to scale the concept beyond the neighbourhood of Volpelleres, using the network of libraries in Barcelona and with other partners around the city, constitutes the next step in growing the partnerships to the next level.

Specification: What tools and instruments are/ were used to co-create?

At the very initial stages of the co-creation process, the mapping and the definition of the first steps and the structure was defined through a governance model. From the very beginning, the definition of such structures was central in the approach. Retaining the central role of co-creation and user centric innovation processes in the concept of the Living Lab was challenging in the beginning when the notion of a Living Lab was new and not well understood by all stakeholders. Defining a clear structure and a governance model from the very beginning was therefore crucial in holding on to the nature of the concept while at the same time focusing on the bigger picture, connecting all stakeholders and the expertise in creating an ecosystem around the Living Lab.

The library Living Lab has played a central role in working across silos, facilitating the collaboration between different departments: innovation, education and cultural departments, for example. At the same time, it has been central in facilitating the collaboration not just between different departments, but also between several stakeholders: the university, the cultural associations, the municipality, the residents etc. The complexity, but also the true value, lies in understanding that innovation is a transversal factor affecting many departments and actors, and in this case something that could only be achieved in engaging also the very central stakeholders from the public sector such as the municipality and the Provincial Council of Barcelona.

Keeping all the stakeholders involved in the process, several recurring meetings between actors are held on an ongoing basis. A weekly operational meeting, a monthly governing body meeting, and a bi-annual meeting to follow-up on the political side in order to set up priorities. Companies are mainly involved in the projects, for example the 3D project that involves citizens in 3D scanning is well connected with 3D printing companies in the area, providing expertise in 3D printing and at the same time, having the opportunity to showcase their products.

RRI (Responsible Research and Innovation) has been a central framework followed by the Living Lab in ensuring openness, responsibility and suitable innovation practices. Similarly, in the context of citizen science the lab complies with the Decalogue for Good Practices in Citizen Science.

Methods and tools used by the Living Lab include Design Thinking methods and tools, focusing on an observation-based approach in order to implement the dynamics of open

innovation. In reaching co-creators, interest groups and talent clubs are invited to the lab in order to form a community that is expected to be motivated, skilled and autonomous. Thematic events, such as workshops or conferences help to further attract interested people and to define common or prioritised lines of action. Hands-on sessions, experiments and expert sessions connect specific expertise and guidance from skilled individuals to facilitate innovation and experimentation among the group. Communication tools, social media, and web-based tools are deployed for dissemination, sharing the results and reaching interested users.[10]

Which learnings emerged?

Eventually, the mindset is most difficult to change and this applies to all the stakeholders involved. There are key supporters of the concept but also many barriers to overcome, and changes to ignite. There has been a lot of surprising learnings along the way for example with regard to the strong support from key decision makers and the innovative culture embraced by many of the actors involved, especially when it comes to such a new and previously unknown concept such as Living Labs. The Living Lab concept was new for all involved from the beginning, and all actors have been climbing up the learning curve together.

Throughout the journey of learning on the go, one of the most crucial key learnings has been the importance of recording insights and learnings down throughout the process. More documentation on the successes and failures is needed to ensure the continuous improvement, sustainability and scalability of the lab. The Library Living Lab team has recognised the need for such documentation and aims to gather learnings retrospectively, as well as formalise people and processes for recording such learnings in the future. A dedicated Living Lab manager, an orchestrator of co-creation is required to steer the process forward, taking on the documented learnings from the process onto the next steps, accelerating the process of learning and growing from the process. In the future, dedicated two-pager reports, deep process documentations and PHD candidate studies would help in recording the learnings from the process and something that will help in developing the methods and tools further.

Regarding funding schemes, the project-based working method proves difficulties in the sustainability plans for the lab. People leading the projects are often moving onto new

positions or new projects once funding runs out, and this scheme therefore fails to recognise the importance of the people in the process, where innovation comes from the people. The creation of trust takes time and discontinuing these structures of trust in between projects breaks the glue in between the stakeholders involved. The follow-up learning therefore is, that the outcomes of these collaborations should lead to commitments and such commitments should be written down.

Timing has played an important factor together with the agile approach of this multi-stakeholder collaboration. Things are sometimes happening very quickly and at the same time, timing is of the essence when aligning priorities and political spheres. Innovation was a key mission of the university and the other stakeholders aligned to this key component: there has been a clear learning curve in adopting the agile and innovative practices, but at the same time with crucial and clear support from the decision makers from the government. The first mayor of Sant Cugat has been a crucial actor in supporting the network of libraries and the Living Lab concept in the libraries in Barcelona.

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Sciencewise – Involve and UK Government BEIS | UK

Trupti Patel and Melanie Smallman (UCL)

Sciencewise provides evidence of public views on emerging areas of science and technology by supporting government departments to design, commission and run deliberative public dialogues. This improves the effectiveness of policymaking by strengthening the evidence on public perspectives and values. It is a UK Government program run in conjunction with the charity, Involve. The programme runs deliberative public dialogue events to collect the view of the public.

What is the project/initiative all about?

Sciencewise is a time limited initiative which helps to ensure science policy is informed by the views and aspirations of the public. The programme is led and funded by UK Research and Innovation (UKRI) with support from UK Government Department of Business, Energy and Industrial Strategy (BEIS)[1]. UKRI is a quasi-autonomous non-governmental organisation of the United Kingdom that directs research and innovation funding, funded through the science budget of the Department for Business, Energy and Industrial Strategy. Involve, the UK's leading public participation charity, provides expert advice, assurance and support to the programme. Involve is a non-profit organisation. Established in 2004, the programme has supported over 50 public dialogue projects[2]. Sciencewise supports government bodies to commission deliberative public dialogue. The support includes up to 50 % co-funding, expert advice and guidance.

Co-creation is seen in the form of public dialogues which provide in-depth insight into the views, concerns and aspirations of a broadly representative sample of the population. This allows decision makers to develop policy that resonates with public views. Emerging areas of science, technology and innovation provide major public benefits but also potential risks. The public need to be involved in the development of policy and legislation in these areas in order to identify possible risks. Sciencewise provides evidence of public views on emerging areas of science and technology by supporting government departments to design, commission and run deliberative public dialogues[3]. Sciencewise aims to improve the effectiveness of policymaking by strengthening the evidence on public perspectives and values about scientific and technological innovation. It does this by providing financial support and specialist advice on dialogue good practice to Government departments.

Sciencewise develops projects in policy areas that are of strategic importance for UK Research and Innovation, the Department for Business, Energy and Industrial Strategy, and wider government. The current priority themes are: artificial intelligence and data, the future of mobility, an aging society, clean growth, and genomics and gene editing[4]. These Grand Challenges are areas of innovation where the UK aspires to play a leading role in the global technological revolution to bring benefits to the economy and society. By listening carefully to the public's concerns and aspirations, policy makers can develop strategies to drive the Grand Challenges that will measure up to public aspirations and address public concerns. Sciencewise supports the delivery of the Industrial Strategy by helping policy makers to develop deliberative dialogue projects that investigate the public's views on policy options relating to the Grand Challenges. Sciencewise also organises roundtable discussions with researchers, policy makers and other stakeholders working at the cutting edge of the priority themes. These help them to identify specific policy areas that will benefit from public dialogue and to identify the specific topics on which public views will matter.

Sciencewise is beginning a new phase from April 2019[5], and will build on this success. It will support the delivery of Government priorities, such as the new Industrial Strategy, by strengthening evidence about public views on emerging science and technology applications. As such, it is an initiative with a focus on policy making.

Sciencewise has an organising and facilitating higher level structure which is not directly involved in either the public dialogues, nor roundtable discussions. Their responsibilities lie in the planning, facilitating and evaluation of the projects including funding, proposals,

and reporting[6]. The co-creation occurs in the public dialogues and roundtable discussions but is also an ethos of the programme. As the programme seeks to account for societal views in science, technology and innovation policy making, it does so in an inclusive manner, co-creating initiatives between scientists, policy makers and the public.

Brief Outline of the project/initiative's pathway

The initial starting point came in 2000 when the House of Lords Science and Technology Select Committee stated that '...direct dialogue with the public should move from being an optional add-on to science-based policy-making and to the activities of research organisations and learned institutions, and should become a normal and integral part of the process' in their 'Science and Society'[7] report. The committee scrutinises UK Government policy by undertaking cross-departmental inquiries into a range science and technology related areas of public policy. Lords Select Committees do not shadow the work of government departments. Their investigations look into specialist subjects, taking advantage of the Lords' expertise and the greater amount of time (compared to MPs, and thus House of Commons committees) available to them to examine issues. The government will normally make a response to a select committee report and reply within two months of the publication of the report[8]. In the 2000 report, it was made explicit there was 'A crisis of trust' in the publics' attitude towards science. The report was based on academic work and interviews and focus groups conducted by the committee researchers themselves. It came about at a time when the Bovine Spongiform Encephalopathy (BSE) crisis in the UK was coming to its peak with government being criticised in the same year for their response in an inquiry report[9]. In the 1980s the first cases of BSE in cattle were confirmed and in 1987 the British Ministry of Agriculture accepted a new disease was causing the deaths. In 1989 some high-risk foodstuffs like offal were banned for human consumption and fear about beef led to many British consumers to stop purchasing it[10]. Between 1990 and 1994 the disease began to spread to other animals. The government was at the time assuring the public that British Beef was safe and that BSE-infected meat would not infect other animals which was a claim based on experience with scrapie-infected sheep which was proven not to cause illness in humans[11]. However, scientists were already questioning this assumption and in May 1990 it was reported a Siamese cat had become infected with BSE through the media[12]. This was the first confirmation outside a lab that BSE could be transmitted between species through eating infected meat. Despite this, the government maintained

that British beef was safe and the Secretary of State for Environment, Food and Rural Affairs appeared on TV encouraging his daughter to eat a British beef burger, and declared British beef to be 'completely safe'[13]. Many other animals then went on to develop the disease[14]. Cases of the disease in cattle continued to rise despite the ban on feeding offal to cattle[15]. In 1994, many people began to show symptoms of a neurological disease simply to CJD, a fatal disorder that occurs naturally in few people but usually later in life. This new form of the disease was identified as variant CJD (vCJD), occurring primarily in younger people and cause through eating BSE-infected meat. The first known death was reported in May 1995[16]. Although the government continued to emphasise the safety of British beef and concluded in 1995 there was 'insufficient evidence' to link BSE and vCJD[17]. In March 1996 the Secretary of state for Health announced that vCJD was caused by eating BSE-infected meat[18]. A week after the announcement the EU imposed a ban on exports of British beef[19]. The report emphasises the uncertainty in science when science and technology is advancing rapidly and in particular the issue of disagreement between scientific experts at a time when new technologies are coming into the public realm[20].

The science and society report claimed the UK public were uneasy about the opportunities of science and technology which seemed to be advancing ahead of public awareness with an example being the BSE fiasco[21]. It was claimed that in turn, as a response the public felt uneasy and on occasions hostile towards science and technology. It was noted that 'On the one hand, there has never been a time when the issues involving science were more exciting, the public more interested, or the opportunities more apparent. On the other hand, public confidence in scientific advice to Government has been rocked by a series of events, culminating in the BSE fiasco; and many people are deeply uneasy about the huge opportunities presented by areas of science including biotechnology and information technology, which seem to be advancing far ahead of their awareness and assent. In turn, public unease, mistrust and occasional outright hostility are breeding a climate of deep anxiety among scientists themselves.'[22]. Thus, the Sciencewise programme, based on public dialogue, was formed. It focusses on bridging the gap between the public's attitude towards science and public policy with the hope the latter would be informed by the former. In 2005, the Council for Science and Technology recommended the development of a new framework for the use of public dialogue to inform science and technology related policies, and for the government to develop a 'corporate memory' for public dialogue in their report 'Policy through dialogue: informing policies based on science and technology'[23]. Since then, parliament has also recognised the role that public dialogue can play in supporting

effective policy making. For example, in 2017 the Science and Technology Committee noted the government's '...primary responsibility for fostering and facilitating science engagement in its policy-making'. The committee recommended that the Sciencewise programme '...should be routinely used across all government departments, so that public opinion is fully captured in developing government policy where science is involved'[24]. After the initial 2000 report, the government debated the issue and the Sciencewise programme was formed.

Context and environment: Where does it all take place?

Sciencewise is a UK-wide programme. The United Kingdom is a state made up of the historic countries of England, Wales and Scotland, as well as Northern Ireland. It is known as the home of both modern parliamentary democracy and the Industrial Revolution. Two world wars and the end of empire diminished its role in the 20th century, and the 2016 referendum vote to leave the European Union has raised significant questions about the country's global role. It has a population of 62.8 million people and the capital is London. The life expectancy for men is 78 years and for women is 82 years. Britain was the world's first industrialised country. Its economy remains one of the largest, but it has for many years been based on service industries rather than manufacturing. The process of deindustrialisation has left behind lasting social problems and pockets of economic weakness in parts of the country[25]. In response to growing dissatisfaction with the UK's traditionally highly centralised nature, the London government devolved powers to separate parliaments in Scotland and Wales in 1999[26]. But this did not stop the centrifugal trend. A nationalist government has been in power in Scotland since 2007. A referendum on independence was held in September 2014, with 55 % of voters opting to remain as part of the United Kingdom and 45 % favouring independence[27]. In Northern Ireland, after decades of violent conflict, the Good Friday agreement of 1998 led to a new assembly with devolved powers, bringing hopes of lasting peace. The UK is ethnically diverse, partly as a legacy of empire. In the 2011 Census, 80.5 % of people in England and Wales said they were White British, and 19.5 % were from ethnic minorities[28].

The public dialogues are formed of a proportionally representative sample of the population in terms of socio-economic demographics. The participants are recruited through a private third party. As the programme runs in conjunction with the UK

Government it is fully compliant with legal restrictions. Financial support is provided by UKRI and BEIS and the programme has been fully funded since 2004[29]. Prior to the Sciencewise programme, the public were engaged members of science, technology and innovation policy making in the UK, but after the 2000 Science and Technology Select committee report, the public took part through the form of public dialogues whereas previously they may only have been consulted with public involvement was mainly seen as an add-on and not an integral part of the science, technology and innovation policy making process. This is as public engagement was often done (and is still done in the case of local councils) through public consultations in which the public are invited to comment and raise concerns on new proposals prior to their approval. Post Cold War the government has always has an interest in what gets funded and why as well as strategies linking government-funded science and innovation to economic success of the nation (Wikipedia, n.d.). Most recently, this has been through the form of the Government's Industrial Strategy which outlines growth fields ripe for further research. The industrial strategy is developed by the Department of Business, Environment and Industrial Strategy, thus the Sciencewise programme is funded by this same department. It has recently relocated to be a part of UKRI, but this is also funded by BEIS[30].

Management & Organisation: Who interacts how to facilitate co-creation?

Within the most recent phase of Sciencewise, BEIS is becoming a more active member. A core new feature is that dialogue projects and their evaluation will now be commissioned through a framework contract coordinated by BEIS. This will significantly reduce the length of time it takes to develop and commission dialogue projects and enable Sciencewise to be much more responsive to the needs of policy makers and the policy process[31]. BEIS will also have a much greater role in managing the programme overall and in supporting government departments to identify potential dialogue projects.

The aim of the government is to ensure that the public and the broad science community are able to see that a wide range of views and perspectives have been heard in the open, and been taken account of by policy makers as decisions relating to science and technology innovation are taken. The objective is to enable more informed policy in science and technology and so build confidence in decision-making related to the undertaking, development and overall governance of science and technology; to build on the public's

generally positive views of science - and both to maximise the opportunities offered by new areas of science and technology and to minimise potential downsides. The approach is to enrich decision-making by working with the public to understand the aspirations and concerns of the UK population in the development of policies involving science and technology and their governance. Such public dialogue will inform, rather than determine, policy and decision- making by those empowered to do so[32].

Involve's role within the programme is to:

- Provide independent external assurance to ensure that all dialogues that are commissioned through the programme meet the Sciencewise principles;

- Provide support to government departments commissioning public dialogues by further developing and strengthening the existing, and highly valued, Dialogue and Engagement Specialist (DES) network;

- Build the capacity of government officials to commission and deliver high-quality public dialogue projects that impact effectively on policy;

- Build on the existing resource library of case studies and lessons learnt to support a wider understanding within government about the role that public dialogue can play in effective policy making; and

- Develop a light-touch evaluation framework to integrate ongoing learning into the development of the Programme[33].

Involve is the UK's leading public participation charity. At the time of the development of the initial Sciencewise programme the bid would have been put to tender and involve would have won the 'contract' with the government to conduct the Sciencewise programme and deliver the results to the government for processing for a given amount of money. While the programme is led by Involve, they are supported by a wider team. The core team consists of[34]:

- Simon Burall as Programme Director responsible for the strategic direction of the programme;

- Hally Ingram as Programme Manager;

- Kaela Scott responsible for developing and promoting Sciencewise materials;

- Dominic Ward as Project Officer supporting this core team;

- Diane Beddoes from Deliberate Thinking as senior DES, providing quality assurance for the support that we offer and helping to deliver on lesson learning and evaluation;

- Diane Warburton from Shared Practice supporting the development and integration of evaluation throughout the Programme;

- Roland Jackson, senior consultant, providing input to the business case assurance process and networking support; and

- Paul Manners and Sophie Duncan of the National Coordinating Centre for Public Engagement, providing challenge and support, and widening Sciencewise's research networks in support of awareness raising and project identification.

The Sciencewise Dialogue and Engagement Specialists (DES) network will continue to support government departments to commission and deliver world class dialogue projects. The network consists of:

- Alison Crowther;

- Andrew Acland;

- Daniel Start;

- Kaela Scott;

- Steve Robinson; and

- Suzannah Lansdell (Burrell, n.d.).

All these positions are formalised and the expectations of/from all involved are agreed through a contract. These people form an advisory panel and are reimbursed a fixed fee for their time as set out in their contracts which are made between themselves and Involve/ Sciencewise. Involve subsequently has a contract with BEIS, now transferred to UKRI, to deliver the programme.

What are the concrete processes and practices of co-creation?

This programme involves the science, technology and innovation policy of a nation state – the United Kingdom. The stakeholders involved include: citizens, interest groups, consumers/users, businesses and the wider economy, employees and volunteers, affected populations. The initiation of the programme was initially through a policy programme as well as previous activities/projects. A pressing social demand and societal challenges as outlined in the House of Lords Science and Technology Select Committee report on Science and Society published in 2000[35]. This led to policy incentives and the Sciencewise

programme. Financial resources provided by the government as well as governance, politics and individuals, networks and groups are the main drivers behind the programme.

As this is a government programme, the selection of the public has to be a representative sample of, either a nation, region or city – whichever is relevant for the policy. Thus, a recruitment company is used for this process. Roundtable discussions are facilitated by the programme with researchers, policy makers and other stakeholders working at the cutting edge of the priority themes. These help them to identify specific policy areas that will benefit from public dialogue and to identify the specific topics on which public views will matter. A public dialogue project is then conducted to understand people's thoughts and issues. Such public dialogue will inform, rather than determine, policy and decision-making by those empowered to do so.

Public dialogue is a process during which members of the public interact with scientists, stakeholders and policy makers to deliberate on issues relevant to future policy decisions[36]. Public dialogue enables constructive conversations amongst diverse groups of citizens on topics which are often complex or controversial. Not only does it provide an in-depth insight into public opinion, it also offers a window into understanding people's reasoning. Public dialogue can be used to help formulate and test policy options in the early stages of development. It can also provide evidence on what assurances and safeguards members of the public expect if a policy area is to be taken forward. This improved understanding helps policy makers to mitigate potential risks.

Typical components of the dialogue process include (ScienceWise, n.d.):

1) Clear Purpose: A public dialogue must have a clear and well-defined purpose, and it must engage with policy questions.

2) Tailored to specific circumstances: The process is tailored to the specific circumstances of the topic and decision-making process.

3) Diverse participants: Participants are recruited to be broadly reflective of the population in the countries or regions where dialogue activities take place. The delivery contractor recruits to predetermined demographic quotas (e.g. 50% men and 50% women) using well-established methods.

4) 30-200+ participants: The number of citizens participating in a Sciencewise funded dialogue project ranges from 30 to over 300. Sometimes, dialogue workshops will be

supplemented with surveys or digital tools, enabling a project to reach a larger number of people (e.g. over 1000).

5) Stakeholder involvement: Sciencewise funded projects are guided by an oversight group comprising stakeholders with an interest in the policy area. The oversight group must include a diverse range of opinions and interests in a topic, as one of their primary roles is to ensure that the process and materials are balanced. Scientists and policy experts take part in public workshops. Their role includes listening to and engaging in discussions with the publics involved, providing information when required, exploring participants' ideas and sharing their reflections on what they have heard. A public dialogue may also include dedicated stakeholder workshops. These are usually held at the start and/or end of a project.

6) Expert design and facilitation: Sciencewise funded projects are designed and facilitated by independent contractors with a track record of delivering successful dialogue projects. Involve supports the lead government body to appoint an experienced contractor using the Sciencewise framework of dialogue delivery contractors.

7) Interactive workshops: Interactive workshops, typically lasting a half day or full day, are at the heart of Sciencewise dialogues. Workshops are designed around the requirements of the particular topic. Information and evidence are provided in a variety of forms, including oral presentations, videos and written materials. There is always a lot of time for questions and discussion. Participants are encouraged to share and develop their views and to deliberate on the implications of the information they have reviewed. Typically, workshops are repeated, enabling the same participants to meet two, or sometimes more times over the course of the project. This allows time for individual reflection between workshops.

8) Measuring the impact: Sciencewise funded projects are independently evaluated. An evaluator is appointed from the Sciencewise framework of evaluation contractors. The evaluator will assess the early impacts of a project on the stakeholders involved. The Sciencewise programme team continues to monitor impacts in the months and years following the conclusion of a project.

9) Communicating the results: Sciencewise co-funds projects where there is a clear plan for outputs to inform policy development and decisions. The evaluator will assess the extent to which the commissioning body has disseminated the findings to key

stakeholders and wider audiences and, through interviews, what impact these findings have had.

One facilitator mentioned that one of the barriers to public dialogue include that experts and policy makers can feel nervous about engaging with the public, thus may feel powerless themselves. This leads to them not willing to question and pry the public about their opinions and being rather uncritical of the public. This leads to a lack of reflexivity on what the public are saying. A mismatch in wording and incompatible language as well as power-asymmetries were also seen as barriers to the dialogues.

Specification: What tools and instruments are/ were used to co-create?

The Departmental Dialogue Index Tool[37] is recommended to help facilitate more public dialogues in projects. This diagnostic and toolkit has been developed by Sciencewise to help people within organisations who are interested in improving their organisation's use of dialogue and engagement. Rather than recommending wholesale 'culture change', the Departmental Dialogue Index approach suggests that to improve an organisation's use of dialogue and engagement, it is essential to: (a) understand the organisation's preferences and beliefs; (b) consider how this affects the organisation's propensity to engage; (c) use these insights to find effective ways of promoting and using engagement which goes with the grain of the organisation's character, and therefore are more likely to be accepted. The toolkit provides a series of exercises which you are recommended to follow. The steps are outlined here[38]:

1) <u>Define the 'organisation'</u> that you are going to be focusing upon. The more specific you can be, the easier the following steps will become – the organisation could be a whole department or a specific team.

2) <u>Explore the current engagement preferences</u> of the organisation using the Current Engagement Preference Questionnaire. If more than one of you completes this questionnaire, compare your results and discuss any differences.

3) <u>Establish the Organisational Character Index</u> by filling in the OCI questionnaire. If more than one of you completes this questionnaire, compare your results and discuss any differences.

4) <u>Read the Interpretation and Recommendation Card</u> for the organisation character(s) identified in step 3. If your character is 'on the cusp' of different types, try reading the relevant types and find the one most relevant.

5) <u>Consider what next</u> - what actionable insights (if any) – for example, listed on the interpretation card, or in the example tools - has this given you? You may also wish to undertake the assessment for another 'bit' of the organisation, or to explore how the organisation is changing. You may also wish to compare the answers you gave, to those of others, or how you think the organisation views itself.

6) <u>Give us feedback</u> – this tool will be regularly developed. We'd very much welcome any feedback you may have: please let us know how it went. We've attached a feedback form at the back of this document.

Workshops are often used as places to hold public dialogue sessions. The point is to open up discussions and explore tensions and challenges as well as opportunities. The projects library[39] contains all the projects with evaluation reports for each. An independent evaluator is used for each event but this varies for each project, e.g. the Genomic Medicine project was evaluated by Ursus Consulting Ltd[40] whereas the 'Consent to use human tissue and linked health data in health research' project was evaluated by 3KQ[41]. These two bodies come up within the impacts page on their website[42] more often than others however. In some cases, the dialogue activity itself is also contracted out from Sciencewise/Involve to public survey companies, most notably Ipsos MORI[43].

Which learnings emerged?

The idea is not actually to reach a consensus; the idea is to open up discussions and begin to understand different perceptions. Public dialogues are not aimed towards reaching consensus, instead they are spaces to explore potential challenges and tensions the publics may have with science and technological development which helps form industrial strategy and the grand challenges programme which helps direct scientific research.

If the public are asked, they do not actually want to make the final policy decision, but simply want their opinion to be considered. The public involved do not want to feel liable for all other publics. They believe they have democratically appointed ministers and contribute to the costs of the civil service who are experts in policy making to conduct this

process. Their opinions are important but they do not want to be the ones creating and developing policy.

Experts and policy makers can feel nervous about engaging with the public thus may feel powerless themselves. This leads to them not willing to question and pry the public about their opinions and being rather uncritical of the public. This leads to a lack of reflexivity on what the public are saying.

Facilitators should ensure the power asymmetries are accounted for by making a 'safe space' for deliberation. This is often done through the use of jokes to create a more relaxed atmosphere. Power asymmetries can have an effect on whether or not opinions, no matter how controversial, are aired.

The experience of the Sciencewise programme is that when a policy area is discussed early with a group of citizens who have access to key scientists, pressure groups and other leaders in the field, the better and more robust that policy will be, and the more certain government and ministers can be that the policy will be successfully implemented. In 2014 BEIS, in partnership with Ipsos MORI and the British Science Association conducted a 'public attitudes to science survey' with a representative sample of 1,749 UK adults aged 16+ and a booster survey of 315 16-24 year-olds, which were carried out from 15 July to 18 November 2013 which concluded that: 1. the public is very positive about science; 2. scientists and government should take account of what ordinary people think; 3. the public would like to feel better informed on scientific and technological debates and developments; 4. there are some issues with trust in science and its governance.

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Interview

Simon Burrell

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The Australian Centre for Social Innovation (TACSI) | Australia

Felicitas Schmittinger (POLIMI)

The purpose of the Centre is to create better lives by shifting systems, demonstrating what is possible, and developing replicable approaches to social innovation. As the national centre for social innovation, the goal is to uncover new and better ways to create social good. From systems innovation through to unlocking the assets and potential of

communities, social innovation should be moved from the margins to be a national priority.

What is the project/ initiative all about?

The Australian Centre for Social Innovation (TACSI) has engaged together with the Aboriginal organisation Koori Caucus to reach the concrete goal of reducing the over representation of Aborigines in the Australian justice system in the state of Victoria.[1]

The idea to start this project had been to build on existing knowledge and experiences on what had worked in the past and what had not to aim for a real and significant impact in the justice system to be built over time.[2]

The working group is composed by Koori Caucus, an Aboriginal Association collaborating with the Victorian Government, the Koori justice unit from the Department of Justice and Community Safety and The Australian Centre of Social Innovation (TACSI) functioning as a facilitator and innovator.

TACSI is based in Adelaide, Australia and since it's foundation in 2009 as a government initiative is has transformed into an independent organization aiming to improve the social and economic circumstances of Australia's inhabitants. Its core activities are all centred to the involvement of end users to develop solutions around them directly involving them in the process to identify and meet real needs.[34] Operating on Australian territory, one of the most pressing issues has been found to be the tensions among Aboriginal inhabitants and non-native citizens one of their core activities has become the facilitation and initiation of Aboriginal-led social innovation.[5]

During the initiative described in this case, an overall strategy has been developed with five specific initiatives to put the strategy of reducing the massive over-representation of people with Aboriginal decent in the Australian justice system in practice.

The global aim to reduce this over representation is planned to be reached supporting the development of a self-determined approach towards justice. Over the year working in social innovation, TACSI has found social innovation to be more a matter of developing a practice and principles to go with it over a long-term period rather than on-point projects that easily become too abstract and do not result in the self-determination needed to actively engage people in changing the existing system.[6]

To further this self-determination, five different projects have been put in place (Fig. 1) to build the base and target the different roots of problems identified in first place:

1) A family centre aiming at providing constant and specific support to families in need;

2) A concept to guide the society towards the final goal of self-determination taking action at the level of single, smaller communities;

3) Procedure adaptation in the government and social structures to reduce and finally avoid needless warrants to strengthen the support for Aboriginal communities and aim for a fair and transparent justice system;

4) Model towards prevention for minors especially concentrating on the avoidance of fall-backs after a first contact with the justice system setting up support procedures;

5) A media strategy to empower Aborigines in guiding the narratives of their story and role in the society across media to foster the communication among communities and strengthen their identity in the overall picture of media.

Our Mob, Our Choices —A Family Centred Centre	Aboriginal Social Justice Caucus	No Stepping Back: Aboriginal Supportive Pathway Plan	First Contact is the Last Contact	Koori Voices
A family-focused, holistic and restorative support model	Community-level self-determination of most concerning criminal justice issues	Adapting procedure to reduce unnecessary bail assignments and breaches	Prevention for Young People: Ensuring the first contact is the last	Koori Driven Media
A family-focused, intensive wrap-around model that can be applied at every stage of the continuum, from prevention to response. Identify what can be adopted and adapted and what will need to be developed. Ensure it has a joining up mechanism to connect multiple systems around a family.	A methodology and approach to foster community-led identification of issues, design of solutions, implementation and ongoing learning. Build the runway toward a self-determined, Aboriginal Community Controlled Justice System through place-based action and data sovereignty.	A set of approaches and tools intended to reduce the number of Aboriginal people who receive unnecessary or inappropriate bail conditions and the number of Aboriginal people who breach conditions once set. The model emphasises building community and social connection.	A model or approach to support to victims and witnesses of crime and neglect to ensure that first time young people come in contact with the system is the last, and preventing unnecessary contact. Amplify the community's role as the first line of defence.	A media strategy to take the narrative about Aboriginal people back into the hands of Aboriginal people. Amplify Koori Caucus Voice and influence, reinforce positive identity with strong social media strategy and enhanced Caucus communications role.

Fig. 1 The five initiatives created for the strategy[7]

All of the initiatives described above are interconnected and are essential elements and issues to be tackled to reach the aim of the overall strategy. Striving towards the decolonisation of the justice system, provide necessary support to individuals and families

and strengthen the bond between Aboriginal and non-native inhabitants in the region of Victoria is aiming to lead to a fight against social inequality and racism from a cultural points of view while adapting the justice system itself for a proper and equal representation of all inhabitants of the region.

The development of the project has been sub-divided in four phases starting from a review phase of existing material to define the key problems followed by a development phase in which solutions have been co-created. After refining the concept with policy makers, the initiatives have been developed into project plans to be in the conditions to be implemented while exploring opportunities for investments and funding making the initiative sustainable for all involved parties. [8]

Context and environment: Where does it all take place?

The entire project has been developed in Southern Australia tackling specific and historical problems of that region and teaming up with organisations specialized in the local issues. At the same time, the fact that most elements of the justice system operate on a state instead of a national level and the government of Victoria itself launching the initiative lead to the initiative been set up in the state of Victoria.

Overall, Australia is considered one of the wealthiest nations in the world that keeps its ranking constantly within the Top 10 of World's Richest Countries throughout the listings of GDP per capita.[9] [10] This wealth is mainly due to its extremely stable economy and rich natural resources as well as political stability.[11] Throughout the last 18 years, politicians from the Australian Labour Party and the Liberal Party have lead the country trying to ensure a durable and balanced economic situation with trade, manufacturing, services and financing as their main resources of wealth and a forward-looking approach.

Australia's prosperous economy consists mainly in service delivery taking up around 60 % of the entire economy, followed by agriculture and mining.[12]

The stability of its economy can be traced back on one hand to its variety of sectors and the enormous and various natural resources of the country as well as on the other hand, as already mentioned, to the consistent government with a particular focus on building and maintaining a healthy economy for the country. [13] [14]

As a result of being a relatively wealthy nation, also socio-economic structures are advanced and the healthcare and legislative system are considered advanced and well-developed.[15]

Notwithstanding the wealth and socio-economic support developed as a result in the last decades, like in most other countries, socio-economically disadvantaged groups tend to be more often in conflict with the justice system and and show higher rates of justice violations.[16][17]

One specific group standing out from the average is the Aboriginal community showing a massive number of justice violations, especially considering that they represent a relatively low percentage of Australia's overall population. It can be said, that people of Aboriginal origin do show an extremely strong over-representation in the Australian justice system.[18]

Even though they represent only around 3 % of the total Australian population, the percentage of Aborigines on the total of people held in prison in Australia has been 27,3% in 2016.[19] Considering only juvenile prisoners at an age between 10 and 17 years, as much as 50% are Aboriginal.[20][21] Former Prime Minister Kevin Rudd stated in 2015, that Australia was 'facing an Indigenous incarceration epidemic'.[22]

The reasons for this massive over-representation are widespread tracing back to Aboriginal history and related issues in consequence. Not only poor social or economic situations, but the forced removal of children from aboriginal families, bans from the land of origin, racism as well as an inadequate legal representation have been identified as possible triggers for such high crime rates, especially among minors coming from troubled families affected by these issues. The frictions between the different cultures present in the country and the system of governance deriving from the Commonwealth and not sufficiently considering the presence, culture and history of the Aboriginal communities lead to mistrust, frustration and a gap of representation of interests within the system.[23]

This lack of representation and inequalities often leads to Aboriginal communities not being properly represented in the system and not recognizing it as theirs as an additional driver for violations.

Especially the state governments are well aware of these problems and favour and support numerous initiatives related to innovation and social innovation attempting to find

alternative solutions - TACSI itself has been founded driven by the South Australian government.

Having started its activity as a governmental initiative itself[24], TACSI kept its focus on the Australian society and its developments over time and operates exclusively on Australian territory, dealing with its specific problems and collaborating predominantly with users and stakeholders from within the country.

Notwithstanding the past initiatives and attempt to fully include Aboriginal representation in the legislative system, the percentage of representation of Aborigines rose of 168 % from 2008 to 2018.[25] Even though explanation for at least a part of this growth could be the increased performance in identifying Aboriginal offenders, the expansion is significant and alarming in any case.

A budget of $12 million funding has been provided from the state government after the publication of those numbers, all dedicated to the improvement of services in courts and tribunals related to Aboriginal people in the state of Victoria.[26]

The public funding and the high level of support from the officials are to be mentioned as a key point in starting and developing the initiative extremely facilitating the later implementation.

Even though the process has been oriented in a user-centred way and keeping a strong focus on giving a voice to those users, the top-down approach regarding the entire project is extremely promising in terms of actual implementation and support from policy makers compared to a bottom-up initiative.

The initiative does not only aim at lowering the over-representation of Aborigines in the justice system, but at the same time another step towards the elimination of tensions and inequality in society related to aboriginal inhabitants and the rest of Australia's manifold society.

These tensions play a fundamental role, since this split of the society becomes visible not only in their entirely different culture and historical conflicts, but also in the public system and legislation. The language barrier created by the use of exclusively English throughout all processes despite the fact that most Aboriginal communities are not familiar with the language is to be listed as one of the technical and organizational issues while racism and discrimination are influences deriving from the cultural and historical aspect.

Brief outline of the project/ initiative's pathway

The project described in the following consists of several initiatives to Reduce Aboriginal Over Representation in the Criminal Justice System in Australia. Despite all attempts to reduce the over representation of Aborigines in the criminal justice system, the number kept steadily rising until 2018[27], when Koori Caucus decided to tackle this issue from a different starting point. Koori Caucus is a part of the Aboriginal unit in the state of Victoria, AUS composed by Koori members and closely collaborating with the Victorian government regarding Koori justice and law-making. With their established connections not only to the Victorian government but to several associations and organisations in this field like the Victorian Aboriginal Community Services Association Limited (VACSAL) the possibility to resort to a large network related to the state government and Aboriginal communities had already been accessible. Given the complexity of the task in general, the number of potential causes for the main problem and the quantity of actors involved as well in the development problem itself in society as in its potential solution in the field of policy making required a new approach allowing an involvement of all those actors and ensuring the possibility for contribution and feedback from all sides.

During a first phase of desk research hypotheses on the drivers of the problem have been confirmed or contradicted and several different approaches have been studied, evaluated and compared to each other leading to the choice to select 15 different thematical areas holding opportunities for innovation and further develop them. This phase has been carried out by Koori Caucus holding both the governmental point of view as well as the point of view of the concerned target group with its members being of Aboriginal origin themselves.

In the second phase, five initiatives to be run in the previously defined 15 areas of opportunity have been co-created with Koori Caucus members, staff working directly on the front line in the justice system and decision makers from the government. The involvement of all parties has been found necessary to take all different points of view in consideration in order to develop a sustainable and working solution as well as grasping the opportunity to build on previous experiences, existing evidence and knowledge. The five initiatives developed in this stage are all interconnected and aim to work not just with individuals, but at the same time target their families, communities and involved system actors.

Following the ideation including some first prototyping, the initiatives have been shaped into realistic proposals collaborating closely with Caucus members being aware of legislative restrictions and necessary conditions to put such initiatives in practice. This step helped the construction of realistic and implementable initiatives instead of aiming at results out of reach.

The final step had been guided by TACSI planning a future and long-term strategy for the developed initiatives past the disposable budget. Strategies for sustainability have been found necessary to ensure not only the duration of an initiative, but also making it attractive and potentially replicable in other regions/fields. Especially the sustainability of such initiatives has been identified as a potential bottleneck since they are in need of a certain range of time to produce results and necessarily have to be run long-term to show efficacy and efficiency and be fully integrated into a complex system.

Management & Organisation: Who interacts how to facilitate co-creation?

The project setup consisted in the Australian Centre of Social Innovation (TACSI), the Aboriginal organisation Koori Caucus, the Koori Justice Unit (KJU) within the Victorian state government and it is part of the phase 4 of the Victorian Aboriginal Justice Agreement (AJA4) with a dedicated budget package to improve Victorian court- and justice services for and with Aborigines.

As a partner, TACSI has been cultivating and maintaining contacts to Aboriginal associations over the past years and has carried out a number of projects in cooperation with them. Aiming for social innovation, one of the biggest issues in Australia is the social situation and inequality of Aborigines and its connection to the history of the country.[28]

The footer of their website contains the flags of the Australian Aborigines and The Torres Strait Islanders stating that they are paying 'respect to the Traditional Custodians of all lands, past, present and future. Honouring our Elders and nurturing all young people'.[29] Apart from their contacts into the community, TACSI is deeply rooted in user-centred design as well as the design of sustainable services and the inclusion of users and stakeholders in development processes functioning as an innovation facilitator and strategic supporter in this initiative.

Koori Caucus had been one of their frequent collaborators, an organisation tackling (social) issues in the Aboriginal communities and all of their members are of Aboriginal origin themselves. They already functioned as an advisor for the Victorian government and therefore brought significant competences into the project not just regarding the target group, but in-depth knowledge and working experiences with the Victorian justice system.

The Koori justice unit (KJU) is part of the Victorian state government and represents the interests of the Aboriginal community at the inside of the government. Their main goal to provide effective and efficient justice is put in place by consultation and representation practices within the government system of the state.

The initiative is based on the AJA4 providing a funding of 12$ to further develop and enhance services related to the court and the law system for Aboriginal justice.[30]

More than half of this funding has been dedicated to the Koori court division of the magistrate's court initiated in 2002 and which has not only been successful in starting to bridge the gap between Indigenous Australians and the colonial law but also, they are disposing of a wide community of engaged Elders and Respected Persons.

TACSI has mainly contributed as a facilitator and planner providing structure and methodologies as well as experiences and background knowledge on working with and for the Aboriginal community. Koori Caucus brought first-hand experiences and direct contribution of the target group itself into the project together with their practice in collaborating with the Victorian justice system while the Koori Justice unit represented the official side providing opportunities for participation and consultation with policy makers and civil servants.

What are the concrete processes and practices of co-creation?

The selection of the participating stakeholders has been made before the start of the project and with the choice of the partners as representants of the different parties it has been decided to not keep it open to 'lay' participants. This decision can be traced back to the necessary level of expertise needed to design such a complex strategy and has been kept throughout the process.

In the initial phase consisting of a desk research the main particularity to be noted is, that it has been carried out not by TACSI as a strategic partner and expert in research and co-creation, but the Aboriginal members of Koori Caucus, representing the final target of the then-developed initiatives. In this way, not only the point of view of the target has been caught, but the knowledge has been also built on previous work done by the Aboriginal Justice Forum and past initiatives. Evaluating their strong and weak points and which parts of those initiatives did or did not work provided further insights on opportunities and barriers. This introductory desk research was followed by the definition of areas of opportunity withholding the potential for innovation. The conduction by Koori Caucus alone left space to link their previous experiences and expertise with the evidences found in literature and media. This independence was enabled by Koori Caucus' existent approach of conducting research in this particular way. The problems identified have then been translated into opportunities to then lead into the phase of ideation and prototyping based on those opportunities identified.

The ideation has been carried out with all partners and external participants from the justice system like civil servants. Also TACSI actively joined the working group facilitating and organizing the co-design of the new services and initiatives carried out by Koori Caucus, front-desk staff and decision makers from the government as representants of the main three groups involved: The Aboriginal community, civil servants and policy makers. The final step of this second chapter consisted in paper prototyping the ideas and testing them inside the group to validate and then eventually refine them. The easy and fast way of prototyping allowed all participants with their various levels of knowledge on co-design and prototyping to participate and translate and test their ideas.

All involved actors operating within the system have been gathered for the development of the solution not only producing ideas, but actively prototyping and testing them with low-fidelity prototypes.

In the following step of defining the final design the working group went back to focus on the Aboriginal people as a final target and the previously developed initiatives were shaped into a final concept by Koori Caucus and TACSI. Designing the details and interconnecting the different initiatives the overall concept has been unitized und made realistic and following a logical structure of development.
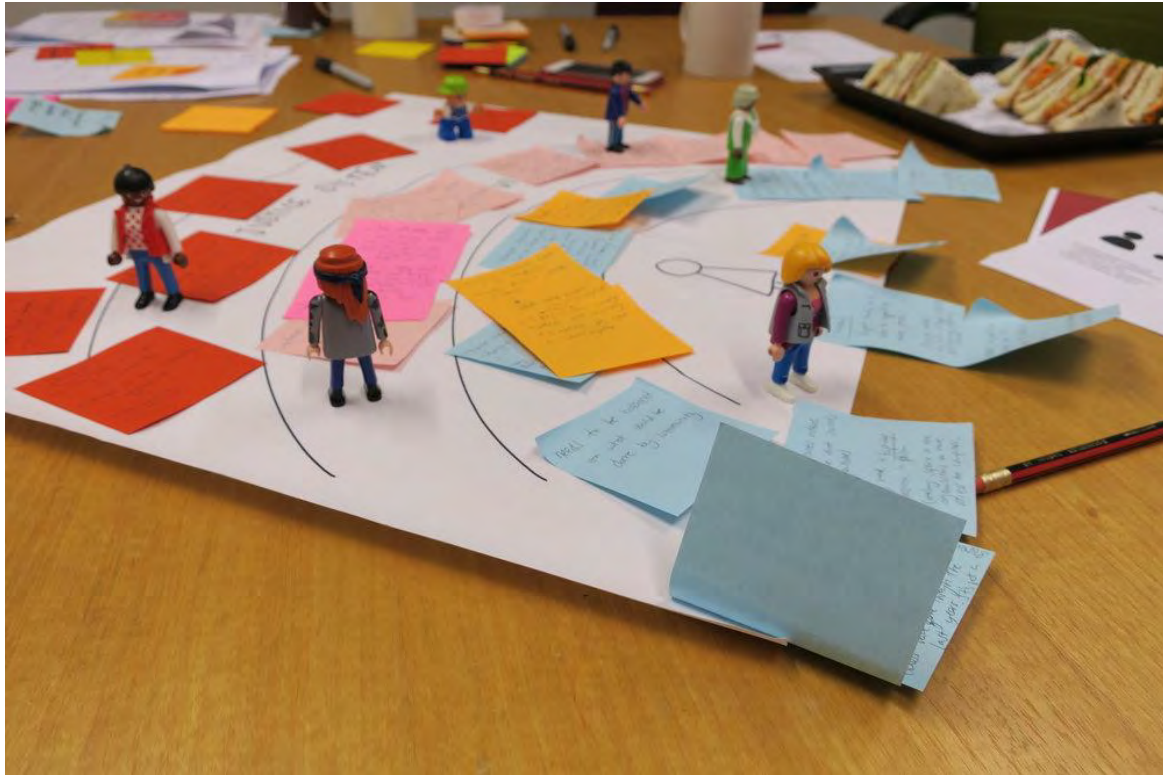
Fig. 2 - Co-design activity for the project

During the last step, the roadmap for the developed concept has been drawn by TACSI receiving support from the other partners to ensure that considerations on potential pitfalls throughout the development phase, sustainability and impact are made before the actual launch of the implementation phase.

TACSI puts an emphasis not only on the importance of the application of user-centredness and co-creation in projects, but also on the awareness what kind of methodology is being applied and for which scope. Stating, that there is no 'one size fits all', the single approaches have to be evaluated for every single initiative to then use most suitable one.[31]
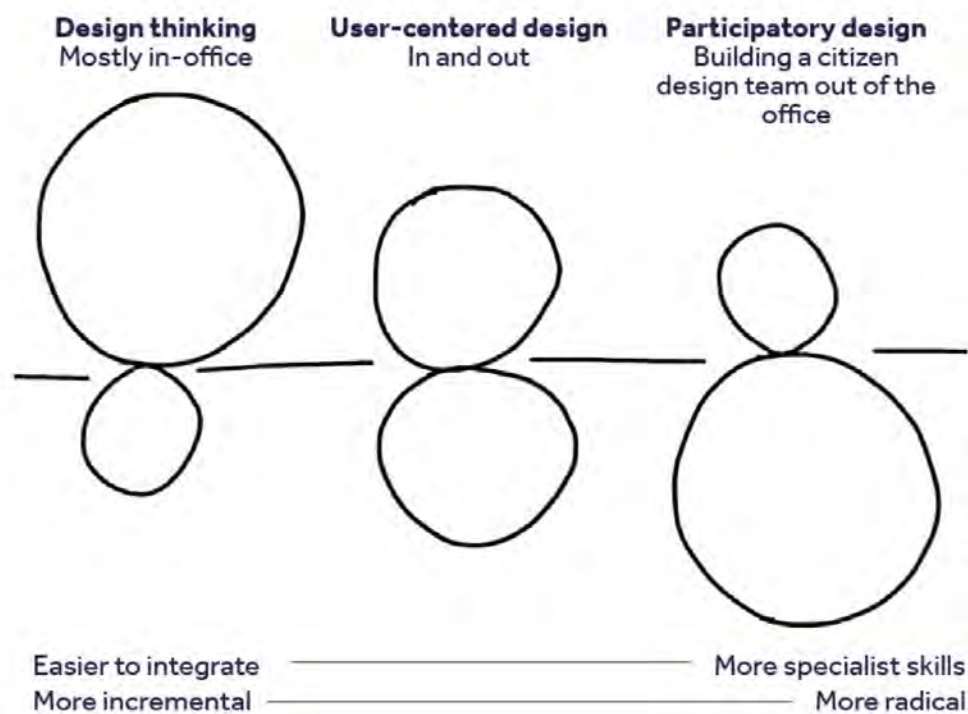
Fig 3 – Different ways to co-design according to TACSI

Specification: What tools and instruments are/ were used to co-create?

TACSI developed an own co-design planning tool to be applied in its various projects.[32] The focus lies less on the specific tools used in these processes, but more on the general attitude and approach applied to the different phases.

In the beginning the mindset for co-design is explained with the four simple keywords/-phrases 'learning by doing, being in the grey, curiosity, people are the experts'.[33] Following the key aim and title of the project, the leaders are asked to document their initial assumptions to be compared with the outcome of the problem definition.

For the generation of new ideas after an analysis, the tools specifically suggested are conversation starters, community dinner, card sorting or visual elicitation collage.

A strong emphasis lies on the phase of prototyping – this focus can be traced back to TACSI's activity in social innovation – the multiple layers and frequent changes in society might not allow to ideate an adequate solution without prototyping and testing.

Being involved principally in non-tangible prototypes like services or systems, frequently techniques like tabletop prototyping or scenario prototyping are applied to allow a testing of the concept to then refine it before testing it again or eventually launching it.

For the project described above, a paper prototype has been built – a quick and easy method to create low-fidelity prototypes that do not require any specific skills and can be highly effective in illustrating sets of features concentrating on the core aspects instead of beauty and perfection of the prototype itself.

Moreover, a last element of the planning tool and significant for TACSI's approach and way of working is a co-design scorecard containing the key activities and mindsets defined as core points for co-design in social innovation throughout past initiatives (Fig 3). It is thought to be used throughout the entire process and/ or after the conclusion as a self-reflection on how much co-design has actually been applied and put into practice.

Co-design scorecard

Facilitation and convening	Safe space to try new things	Committed to reducing disparity
Financing the process	Learning and sharing learning	Partners, not participants
Investing in solutions	Staff support	Being in ambiguity
Building lived experience capability	Accountability	Curiosity
Prototyping, testing and learning	Outcomes over outputs	Value for co-designers
Communicating the work	Following through	Cultural competency
Authorising environment	Recognising experts by experience	TOTAL / 100

Fig 4 – Co-design scorecard containing the core activities and mindsets as defined by TACSI

Even though TACSI has been the main driver engaged for co-creation activities also Koori Caucus brought various experiences in co-creation activities into the project. Their deeply embedded approach of combining the evaluation of quantitative data with the knowledge and experiences of communities and single users blends with TACSI's user-centred approach and facilitates the integration of co-creation techniques.

Koori Caucus is involved in various similar initiatives based on a co-design approach or adapting similar techniques aiming at the acknowledgement, inclusion and celebration of Koori rights.

For example, they are partners in the project 'Yarrwul Loitjba Yapaneyepuk – Walk the Talk Together', an action plan for Koori inclusion in the legislative department of the Victorian government committed to reach its goal through constant involvement of the target community in all consultation and development processes.[34]

As a conclusion it can be said that even though various tools and methodologies have been applied throughout the process of the initiative, generally TACSI lies its focus concentrating on principles and a broader picture rather than single methods and tools. This traces back to their extremely wide and complex field of work and according to CIO Chris Vanstone this can be tackled only by enabling communities and constantly maximise learning and growth to build new systems and influence existing ones effectively.[35]

Which learnings emerged?

Acknowledging that there are too many influencing factors leading to the high percentage of Aboriginal people in contact with the justice system to define and tackle all of them at once, one of the first learnings had been that only the creation of multiple, interconnected initiatives within the project could address the target group as planned.

The project members acknowledge also that initiative like these are, even if well-developed, just a small contribution to the reduction of the over-representation in the South Australian Justice System (SAJS) and it is too complex to be entirely addressed with just a single project.[36]

One important factor left out in the project development has been the identification of specific actors or organizations that would drive and govern the different aspects and

components of the implementation phase. Even though considerations on sustainability and potential pitfalls have been made drawing the roadmap, the responsibilities for the implementation have not been defined and are going to be among the next actions taken by TACSI as another step towards implementation.

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RETRACE – Interreg Europe Project | EU

Marion Real (Fab Lab Bcn)

RETRACE (REgions TRAnsitioning towards a Circular Economy) aims at promoting systemic design as a method allowing local and regional policies move towards a circular economy when waste from one productive process becomes input in another, preventing waste being released into the environment. The case aims to explore how to engage local stakeholders and policy makers in the design and implementation of circular economy regional roadmap. The project is run in Italy, France, Spain, Slovenia and Romania.

What is the project/ initiative all about?

RETRACE - acronym of 'a systemic approach for REgions TRAnsitioning towards a Circular Economy' - is a three year european INTERREG project (2016 - 2020) leaded by Politecnico di Torino which promotes the local development of circular economy into five partner regions: The Nouvelle Aquitaine (France), Piemont (Italy), Bizkaia (Spain), Slovenia, North-East of Romania.

The RETRACE Project aims to improve regional policies by facilitating the transition towards a Circular Economy focusing in Systemic Design. The Systemic Design approach was developed by the research group of the Department of Architecture and Design at Politecnico di Torino (Italy), and seeks to create new forms of complex industrial systems. It aims to implement sustainable productive systems in which material and energy flows are designed so that output from one productive process becomes input to other processes, preventing waste from being released into the environment. Contrary to other system approaches based on a positivist paradigm, the presented approach is situated in the complexity paradigm, embracing constructivism and soft system methodologies. It emphasises the place of territory for creating transitions and people as key determinants at the center of these transformations. The main method developed by the team is the Holistic Diagnosis (HD). It appears as a more conscious and radical way to raise awareness of the material flows that generate the various agricultural and productive processes. The principle is simple: building a rich picture of the current situation in term of territory, policy and industrial sector, and start thinking about it and act with local stakeholders. RETRACE partners deem that the adoption of more systemic approaches at territory/ regional level can play a leverage effect in transitions toward Circular Economy. They

gather themselves to apply the systemic approach in region and build broader knowledge to leverage circular pathway in Europe.

Co-creation in this project acts at both European and regional level through exchange and learning experiences, strategic design thinking and concrete pilot actions. At the European level, The INTERREG EUROPE platform permits to the stakeholders to build and share more than 30 good practices and experiences about circular economy through Europe.

At the regional level, the co-creation process was related to one specific policy programme and was led by two main partners per region that combined a technological centre with a regional authority. Other stakeholders from civil society, industry to academic and policy maker have constituted a stakeholder group in each region that met regularly during the project and were involved at different stages of the process.

Co-creation took place in the form of activities realised by each partner's region in their territory to identify good practices, raising discussions about policy gaps, co-design and implement a regional action plan. Regional stakeholders have learnt from good practices of other territories, participated in local stakeholders group meetings, cooperated to the Holistic Diagnosis of each territory, cooperated in the implementation phase of the project and take part in regional and international dissemination events.

The overall process was designed and monitored by the lead partner through a training experience for partners at the beginning of the project, regular virtual and physical meetings as well as clear instruction templates and deadlines to reach all along the project.

**Context and environment: Where does it all take place?**

Europe is on its way to Circular Economy. On the 2nd December of 2015, the European Commission adopted a Circular Economy Package with the aim to support the transition towards a stronger and more circular economy in the EU, where resources are used in a more sustainable way and their value is kept in the economy. This package consisted of legislative proposals on waste and action plan covering the whole life-cycle of products and materials. All EU Countries and Regions are setting policies and actions to boost circular economy. This requires a cross-sectorial and inter-institutional approach, and efforts in aligning programmes and funding and in coordinating policies and actions at all levels. The role of local and regional authorities is of utmost importance of European environmental

policies as they act as key stakeholders for territorial development via the management of EU operational programmes. They also act as connectors for top-down policies and local initiatives. Supporting Circular regions rely on building specific governance and activities, gathering stakeholders, in coherence with the territorial context, meaning from the resource flows, the geography, demography, industrial systems, the cultures of each localities.

The Retrace project is born in this context of supporting regional transitions for Circular Economy bringing more cooperation, coordination and integration amongst policies at every levels. It has been financed under the first call for proposals of an European Territorial Cooperation programme – 'Interreg Europe', under the Specific Objective (4.2)– Improving Resource Efficient Economy Policies. This new programme aimed at improving the implementation of regional development programmes and policies by promoting experience exchange and policy learning among regional actors.

Contextual elements will be shortly introduced from two perspectives: (1) the history of the Systemic Design network and (2) the territories - i.e regions that constitute the project.

(1) Systemic Design in the Retrace project is the methodology proposed by Politecnico di Torino for supporting the adoption of Circular Economy when designing policy at the local and regional scale. Over the past decade, several research communities focus on the study of systemics as new constructivist approaches to understand and manage complexity in systems. Based on the work of Von Bertalanffy, Meadow, Capra, Georgescu-Roegen, Checkland, Prigogine, Morin, these communities shared tools and methods, theories and practices to better define the field of systemics. The specific community of RSD (Related Systemic Design) gathered the practitioners and researchers of systemic and design to give more soft perspectives to complex system design. Emphasising the place of people in design processes and the importance of managing local resource-activity flows, Polito built a Systemic Design approach for complex agro-industrial systems that is the only one to combines systemic with circular design principles. For the Retrace project, Polito went beyond existing practices and proposed an original approach dedicated to regional policy design. The application of the methodology highly depended on each regional/ national context.
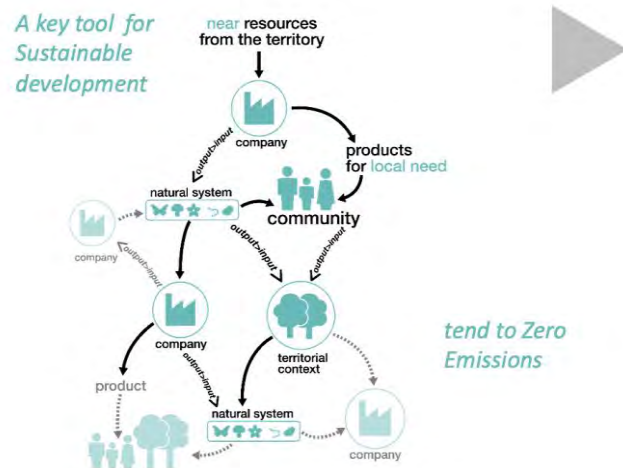
(2) The project occurred in five regions within a particular context and already engaged at different levels.

The Piedmontese territory (more than 2,500,000 hectares) has the alps as a reference landmark that has established the economic and cultural development of the territory. This is revealed in the geographical location of the eight main cities. After the main city Turin, where most of the infrastructures and services are located, other seven cities well distributed on the entire territory are important: Biella, Cuneo, Vercelli, Novara, Verbania, Alessandria and Asti.

The Nouvelle Aquitaine region is situated in the South West of France, connected to the Bask Country region of Spain, to the Atlantic Ocean and to the Pyrenees Mountain. Since the new organisation of French regions in 2016, Nouvelle Aquitaine gathers three areas (Aquitaine, Limousin and Poitou Charentes regions). In such context, the superficie has doubled (from 41,308km² to 84,736 km²) and the population increased from 3.3 to 5.9 millions of habitants.

The land of the North-East Region is mainly represented by the Carpathian mountain area (in the west) on 28 % of the territory; the Sub-Carpathian area in the center and South part of the region, covering 12 % of the land and a flat land in the East, occupying 60 % of the territory of the North-East Region.

Slovenia spans itself on 2,073,000 hectares where the hills and mountains prevail (86 %) as well as the forest that covers around 60 % of territory. As a consequence, relatively small surface is available for the agriculture 24 %.

Biscay, whose capital is Bilbao, is the province with the largest size in the Basque Country. It is located in the coastal zone, between the province of Gipuzkoa and Cantabria, with a total area of 221,232 hectares. Biscay is a territory made of a sea, mountains, forests, as well as cliffs, where the natural environment supposes 80% of all the extension of the territory.All regions addressed their own Operational Programme 2014-2020 and introduced new action plans in line with the Circular Economy recommendations. The diversity of regional ecosystems was studied and infographies have been realised as a core activity during the project. Diversity could have been noted between regions but also into the regions themselves. The scale of regions remained big and face some difficulties to align with local policies and to be transparent and accessible at all levels.

The legitimacy of the partners involved in the territory, their proximity with regional policy makers, their core values and beliefs, their knowledge of the ecosystem, their perimeter of actions strongly influenced the process. The scale of the regions can influence the possibility to identify all the existing actions and make the characterisation of resources harder.

The 'spirit of cooperation' was built in the project through the value of circular and systemic design, the discovery of each territory and the force of peer-learning based on field-trips.

Brief outline of the project/ initiative's pathway

As other european projects, the Retrace project started with the design of the proposals, led by Polito, the definition of task and activities and team of the projects once the project was accepted to be part of the INTERREG Programme. For the proposal, the leaders identified key partners who had interest in the systemic approach, present the project and co-define with them the conditions for each region i.e. (1) identifying one operational programme, (2) two partners - one technical centre and one managing authority and (3) several letters of engagement from different stakeholders.

The RETRACE Project implementation started on the 1st April 2016 for 48 months later until the 31st March 2020. The project process is divided into two main phases consisting in first, the design of policy action plans and second, its implementation.

The project officially started in April 2016 with a kick-off meeting in Torino with all the partners. The nine partners have met, revised the project and received a training about the systemic design methodology that helped them to initiate each systemic design process in their region.

The co-creation process started with the organisation of a first stakeholder meeting in each region where the partners presented the project and interact on circular economy.

Then, the first phase has consisted in three main activities which are (1) the good practice exchanges, (2) the Holistic Analysis and (3) the design of action plans signed by regional entities.

Holistic Diagnosis   +   Exchange of Good Practices   =   5 Regional Action Plans

(1) Holistic Diagnosis. The activities aimed to support partners to have a better vision to the territorial activities supporting the problem definition. The HD consists in three phases: First, through desk research and interviews, each partner filled out an excel file gathering data about cultural, demographical, economic, geographical, urban areas. The Lead Partner create infographics to be disseminated locally in dedicated events. Second, partners also analysed in detail the Operational Programme and the policy context so to identify policy gaps. Third, they focus on three sectors where they analysed more in depth the input-output process and complete the policy gaps.

(2) Good Practices. Partners have identified more than 30 good practices through seven regions. Seven Field Visits have been set up in Piemont (Italy), Nouvelle Aquitaine (France), Bizkaia (Spain), Slovenia, North-East of Romania, Netherland, Scotland, with two to three months between each. Each partner selected good practices with a specific process, co-organised one field visit, created a video and report, participated to all the

other trips, invited other local stakeholders to travel discovering the good practices and were part of a peer-review team.

(3) Action Plans. Thanks to a matrix confronting all good practices and policy gaps shared and improved by local stakeholders, recommendations and potential actions have been identified. Through discussions, a policy action plan was built by region, and signed by the region. No specific methodologies or tools were provided to support the co-creation except the matrix and the action plan templates.

The second phase (2018-2020) were dedicated to the implementation phase. In that phase, partners contributed in facilitating the monitoring of the actions in each region by contacting the stakeholders and beneficiaries of the different actions and meet each semester (at least) to learn from each other by exchanging on the success and difficulties met in the implementation of their action plan. At the end, they will discuss the results, exchange and draw conclusions on the two years of action plan implementation.

Co-creation is not mentioned directly but appears as a basic principle of systemic design (people at the center) and at the core of the Retrace proposal. Partners and related stakeholders were involved at different stages of the design of regional policies. It was by participating in analytical research, in participative workshops, learning experience, implementing the actions.

The major activity of the project has been the design phase where the networks have been growing through the activities. In the second phase, that is still running, it will be interesting to analyse the evolution of the ecosystems in a context where the engagement of the core partners was less important (less human resources - less activities). Will the networks be less active or consolidated, gaining in autonomy through their integration in other structural projects? Does the exchanges in the first phase facilitate the sustainability of the projects? How?

Management & Organisation: Who interacts how to facilitate co-creation?

The project had four levels of engagements: Managing the overall project (Lead Partners), facilitating regional actions (duo of partners), participating in the core local actions (Local groups of at least 15 stakeholders), general audience (see table below).

Lead Partner: Polito		
Regions	Partners	Local Stakeholders
Piemont	Politecnico di Torino Piedmont region	i3p, 2i3T, Enne3 Incubators Smart Products Cluster Energy and Clean Tech Green Chemistry Cluster Polo Agroalimentare Cluster Turin Chamber of Commerce Systemic Approach Foundation Foundation Consulta Regionale Europea A come Ambiente Museum Polo Tessile Po.in.tex Cluster ANFIA Professional association Cittadellarte-Fondazione Pistoletto Foundation Triciclo Amiat - Gruppo Iren
Nouvelle Aquitaine	Estia Apesa	Bizkaiko Foru Aldundia, Bic Bizkaia Incubator Innobasque Bilbao Ekintza Aclima Cluster Ihobe Orkestra - basque Institute of Competitiveness AZTI - Tecnalia Research centre
Bizkaia	Azaro foundation Beaz	Council of Aquitaine. Department of Environment and Department Communauté de Communes de Maremne Adour Cote Sud Public authority Bil Ta Garbi Public authority Agri Sud Ouest competence pole on agriwaste. Cluster Xylofutur Bordeaux Science Agro Cluster Le Relais Company ECOCIRRA Project ETICOOP Company

		Basque country development council ONF IENER Company Api'Up Company CCI - Bayonne Pays Basque
Slovenia	Slovenian government office for development and european cohesion policy	Ministry for Science, Education and Sports Ministry of Economic Development and Technology Ministry for Environment and Spatial Planning University of Ljubljana Universtiy of Maribor University of Primorska Chamber of Commerce and Industry of Slovenia Chamber of Crafts and small business of Slovenia Association of Municipalities NGO Plan B za Slovenijo NGO Chamber for Agriculture and Forestry Public authority Museum for Architecture and Design Museum
North- East Romania	Romanian North-EaSt regional development agency	Ministry of Regional Development and Public Administration Technical University Gheorghe Asachi from Iasi Stefan Cel Mare of Suceava University North East Regional Directorate for Statistics Local Agency for Energy Efficiency and Environment Vaslui County Agency for Environment Protection in Bacau Vasile Alecsandri University of Bacau Municipalities of Moinesti, Botosani and Suceava SC Rossal ROMAN ADR Nord-Est - IB for ROP 2014-2020

The stakeholders in local groups have been identified, first through a stakeholder mapping (table) that permit to start organising each stakeholder. In this project, stakeholders have been defined as any person or organisation potentially, directly or indirectly, affected by

the operations of the organisation and vice versa. A wide variety of stakeholders has been involved in the RETRACE Project:

- <u>Universities,</u> which represent academic stakeholders, the research and technical knowledge in systemic approaches, Circular Economy and sustainable development applied both to the territory and the industry.

- <u>Public agencies,</u> which represent the links between authorities and companies. They transfer knowledge in the Circular Economy and the systemic approach to companies and industries, ensuring an effective transfer of knowledge with practical purposes, such as for the creation of new green products and services.

- <u>Incubators,</u> which are critical stakeholders able to develop startups oriented towards circular economy.

- <u>Foundations and NGOs,</u> which focus on environmental or circular issues, with close links with other grassroots organisations and society.

- <u>Companies,</u> which represent the business sector and are the main stakeholders with regard to the adoption of circular economy approaches in industries.

- <u>Professional associations and clusters,</u> which are a relevant for the adoption of Circular Economy practices. They represent a broad extent of the private economic sector, including companies and industries, both large and SMEs.

- <u>Museums,</u> which participate in raising awareness on environmental and Circular Economy issues.

43 % are professional associations and clusters, 14 % are NGOs, 14 % of public Authority, 22 % of incubators and 7 % of cultural institutions.

The partners have supported the process of engagement by inviting stakeholders to learn from good practices of other territories, participate in Stakeholders Group meetings, cooperate to the Holistic Diagnosis in each territory, cooperate in the implementation phase of the project, take part in national dissemination events and the final dissemination event.

Interregional interactions were built all along the project by connecting people and good practices. Existing partnerships could be reinforced by creating collective training session in territories and keep on feeding the Interreg Europe Platform which make sense for the emerging need of learning about co-creation, policy design through intercooperation.

Seven videos and three books have been set up and disseminated by the partners that represent collective activities for sustaining the project beyond the limited timeframe.

What are the concrete processes and practices of co-creation?

As mentioned below, the overall project is based on learning exchanges and on strategic design thinking process leading to Regional Action Plans (RAPs), with the engagement of stakeholders and concerned regional authorities.

The originality of these co-creation processes relied on the object of design which are regional policies for circular economies, and the values of systemic design that encourages new learning to build radical changes in the way to value territories.

For the strategic design thinking process, six phases have been defined during the project consisting in the realisation of an Holistic Diagnosis, an analysis of potentiality and critical issues, the definition of system design policy making, the analysis of possible outcomes, the implementation and the analysis of results and feedback. Partners have been supported for each step with diverse tools, recommendations, procedures while they keep on developing and consolidating a network of stakeholders all along the project.

For each activity, the selection of participants was framed by general recommendations but each partner was free to invite the stakeholders they expected to be the most relevant for the situation. At minima, the project required to identify 15 target stakeholders by region,

organise one stakeholder workshop by semester and have a signature of a regional authority for the regional action plan. For each stakeholder workshop, invitations were sent in advance with an agenda. It happened that events were organised inside other bigger events to fit the agendas of participants and have a better participation. Participative activities were happening in most of the workshops set up by each partner. For instance, in the Nouvelle Aquitaine region, a round table with a real-time sketching activity was realised as well as tasting demonstration and immersive workshop in a bicycle workshop. One of the stakeholder meeting happened during a local dissemination event of zero waste co-organised by the local waste management centre and the Retrace partners.

Among this general process, the Retrace partners act as CE educators in regions as well as innovation intermediaries between grassroot initiatives and regional authorities, sort of incubators for circular ideas that support the identification of opportunities and help stakeholders to design project proposals and answer to various calls at different scales (EU, national, regional) so to sustain this work after the project and enlarge the perimeter of territorial CE applications.

Beyond a practical instrument to systemic design, some systemic guidelines have been proposed by the partners highlighting the importance of using models as object of design to be discussed, of jungling with scales (being aware of the borders while connecting them by actions), of creating the conditions for emergence in between bottom-up/ top-down initiatives, overcoming the quantitative reflex using participative management tools to decentralize decisions and monitoring the evolution of value creation and territorial development.

The co-creation processes highly depended on the access to policies makers and the overall policy context in territories that are in permanent changes in their borders, governance and programmes. The choice to involve technical centers with managing authorities ensured an first basis for cooperation that guarantee the realisation of collaborative work and deliverables and a certain proximity with policy makers. Nevertheless, the place and legitimacy of each partner in their local innovation ecosystem could have interfered in the co-creation process.

**Specification: What tools and instruments are/ were used to co-create?**
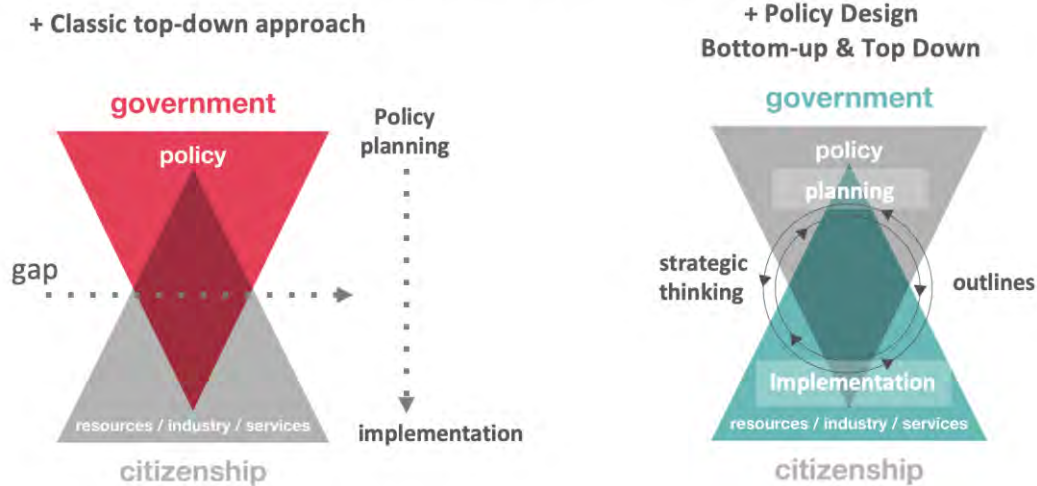
From giga-mapping, infographics, hands-on stakeholder mapping – input /output modelling activities, various tools for supporting systemic design and participative circular design tools which have been designed in the past years. In the Retrace project, two specific co-creation tools has been tested with a special emphasis given to the complex problem definition phase with the Holistic Diagnosis. The ideation phase was supported by the Policy Gap Matrix.

Holistic Diagnosis for problem definition

As mentioned before, the Holistic Diagnostic involved different stakeholders during one year of project. It is built into three sub-phases who was supported by different tools.
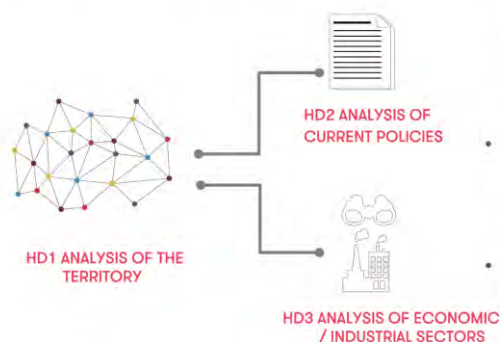
In the subphase one, partners have realised data collection through a spreadsheet, where they connected with the relevant stakeholders to be sure of the information. This was followed by infographic design realised by the lead partners, to create a visual synthesis, 'a rich picture' mixed of both quantitative and qualitative data, disseminated in local events.
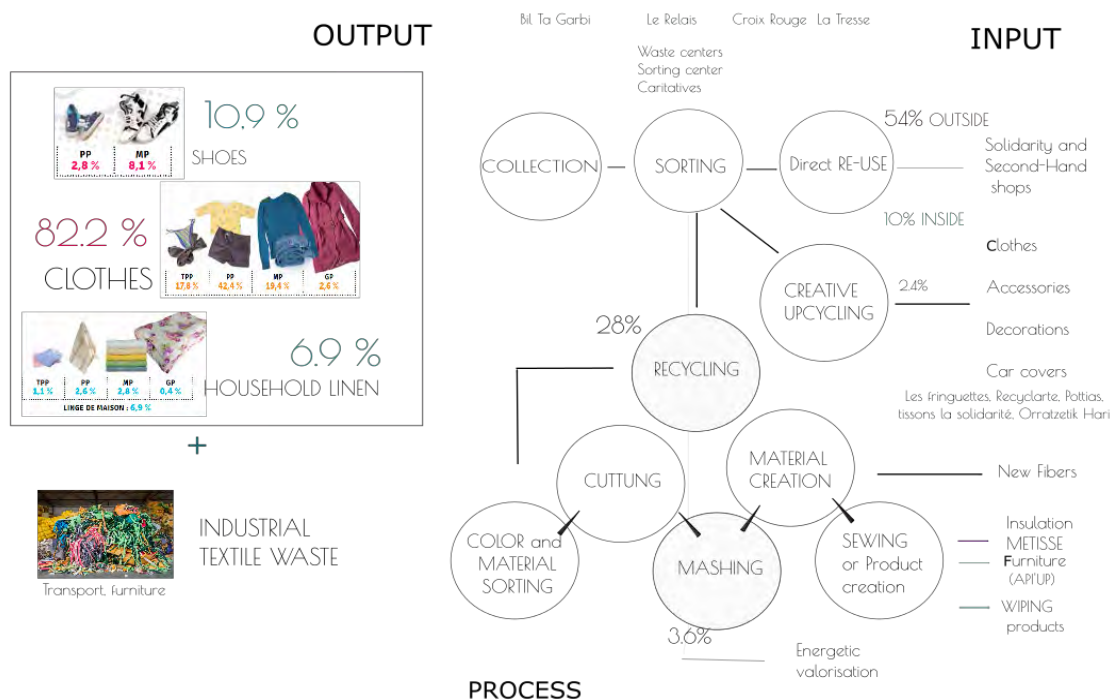
The second subphase consisted in a deep review of the operational programme. At this stage, a contact with the regional policy makers has been necessary in some regions. It was a way for partners to learn about policy making procedures, identify the frame of actions for the project and create contacts for future collaborations. The object of co-creation here is the programme themselves. Classic methods were used (discussions, interactive documents).

The third subphase was composed in a focus on three sectors of interests for each region. By additional data collection, the main output was to create input-output mapping to identify future opportunities in future sectors.

Policy Gap Matrix for policy ideation

The Policy Gap Matrix was the synthesis tool between the Holistic Diagnosis results and the activities of good practices. Combining the good practices of all regions for each policy gap, partners and their local group of stakeholders were invited to build a matrix aims to ideate, cross and combines ideas for creating the future guidelines and action plans for their territory.

Beyond these tools, additional efforts have been proposed to adapt the content according to the public and to create field experiences that enhance learning, inspiration and networking. Indeed, infographics for each region, videos for each field visit have been set up to better disseminate contents and make complex knowledge - accessible. The three books published during the project aimed to support researchers and specific stakeholders to better frame what is going in the project. Policy action plans were dedicated to the policy makers.

Which learnings emerged?

Through RETRACE, three main learning emerged beyond what was presented before.

- The case-study emphasises the role of the design in policy design as a new approach that are able to facilitate ongoing processes of transformation. The lead manager underlined the importance related to the fact that the project management was not leaded by a regional managing authority but by the design department of Polito. With new practices from other horizons, policy makers appeared quite curious and realised

that the designers can help to facilitate circular economy projects, because of the capacity of systemic design to deal with and go beyond the inherent complexity of systems.

- The Retrace project success highly depended on the first engagement of partners in the project. Due to the heterogeneity of backgrounds and the territorial diversity, it was not an easy task to build a common knowledge and transfer systemic design principles at both theoretical and methodological level. The first training and the learning experiences slowly permit to build trust while letting partners bringing creative ideas to adapt their interventions on their territory. The lead partner reminds that 'without the partners doing it', the project would not have been as fruitful as it is.

- In term of languages and communication, the necessity to compare the regions while giving spaces to local actions involves additional work than need to be taking into account in project proposal. Time and budget for translation in both directions was often discussed in the consortium. How to make the consortium fully aware of what is going? How to explain, translate and disseminate locally what is going on in other scale?

- Finally, all the Retrace project outputs were gathered in the INTERREG EUROPE platform as a way to disseminate the good practices, to foster interactions between other regions and to keep the project alive beyond its time frame. As regional action plans are built in long-term perspective, opportunities for sustaining local actions are easier to find and develop. Moreother, the partners, now experts on their field, can keep on acting locally and support other territories to run these type of processes. Due to the uncertainties of the follow-ups for the Interreg Europe Platform in the next programme, it remains some risks that the full potential of these new collaborations will not be fully accomplished or other funding strategies need to be developed amongst the stakeholders involved.

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3.3.4. <u>Case studies in other fields</u>

Museomix | International

Samuel Bausson (Ecsite)

Museummix is a 3-day hackathon that takes place once a year in different museums around Europe. Museums propose challenges to multidisciplinary teams that respond to these challenges by designing functional mediation devices as a prototype. Meuseomix works as a decentralised initiative that started 2011 in Paris with its first exhibition.

What is the project/ initiative all about?

Museomix (Rennes, France), is an event that brings networks together around innovative projects to animate and rethink a given museum. It is an independent organisation that facilitates regional 3-day prototyping hackathon-events. Supported by the French Ministry of Culture and several municipal and independent stakeholders, it helps museums around the world invite local individuals to form small, multi-disciplinary teams to develop device-prototypes aimed at (user) functional mediation. The concept was first developed in France, 2011 as a community event that combines the re-imagining of the museum-environment, promotes an open-lab atmosphere, is an opening to analyse the co-creation process as well as facilitate an introduction between individuals and stakeholders from different (governmental) sectors.

Museomix-events are an innovation of the modern museum, exploring a novel purpose for the museum-environment as a space for prototyping and innovation, and furthermore facilitating communication between diverse (local) communities, sectors and curious individuals of diverse knowledge-backgrounds. Co-creation can therefore be observed within the projects-teams, but also between the teams and the museum because the prototype outcomes ideally represent innovative interpretations on the purpose of museum space.

Each Museomix event is fit to the preferences and available facilities of each location. The scope of each event is local, eligibility of participants is only limited by their affiliation to the region. Each team (of approx. 6 participants) is guided by a facilitator, who uses their experience in prototyping and co-creation to guide the group through the process, coaching

time-management and communication within the teams. Stakeholders throughout each event are mutually dependent on each other to achieve innovation. Co-creation is achieved by sourcing, inviting and encouraging local participants to work together from their respective knowledge bases and engage in the process of prototyping for the purpose of innovation (of museum space). The results of each team-effort during the event (the mediation prototypes) are put on temporary display in the host museum.

Therefore Museomix events are a local, grass roots, multi-disciplinary initiative, aimed to ensure societal inclusivity as well as innovation of museum space. The number of partner-organisations is flexible by iteration and location, they are sourced from governmental organisations (museums and municipalities) as well as independent businesses or organisations. Partner organisations can contribute materials, but also knowledge and idea development, and are able to use the projects as a means to provide knowledge dissemination or lobbying opportunities. Local-level co-creation creates mutual awareness and relationships between citizens, interest groups and stakeholders, the potential of which far extends the practical outcome of the event.

Furthermore, an important element within the Museomix organisation is the ongoing analyses and documentation of the ideal characteristics of co-creation-based teams, and how to facilitate this process optimally (time, size, personality characteristics, team configuration, etc). Finally, structured interviews with participants help to create additional insight into the perceived quality of the project and what the future of exhibition spaces can be. The events are financed through contributions from the municipalities (amongst others: the City of Nantes, the Ministry of Culture and Communication, Naoned, the Pays de la Loire Region and the Foundation Banque Populaire Atlantique Corporate), but also sourced from participants in the form of a participation fee in order to cover basic costs.

Context and environment: Where does it all take place?

The project originated from the observation that the traditional museum format of collections and themed exhibits is limited. Though inherently valuable, this classic interpretation facilitates the risk of disconnection from the needs and interests of the community it serves. As such, the museum-environment has obvious potential and need for innovation. Continuing to evaluate and address of this potential is the purpose of the

project, with the goal of helping museums connect better into community and societal purpose.

The original event that laid the foundation for Museomix took place in the Paris Museum of Decorative Arts in 2011, and from this first edition it was recognised that a recurring project could be realised on a larger scale through documentation, analysis, reporting and community building. Coordinators observed that local organisations were required in order to facilitate the planning and organisation of individual events. As a result of this, the domain Museomix.org was registered as a resource base for documentation, reports, social media and contact details. Digital repositories of projects are freely available through GitHub, an open-source software platform. This documentation continues to be updated to incorporate recent and future events. As a realised project, Museomix has been active since 2014, when it was deployed in unison at seven museums around France and Canada (starting Nov 7th).

Original support came from the French Ministry of Culture and Communication and the project has since found additional support from several industrial and independent stakeholders, amongst whom Conrad, Iilyo, aesthetype. Though additional stakeholders have certainly been part of the project, their participation is regularly on a one-off base, depending on their location. Since its initiation, Museomix has been deployed successfully in dozens of museum locations worldwide, and the 2019 edition was hosted simultaneously on four continents at once.

Within Museomix, co-creation is achieved on two levels, innovating museum space and application through prototype design, as well as facilitate cross-pollination and mutual awareness of available knowledge and expertise of participants and (municipal, industrial, governmental) stakeholders. The operational goals of the project are local, calling on the independent creativity of citizens to foster local, functional innovation. Prototype results are put on temporary display at the host museum to serve as a tangible result of the event and as a talking point, opening the conversation to further development of the location.

Analysis of participants revealed that most participants were made aware of the event through peer communication and the availability of online resources. A significant section of participants had never visited the museum location and considered this an additional positive value to their participation.

For the project to run optimally from a practical point of view, a few contextual features are important. Beyond a museum that recognises the need for co-creative innovation, ideally there are governmental and local stakeholders available to financially support the initiative. Furthermore, in ideal conditions, (fab)lab-space facilities are also available to aid prototyping efforts and serve as an additional tool to attract participants. From an organisational point of view, local stakeholders (museum-affiliates) need to be available to generate the planning, communication and promotional efforts required to bring the event to local public attention and attract participants. Finally, Museomix has analysed the structure by which hackathons-teams are optimally supported. This resulted in the designation of an instructed facilitator to aid each team in their process. This guide is experienced in the particularities of goal setting and planning in a rapid prototyping context and is therefore able to nudge teams toward a functional prototype by the end of the third day.

Brief outline of the project/ initiative's pathway

Museomix as an initiative is a response to the need for re-evaluation and innovation in museum spaces, as beyond cultural repositories and exhibition spaces, they are spaces that have potential for increased cultural and societal value. Value and purpose of these spaces change along with the culture they are in, and as such are model candidates for innovation. In particular, the 'static' qualities of traditional museums are of limited value to the modern museum audience. As such, the Museomix-organisation set out to bring community members and local stakeholders together to participate in the re-imagination of museum space, by means of hackathon-based prototyping. Community members in turn, yield benefits through participating in creative community engagement, sharing knowledge, learning about/using new technologies and available resources and networking. Co-creation is an ideal way to facilitate the innovation that the sector is looking for, as it engages the end-user of the space in the developmental process, and inherently opens the environment up to an audience that extends beyond 'standard' museum-guests (who might be content with the traditional format). Using the Museomix-hackathon as a medium generates the optimal context for innovative imagination as it provides low creative constraints, limited time, expert guidance and clear social directives for output. Furthermore, the events provide the opportunity for gathering community information and opinion on local issues, which can be viewed as an outcome alongside the prototypes.

Innovation of the museum sector cannot be achieved through top-down (governmental) efforts alone and sourcing the local community for novel interpretations helps the sector to ask the right questions and work effectively toward the right answers. From the perspective of governmental and industrial stakeholders, Museomix also provides both a branding and communication platform, while for participants it facilitates community engagement, networking and opportunities for (technological) exploration.

Due to its success, Museomix has grown to represent the very innovation it strives to deliver. For the project to continue to thrive and serve its purpose in museum environments around the world, good relationships between stakeholders throughout each event are instrumental. The quality of the organisation ultimately relies on the ability of the results to foster innovation in the local environment, which in turn relies on the availability of space, resources, knowledge and community input. Therefore, ongoing (financial and resource) support of a core-team of stakeholders (governmental, industrial), alongside local, more temporary (municipal, sector) stakeholders is important. Local municipalities should continue to be encouraged to be involved in both the creation as well as the interpretation of the output, as the innovations are created to serve the needs of their specific environment.

Furthermore, many previous event participants turned out to be willing to turn into facilitators or experts (Ingeniousses) for future events if such were requested. Building and fostering the Museomix-expert community helps to further embed and improve the method, improve the quality of the events, and build a strong network/knowledge base from which innovation-minded stakeholders can meet and connect.
The main observation throughout the development of the Museomix project was that the quality of the events relies in large part on realistic planning by the local organisation, availability of community lab-space, the creation of diverse teams early on, and managing expectations of participants and stakeholders throughout the event. Conflicts (of interest) can usually be resolved by appropriate, clear planning and communication, which has organically led to the somewhat modular structure of Museomix events and event planning. This provides each stakeholder with a clear section of responsibility. The Museomix-team is responsible for the deployment, team-dynamic support and analysis, the local venue is responsible for generating awareness, facilities and dissemination of the output, and finally participants bring their skills and background of local needs to formulate the desired

innovation. Finally, the community stakeholders are offered the output as a mediation device for further conversation and development.

Management & Organisation: Who interacts how to facilitate co-creation?

Ideally, museum affiliates get acquainted with Museomix presumably through online researching of museum/community innovation, or through peer communication. This organisation then gets in touch with the Museomix-team, which then explores the possibilities for an event at their venue. At this stage, the process details for hosting an event are well documented and available through the website, including a financial breakdown of an earlier event to help host locations establish a picture of the scale and requirement. The Museomix team itself consists of a small core-crew, that connects and co-operates with local (temporary) stakeholders for the purposes of a single event. Beyond organisational qualities, the network of Museomix also extends to a diverse group of experts ('Ingeniousses'), sourced from the network of the organisers and through events. Because the events attract new experts with each iteration, the pool of experts that can help guide future events continues to grow.

Industrial partner organisations (for instance Conrad electronics), are happy to support these events to connect their brand to the context of innovation and deliver presence to a strong target audience. They contribute in the form of materials which add to the overall value of the event.

Desired partnerships change with each event, and as such can be attracted based on preferences. Overall, governmental and international partners are very helpful to maintain development of the Museomix organisation (keeping the website online and updated, and allowing for proper analysis and documentation of each event in order to refine and optimise the process), while local municipal and private stakeholders help bring the event to life on a local level, delivering materials, promoting the event through their channels, and if possible deliver expertise from their network. Beyond civilian stakeholders, many professional participants find the events useful for the sake of networking and professional development and are often encouraged by their employers to partake. Possibilities for the embedding of a deeper connection to regional employers are discussed in the seventh section of this report.

What are the concrete processes and practices of co-creation?

Although semblance of co-creation practises can be observed throughout the entire Museomix concept (no stakeholder can achieve the result without the others), the strongest co-creation examples are found in the ideation and prototyping phase.
Participation in the event is open and voluntary, apart from regional affiliation there are no exclusory criteria for entry. However, due to the high-level of organisation of the event and required participant-contribution, it is important to ensure participant commitment and to know their skills ahead of the event. This allows the creation of reliable groups with diverse, complimentary skillsets which can be matched to a facilitator.

Ideation can be identified both in the organisational phase of each event (as each venue has unique needs and facilities), and furthermore in the initial stages of the first day of the hackathon. In the organisational phase, museum affiliates create a vision of the possibilities of Museomix, how it fits with available facilities and create a strategy that can attract experts and participants to the event. It is through communication with Museomix, identification of regional needs and the collection of stakeholders and abilities they bring, that a new edition can come to fruition. As such the events are designed to serve the optimal co-creative process to communicate and address local needs. Though there is moderate selection in the design of teams, the result of each group represents a co-creative mediation prototype. Museomix participant analyses are generated to optimise group facilitation, supporting the process but explicitly not the outcome.

During the hackathon, the first day of the event is dedicated to getting to know the environment, the team and facilitator and the ideation phase. This day is about learning to communicate ideas within the group, deciding which concept is going to be worked out the following day and how to achieve a practical result. Again, a unique dynamic between social, material and knowledge qualities need to be combined to work out a single product in a small timeframe. The dedicated facilitator supports the group-, organisational-, and creative balance during this phase, helping to work out a timeframe, to set achievable goals.

The second day is devoted to working out the practical portion of the prototype. The building phase lasts until the early afternoon of the third day, after which the results are presented to the other teams and put on display. A completely seamless transfer from concept to product is not a realistic expectation; therefore, the prevention of problems as

well as the sourcing of solutions is rooted in knowledge and creativity as well as communication abilities of the team. Both the concept and its practical journey end up informing the result. During this day, facilitators keep an eye on team dynamic, and adapt their supporting role according to the needs of the group (communication or practical support). Furthermore, teams are requested to consider the 'cultural mediation' of their prototype. Is it self-explanatory or does it require explanation or curation for its purpose to become apparent? It is up to the teams do decide how they wish to present their prototype on the third day and indeed how it is going to be displayed in the future. The communicative qualities of the prototype have to be considered in order for it to be presented beyond the scope of the project, which is what it is ultimately supposed to do, as the prototypes are presented as exhibition/conversation pieces in service of innovation of the location.

Finally, ongoing semi-structured interviews with participants and facilitators provide datapoints that are used to inform future Museomix events. Analysis revealed that the careful fostering of team dynamics is the key to bringing out participant skills and optimizing their contribution. Ongoing feedback and critical analysis help to keep team-support efficient and effective.

Specification: What tools and instruments are/ were used to co-create?

The tools required to achieve the goals of the project are social, practical and analytical in nature.

A preliminary meeting in the form of 'Aperomix' can be considered a promotional and informational tool to help attract participants to the event. Though the meeting itself is peripheral in nature, it is faciliatory because it introduces and invites participants to get involved in the co-creative mindset and commit to the event. Once the event is ongoing, facilitators can be considered knowledge-resources, with in depth process-information and skills to guide teams toward social cohesion and the best result. Additional knowledge is delivered by expert speakers 'Ingeniousses' who give presentations and advice throughout the event. They can stimulate, debate and directly advise the teams helping them to settle different points of view and confirm or re-assess certain aspects of their prototype.

In practical terms, community lab-space is instrumental to prototyping. Beyond ample workspace, 3d-printers/scanners, laser cutters, Arduino-boards, VR-tools, creative software

as well as plentiful DIY/stationary materials and strong internet connectivity/dedicated server all help to generate a well-developed result. These tools are delivered in part by the venue, but also by industry stakeholders and sponsors.

The prototypes themselves can also be considered tools as they represent what is referred to as 'mediation devices', generating conversation and opinion on innovation of the environment they were created in. Their presentation and subsequent display represents a step toward better understanding of local challenges and the potential of co-creative activity, providing value beyond the event.

As already detailed in the previous section, the ongoing analytics of the process serve the overall quality of the project and its ability to answer to the need they intend to serve. Team information gathering breaks apart into an interview and observational component. Several participants are interviewed during the event, and semi-structured observation helps gather information that cannot be answered by direct questioning.

Finally, online media tools are used by both the venue and the organisation to report on events as well as promote subsequent events. Although online presence serves as a reference point for potential participants, peer-communication turned out to be the most effective tool in participant recruitment.

Which learnings emerged?

There were no true 'mismatches' in the immediate process of co-creation, which points to the flexibility as well as the fruitfulness of Museomix as an ongoing project. Obviously, results between events and teams do vary, and the reasons for this (in as much as they are predictable) and how they are managed are described in this section.
It is important to highlight the efforts required of the host-venue to make the event possible. The Museomix organisers provide guidance and event-structure, but primarily it is up to the region to ascertain whether there is a need for the Museomix project. A large section of planning and resource-management falls under the care of the local venue. Without a local team dedicated to the event, Museomix cannot be deployed.

In order to alleviate known hackathon-issues (idea communication, planning, time pressure and resource management, knowledge-matching teams), facilitators were employed to support the teams through the process. Their help enables the productivity of

the teams and has proved to be of instrumental value to the success of the prototypes. The main tasks of the facilitators are team and time management, as detailed below:

Team management: An important observation that emerged from team-analysis is the facilitation of organic, balanced emergence of leadership. Though the presence of members with leadership qualities is relevant to group success, overrepresentation of 'natural leaders' tends to be inhibitive to successful results. By the same coin, teams that lack members with strong leadership qualities also have trouble reaching an effective goal (prototype). Therefore, it is important that facilitators keep an eye on team cohesion, and facilitate a leadership balance that is conductive to the desired output. Furthermore, their experience in prototyping allows them to provide expectation management if required.

Time-management: teams with members that are inexperienced to the style of the event or the practicalities of prototyping (which is a normal occurrence) have difficulty with the task of time-managing their output and taking deadlines into account. Therefore, the event provides a time-structure, which the facilitator helps to implement.

Finally, in order to further generate local awareness and interest in the event, a preliminary event 'Aperomix' has been implemented to further the reach of information and potentially attract a more diverse cross-section of the regional population and knowledge base. Use of social media both by the event organisation as well as stakeholders should be encouraged early on, again to generate a wide presence and attract a diverse participant base. Furthermore, creation of documentary film footage is suggested by the organisation to explain the purpose and goals of Museomix to a general community. That said, analysis shows that peer-communication is the strongest supplier of new participants. If the goal is to attract as many participants as possible to an event, it is therefore advised to focus on optimising this mode of promotion. Due to the surprising number of participants who are recommended to participate by their employers, a new avenue of promotion can be explored by more explicit marketing to regional employers.

Because the project is regularly running internationally, part of future possibilities lies in the continued analysis of not just the Museomix events, but their outcomes. Because events have now appeared on almost all continents, a new level of comparison emerges. Being aware of communalities and differences between nations or continents could be useful, not just to tailor events to the preferences of these environments, but also to learn about perceptions on innovation and design approaches between cultures/nations. In the future, and for continued evaluation in general, it would be good to attract partners in the form of

behavioural analysts to create an exhaustive perspective on the data and its outcome. This information can be valuable not just to the Museomix organisation, but also to governmental efforts toward cultural innovation.

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Engineering Comes Home | UK

Trupti Patel and Melanie Smallman (UCL)

The Engineering comes home project applied the principles of co-design to the problem of reducing water, energy and food resource impacts in a social housing community in London. Water, energy, and food are conventionally delivered using centralised infrastructure systems. Working with community members, the co-design method identified alternative options for meeting community aspirations, reducing environmental impacts and improving wellbeing.

What is the project/initiative all about?

Engineering Comes Home is an initiative set up by Sarah Bell, a Professor of Environmental Engineering at University College London with the initial research project being based on a social housing community group in the Meakin Estate, South London[1]. The project ran from November 2015 to November 2017, the participants came from the Decima Street Tenants' and Residents' Association (TRA), was a project focussing on co-creation and was funded by the Engineering and Physical Sciences Research Council (EPSRC)[2], a UK-government funded research funding body. The project aims to apply the principles of co-

creation to the problem of reducing water, energy and food resource impacts in the community[3]. Water, energy and food are conventionally delivered using centralised infrastructure systems. Working with community members, the co-design method identified alternative options for meeting community aspirations, reducing environmental impacts and improving wellbeing[4]. The project defined a method statement for each stage of co-creation, and a series of tools to support delivery[5]. A website was developed with designers at an environmental consultancy, iilab (information innovation lab) which provides details of methods and tools for projects in infrastructure co-design[6]. Designers were heavily involved as stakeholders as the tools developed were meant to be taken up by designers and engineers. The project is not connected to Responsible Research and Innovation but the concept is embedded within the research, neither does it have links to Policy Making but does have the Greater London Authority on its advisory board[7], so has some links to regional policy making. Further, the landlord is the housing association Leatherhead JMB.

Co-creation occurred in a planned manner, through a series of three workshops with the TRA, each focussing on one stage of the co-design process: scoping, feasibility, and implementation[8]. The tools used include a variety of calculators and 'Nexy tokens'. These will be described further in sections 5 and 6. The objectives of the project were to: 1) Demonstrate a new paradigm for engineering design starting from the viewpoint of the home, looking out towards systems of provision to meet household demands; 2) Integrate thinking about water, energy, food, waste and data at the domestic scale to support user-led innovation and co-design of technologies and infrastructure; 3) Test new design methods that connect homes to communities, technologies and infrastructure, enhancing positive interactions between data, water, energy, food and waste systems; 4) Develop a robust Lifecycle Assessment (LCA) Calculator tool to support environmental decision-making in co-design[9].

Brief outline of the project/initiative's pathway

The 'story' of the project

The project took place in the Meakin estate in Bermondsey, South London. The area is currently undergoing regeneration and has a lively atmosphere[10]. In the funding application, social housing tenants were mentioned but not yet identified. Funding was

already in place when the estate was identified. The Decima Street TRA was contacted by a Post-Doctoral Research Associate (PDRA) and the positive experience means the engagement continued. The connection between water, food and energy is not often made and it was important to open up discussions about whole-system analysis amongst stakeholder groups. Sewage and water are both pressing issues in London. With a growing population, and an infrastructure system which was built in Victorian times, recently much pressure has been placed on these systems and it is beginning to have effects on the functioning of infrastructure, e.g. recent issues of fatbergs in the sewage system (Guardian, 2017). Further, the connection between this system and climate change and sustainable development has been noted[11].

A motivation behind the project was to work with vulnerable communities. As social housing tenants already have TRAs, they were easier to recruit than private tenants and as the structure already exists to gather people, this avenue was chosen. The research however focussed on the process but was designed to deliver a technological solution and as a result, behaviour change and social issues were not explored in detail. Food sharing was spoken about through the use of technological solutions such as apps and a communal fridge. The tenants had not previously thought about the food-water-energy nexus. At the time a new heating system was being installed in the building, thus infrastructure in their community was being thought about and discussed at the TRA meeting. The TRA was strong and financial rewards for participating were provided.

Problem Identification

To determine the project's approach the researchers followed the best practices available at the time in community engagement methods. They reviewed collaborative research guidelines to draft a collaboration framework and submitted this drafted plan for ethical review by the researchers' university. This included complying with data protection protocols. Alongside this, the researchers identified a set of locations and community groups as potential partners. They consulted with representatives of five place-based groups and picked the group they felt most able to enter into, and benefit from, an infrastructure co-design process – the TRA Decima Street. At this particular site, a new heating system was being installed in the building, thus infrastructure in their community was being thought about at regular TRA meetings. After initial discussions with community group representatives and stakeholders, including residents and tenants, environmental engineers and the iilab (information innovation lab whose aim is to empower social

economy with innovation and technology) they agreed a programme of activities and a timeframe. They consulted with stakeholders to understand: other works and projects happening within the community; appropriate language and approaches for the community group; a feasible number of participants to get involved (in this case 10 % of residents); local gatekeepers, and community members likely to be interested in being involved; access requirements (in this case a door fob allowing the researcher into all areas of the estate). They designed an evaluation strategy that could be used throughout the programme to assess the process and outcomes. Expectations were set by ensuring all partners and participants had a clear understanding of the project aims, processes and range of outcomes through information packs and presentations during co-design workshops. This set feasible expectations for the co-design project and informed the framework for evaluating the project.

The aims were defined to reflect the issues of expected levels of change (i.e. infrastructure and policy); expected nature of outcome (i.e. physical, design, interactional); extent of community engagement (i.e. representativeness, decision-making power); community value retention; and reflexive evaluation of activities[12]. The aims were determined by the expected level of change to be achieved by the project. The level was then used to evaluate the project processes and outcomes. Expectations were linked to the aims and expected levels of achievement. Expectations and expected outcomes evolved through the project in collaboration with the participants and these changes were captured at each stage. A project co-design framework setting out the planned activities and links to the aims and assessments was used to communicate to all participants, support realistic expectations and help with the evaluation through a presentation during each workshop. Although the project started with the intention to design an infrastructure intervention in the WEF nexus, the process and outcome were fully open for the community to influence and change. The person leading the engagement process was responsible for checking the appropriate guidelines for ethics, engagement best practices, and data protection protocols for the organisation, sector and location.

Stages and Intersections

The project began with an ethnographic study of how residents use water, energy and food resources in their homes to understand key opportunities for engineering design to improve wellbeing and reduce resource consumption organised and facilitated by the iillab, UCL and Newcastle academics. The academics from Newcastle were part of the project bid

as well as the Greater London Authority. The relationship with iilab was developed through previous work the PI was aware of. Kat Austen of iilab had previously been involved in a co-design project and had been involved in technological solutions for water stewardship through a project with the charity WaterWise. This was followed by the co-design of decentralised infrastructural systems in three workshops in 2016-2017. The first workshop identified key priorities for development from the community using a novel token-based system design method developed by iilab, to enable participants to build up alternative designs for local provision of water, energy, food and waste services. The second workshop provided participants with factsheets and photographs of the candidate technologies, which were then analysed using an LCA Calculator tool[13]. Rainwater harvesting was selected by the tenants and residents through a voting system as the technology for further co-design in the third workshop, which focussed on scaling up a pilot installation. A Pilot-scale smart rainwater system was installed in partnership with the firm *Over The Air Analytics* (OTA). The contracting of the prototype RWH was done through additional funding from the Future Cities Catapult. OTA's system enables remote control of the rainwater storage tanks to optimise their performance as storm water attenuation as well as non-potable water supply. A Lifecycle Assessment (LCA) Calculator to enable quick estimation of the impacts of new systems and technology to deliver water, energy and food, and manage waste at the household and neighbourhood scale was produced[14]. These initiatives are further explored in sections 5 and 6. Stakeholders, including utilities, design consultancies and community-based organisations, were engaged in the three workshops to inform the wider relevance and development of the co-design methods and tools. A toolbox and method statements to standardise and disseminate the methods used in the project for wider application and development were also produced and have been used within other projects conducted by the research group and made public on the website for others[15].

As this project was a pilot to help understand the use of co-design in action research, a set of statements of practice regarding: i) setting the aims, approaches & expectations, ii) characterising communities, iii) requirement capture, iv) options evaluation, v) detailed design, and vi) evaluation were created and uploaded to the website to enable other groups to conduct co-design exercises[16]. Now that these sets of practice have been developed, all projects which have been developed since by Prof. Sarah Bell, including *Community Water Management for a Liveable London* (CAMELLIA), base their procedures on these guides. Thus, some routinisation has now been achieved. Within the project, the workshops themselves were structured by the post-doctoral researcher.

<u>Development of Partnerships</u>

The TRA was contacted by the PDRA. The Greater London Authority (GLA), a devolved regional governance body focussing on London, was already known to the researcher as a previous project was conducted with them on the advisory board. Through them, the contact with the London Borough of Southwark was made. The iilab was known to the researchers as the head used was previously involved in a co-design project with a technological solution around water stewardship. Collaborators at Newcastle University were known through previous work and sandbox projects funded by EPSRC. Leatherhead JMB were contacted by the PDRA but were also known through a previous project and KloudKeeper, the company providing the rain water harvester, were known by collaborators at Exeter. Contact was made through direct email. No partnerships were terminated.

Context and environment: Where does it take place?

<u>Socio-economic Structure of the Area</u>

This project took place in a housing estate in the London Borough of Southwark and Leatherhead JMB was the landlord. The area is undergoing regeneration with increasing disparity between those of low-income backgrounds, many of whom live on the estate, and those of higher income backgrounds who have recently moved to the area[17]. The initiative however is a specific project looking at the water-energy-food nexus to understand sustainability issues on the estate. Thus, the researchers claim is not highly affected by the social disparity in the community. There was a lot of popularity for a foodbank or a communal fridge; both of which were voiced predominantly by the poorer community members, raising the social disparity of the estate noted by a facilitator. Trust between community members was also raised as members of the Black, Asian and Middle Eastern (BAME) community seemed to feel more concerned about the contents of unsealed food, also noted by a facilitator. This is observed in the YouTube videos produced and uploaded onto the iilab project webpage which document the work done during the workshops[18] [19] [20].

<u>Regulatory Context</u>

There are ethical research issues which effect the legal restrictions of the project. But, generally there are not many legal restrictions other than health and safety and building regulations regarding the energy and rainwater harvester.

<u>Economic, Political and Societal norms and values</u>

As the TRA already existed, there was already a strong community group who were ready to be engaged, especially since as mentioned previously, the heating and hot water system was being upgraded in the building at the time. The Decima Street TRA is often involved in decisions regarding the maintenance and other issues in the estate, thus this was not the first time the citizens were involved in an improvement scheme. As the landlord is a housing association and the council supported the project, back up from policy makers, especially those at the local council and Greater London Authority level was relatively straightforward. The Greater London Authority was a named partner in the research proposal. Financial support is provided by research council funders, previously EPSRC and now NERC. A colleague happened to have extra funding from the Future Cities Catapult, funded by Innovate UK, to build the rain water harvester. The maintenance of this however has now become an issue as no direct funding has been allocated to it and it is unclear if it is being used.

Management & Organisation: Who interacts how to facilitate co-creation?

<u>Internal Functions</u>

As the project is based in the university, the university researchers are the primary contact point for all other organisations and individuals. This includes the principle investigator (Sarah Bell), the PDRA (Charlotte Johnson), and researchers at Newcastle University (Richard Coombe). Other organisations sit on the project's advisory board and others offer in-kind support in terms of facilities and contacts to the TRA. The TRA itself acts as a gateway to the community and the tenants and residents.

<u>Networks</u>

This project works in partnership with the Greater London Authority who sit on its advisory board, community members from the TRA, environmental consultants, designers, and a

water efficiency charity Waterwise. The partnership with the GLA helped build awareness and relationships with the organisation as well as other groups. There was a follow-up project in Southwark as a consequence and the landlord generally became more interested in engaging the communities living in their estates through more democratic processes. This was facilitated through Leathermarket JMB, a housing association. By chance a colleague at Exeter University was funded by the Future Cities Catapult to create a demo in Southwark[21]. The TRA is a grass-roots organisation which represents tenants on issues around social life, repairs and rent within the estate. The housing association Leatherhead JMB supported the project by providing events space as well as catering. An ongoing relationship with communities has developed as a consequence and the researchers are now working with another housing estate owned by the same landlord. General personal relationships have developed as a consequence, for example a young person gained advice on applying to UCL for a degree.

As funding was won from EPSRC, a contract between the researcher and funders was in effect drawn up through the proposal and description of works. The named stakeholders (GLA and iilab) had to write letters of support outlining their contribution to the project and their expected outcomes, except for the housing association and TRA who had not yet been identified. The relationship with them was not formalised but in subsequent bids they have offered formal in-kind support.

Support

As mentioned previously, the events space and catering were provided by the housing association. The GLA sat on the advisory board and took part in discussions around the project. Iilab (energy consultancy - designers) helped deliver the workshop and developed a website on which the toolkit was placed and workshops documented. Colleagues at Newcastle University helped facilitate the workshops. Kloudkeeper manufactured a prototype rain water harvester (RWH) with Over the Air Analytics manufacturing the final one.

Desired partnerships

None at the moment. New partnerships have developed for Sarah Bell and Charlotte Johnson at UCL, e.g. with Thames Water off the back of this project[22].

What are the concrete processes and practices of co-creation?

Co-creation happened in all phases of problem identification, ideation, prototyping and verifying/testing. The large theme of water-food-energy nexus was presented to the participants but the problems within this were provided by the residents. To recruit participants for the co-design process the researchers had a recruitment strategy spreadsheet which listed all members of the target group (in this case residents of one housing estate), the sampling approach (Convenience sampling through introductions from gatekeepers, snowballing and door knocking), and the number and type of approaches (in this case one letter, three door knocks at different times of day, and one email where possible). The recruitment process started with a walk-round of the location led by a stakeholder (in this case the resident liaison officer of the housing provider) for the social researcher to understand the context and be introduced to some of the residents and representatives. The social researcher continued the recruitment process visiting the estate at different times of the day and during the weekend. This aimed to give all members the opportunity to say yes to the project. The social researcher followed lone working practices while in the community, e.g. informing others if they were to be off-site alone for research purposes. For participants who were interested in joining the project the researchers had an information sheet which listed the research process and research team contact details, the expected contributions from participants, the incentive for participation (£100 for participating in all co-design activities), the planned outputs, the data management process, and the right to withdraw. They asked participants to sign an informed consent sheet that confirmed they understood the co-design project and agreed to participate on the day of the workshop.

After recruiting a proportion of the local group to the project the research team started their 'characterising the household' series of research activities. These activities were designed to understand the social and technical context and identify points of intervention for the co-design process. There were four activities: initial semi-structured interview, home visit, diary, ending semi-structured interview. These research activities were recorded using a Dictaphone for interviews or written notes directly on the diaries. The data generated were transcribed and coded. The data were used to provide details of high & low resource intensity consumption practices, values related to these practices, and perspectives on local governance of resources, and to create narratives to be used in the first co-design workshop. The qualitative data recorded is for use in the co-design process.

The team evaluated the data and the process of its collection at the end of the data collection period. The three main aspects assessed at the end of this phase are: equality of participation, quality of participation, effectiveness of procedures[23]. This phase also provided the first data on shared values which, when evaluated with all other project data and documentation, helped to establish value persistence. The person leading the engagement process was responsible for complying with local health & safety regulations, carrying out risk assessments and following lone working practices.

Requirement capture was used to elicit values from the participants, explore the nexus space, bring out existing ideas for interventions and settle on a design space to work within, either during the workshop or through analysis of the workshop. Nexy tool materials and kit were produced. Nexy tools are bespoke hexagonal tokens that allow workshop participants to explore the nexus by creating stories around resources[24]. The tokens are open source and designed to circular economy principles. They were chosen due to their ability to allow the citizens to link abstract concepts to their everyday environment and due to their hexagonal shape the citizens were able to link them together to create story boards. They were designed to be reusable and magnetic. They were used in conjunction with location photos and magnetic boards. Participants used these tools in a workshop setting to construct their own nexus narratives. The hexagonal blocks are cut from acrylic and stamped using re-usable rubber stamps and non-permanent ink. This means you can wipe off the image and replace it as necessary. The workshop was kept comfortable. There were refreshments available; they ensured the space was comfortable and large enough; the workshop was planned to be over a convenient time, and not over meal times. Each team member including the iilab, UCL team and Newcastle team produced Field Notes during the workshop and photographs of all outputs and the workshop as it happens were taken. The workshop discussions were recorded, transcribed and coded to find the values of groups and the processes described in between the nexus elements of food, energy and water. This was used to identify the opportunities for intervention in the nexus and a matrix of values which need to be met by the design.

The next stage was the options evaluation. Once a list of options had been generated when engaging with local communities, the list was reduced to five options according to the feasibility and desirability using Option Appraisal. For the shortlisted options, detailed information about each option was then gathered and presented in Fact Sheets. Fact sheets include factual explanation on what the option is, how it would work and what the cost and

benefits are[25]. The fact sheet was kept at one page long. For the shortlisted options, an LCA Calculator was developed to assess the environmental impacts including GHG emissions, energy consumption and water consumption. In parallel, a plan for the co-design workshop to evaluate shortlisted options was prepared.

At the start of the workshop, a review of the previous stage (i.e. workshop one requirement capture), the resulted shortlist of options by using the Option Appraisal and a brief overview of the workshop, was presented to the participants. The LCA Calculator was then introduced with a simple food and waste scenario. Once the participants were familiar with the calculator, each of the shortlisted options was then introduced and discussed with the support of Fact Sheets and LCA Calculator. In the end of the workshop, a summary discussion was carried out on all of the shortlisted options. Workshop participants were then asked to vote for the top two choices of the technology options, by using a Voting Sheet. The option chosen by the workshop participants was then selected for a detailed design. The workshop was recorded (with both video and audio) for further analysis and evaluation. Field Notes were produced by each of the workshop organising team and then compared.

For the candidate design option, in this case rainwater harvesting (RWH) system, a RWH calculator was developed to facilitate the design from community residents developed by Over the Air Analytics. First, key factors affecting RWH systems including supply (roof area, type of rood pitch, and rainfall data) and demand (use of rainwater for gardening and cleaning, water pressure, requirement of pump etc) were identified. The RWH calculator was then developed, allowing users to develop different configurations of the RWH. In order to have the community members have first-hand experience on how the technology option (in this case RHW) might work, a pilot RWH tank was installed in the community alongside instructions on how it works.

Then, a workshop with the residents was facilitated. At the start of the workshop, an overview of the co-design process so far, including the results of stage 1 – characterising the communities, stage 2 – requirement capture, and stage 3 – options evaluation, was presented. A co-design process poster was then distributed to workshop participants. After the overview of co-design process, a brief presentation on how the drainage work and the importance of rainwater harvesting was given, with the support of a drainage poster. The RWH Calculator was then introduced with a basic scenario called rainwater tank with a simple process of rain-tank-overflow, followed by rainwater usage and rainwater collection

scenarios. A walk around tour was then followed to encourage community residents to learn about the drainage in their community by identifying rainwater downpipes and drains[26]. An estate map was used for the exercise. The tour was ended by visiting the pilot RWH tank installed in the community. After the tour, the RWH calculator was then re-introduced to allow participants to use the calculator to design an RWH system. An RWH system configuration table was given to all participants. The table consists of a set of design parameters, including rainwater tank size, number of tanks, area of roof that rainwater will be collected, size of pump, area of gardens for watering, and the amount of water needed for cleaning. Workshop participants were then asked to select the design parameters with the help of RWH calculator. In the end of the workshop, all participants gave their choices of RWH system configuration choices and outlined their reasons. A summary discussion was carried out to sum up the design outcome and how the community could take the system level detailed design forward. The workshop was recorded (with both video and audio) for further analysis and evaluation. A questionnaire was filled out by every participant to gather feedback on the overall co-design process.

Finally, the evaluation stage was used to reflect on the aims and objectives of the co-design process, and to assess the extent and quality of their completion[27]. During each phase of the co-design process, researchers collected and shared reflections on the co-design process. These included: fieldnotes, community descriptions (phase 1), observations and video recording (phase 2), voting sheets, and video recording (phase 3), and satisfaction questionnaires (phase 4). Co-design activities also elicit and produce materials designed to respond to specific aims and sub-goals, such as value lists, vote sheets, and visual media. All materials were collected and recorded for evaluation. Five main principles were established to guide the evaluation of the co-design process: equality of participation; quality of participation; effectiveness of procedures; stakeholder satisfaction; and value persistence[28]. The following outlines these principles and the procedures for their assessment.

The research group and iilab used the term *Equality of participation* to relate to the opportunity for any stakeholder to have a voice, act, or to influence the outcome of the co-design process. This is evaluated at two levels: stakeholder representation; and stakeholder engagement[29]. Stakeholder representation was referred to as the extent to which stakeholders who engage with the co-design process represent all possible stakeholders. To assess this representativeness stakeholder mapping was undertaken for various partners.

Community mapping happened at Stage 1 of the co-design process, characterising community demographics, including gender, ethnicity, household size, employment, and other context-specific factors. In this case the researchers found tenure and household structure to be key factors and they recruited participants that reflected a diverse range. A decision was made on expected representation in relation to feasibility (e.g. 10 %). In their case, based on their intermediary's experience of running engagement activities with the group the researchers had a target of 10 % of all households on the estate and managed to achieve 15 %. Here, stakeholder engagement refers to the extent to which stakeholders are actively involved in co-design activities[30]. Engagement was recorded for attendance at workshops and activity during the workshops. Attendance at workshops should be available to any stakeholder, and absence of stakeholders from workshops was assessed. Systematic exclusion of stakeholders may occur due to recruitment bias, practical arrangements (e.g. workshop timing, other commitments), or interest and motivation. Evaluation assessed which stakeholders are attending and which expected stakeholders were not present.

During co-design activities, active engagement can occur individually, across a number of groups and group sizes. Participants should have the opportunity to participate at each level and stage. While it is not expected that each participant will want to or feel the need to participate equally with others, the evaluation of equality of participation balances opportunity with activity. During co-design activities, fieldnotes were used to capture the extent to which each participant was provided with, and took the opportunity to, participate. This equality was established within and across co-design workshops.

Co-design activities were expected to produce discussion and other materials, such writing, sketches, and voting sheets. Ideally discussion should have been open, free flowing, and productive. The production of materials was assessed as a process and with an outcome. Measures of quality of discussion were related to the levels of stakeholder engagement in terms of production of new information, disclosure of personal experience, and creation or representation of novel or diverse ideas or experiences. This should not have precluded diverging perspectives, contradicting experiences, or disagreement. However, the researchers aimed to facilitate the discussion to be as free flowing as possible and required minimal prompting while following the structure of activities. These were evaluated through measures of frequency of facilitator intervention, divergence from topic, and turn taking. Evaluation also considered the extent to which these features helped progress towards a desired outcome or outcomes. The processes of production of co-design

materials were assessed against the outcome. Observation of the production took note of the ease of participation, at the start and while undertaking the tasks, the challenges for completion, and the extent to which participants complete the activity. Production also represented equality of participation, whereby each participant has opportunity to produce or effect the production of outcomes. Following the co-design activities, the produced material was collated and recorded, for instance, through photographing materials. The produced materials and discussion were evaluated against the specified aims for the activity, their utility to refine the design space, their diversity, the representativeness of the community values, and their overall relation to the design space.

Across the stages of co-design, the overall aims and objectives were operationalised through co-design activities. Each activity included sub-goals, data collection requirements, and outputs. For each co-design workshop a procedure was designed, which included activities and expected outcomes and timings. Following the delivery of each workshop, the effectiveness of the procedures for structuring participation was evaluated. This included assessment of timeliness (i.e. keeping to time), use of physical space, suitability of materials, and considered the equality and quality of participation as they relate to procedural design.

Stakeholder satisfaction was assessed at three levels: the overall process, the co-design workshops, and the co-design activities. Satisfaction took account of the extent to which community partners and stakeholders feel their needs are being met, that activities and procedures support them in moving towards need fulfilment, and that they are achieving satisfactory equality and quality in participation. Stakeholder satisfaction was assessed for the overall process through explicit feedback. At the final stage of the co-design process (stage 4), a questionnaire was filled out by every participant to gather feedback on the overall co-design process. The questionnaire explicitly asked participants about 1) whether the values elicited in stage 1 come through to the final outcome, 2) whether people feel like they: a) could participate in a meaningful way, b) influenced the outcome, and c) think it was valuable to participate; and 3) whether the ideas were 'co-designed' or at least perceived to be. Satisfaction with the co-design workshops was assessed through implicit feedback. This included participant retention across design workshops, wider community engagement and participant diversification, and observations regarding the quality of participation. Informal feedback from participants was also included in the assessment. Satisfaction with co-design activities was reflected in the outcomes of these activities.

Where participants were not satisfied with the activities, the quality of participation may be lower than expected.

Value elicitation is a prominent feature of the co-design process in stages 1 and 2. The activities of co-design should move these values forward, and it was therefore necessary to evaluate whether these values persist, whether needs related to those values were met, and whether the process of co-design raised or altered these values. Values should always be considered in terms of their representativeness of the stakeholders. In stage 4, values were explicitly referenced and evaluated with stakeholders against the design proposal. Open discussion supported extensive discussion on the values, and the satisfaction questionnaire was used to explore changes in the values.

The researchers are concerned the rain water harvesting system is not being used but they don't want to be too intrusive. In the co-creation process some options were not explored due to a combination of local knowledge and micro-politics. No acrimony existed however as the exercise was low stakes and hypothetical. Barriers include the usual recruitment issues. Not the same people attended each time, however the method meant the same people did not need to attend each time. A core group of people attended every session. Work/ family life and completing priorities were the most prominent reasons for people not attending everything. It would have been good to have more stakeholder involvement throughout the process. There was no opposition from the landlord or council and the research group are now working on a neighbouring estate with the same landlord.

Specification: What tools and instruments are/were used to co-create?

During the workshop co-design tools were employed – 'Nexy tokens'[31]. The Nexy tokens are designed for use in community co-design workshops as an initial tool for participants to explore potential opportunities for new infrastructure in their location. The hexagonal design and visual language of the icons allow for flexibility in the generation of "stories" of resource use at the nexus of water, energy, food and waste. In addition, narratives of the WEF Nexus were created by the participants to help understand their use of water, energy and food. Participants were asked to come up with the issues the estate needed to address, rank and vote on them to decide which issues were the most pressing. Further, ideas to address these issues were generated by the participants. This was done during the first workshop. A month later a second workshop was conducted which focussed on the

feasibility of a technological solution to the issues raised. A selection of ideas was presented to the participants with fact sheets discussing how they work and the expected outcomes. This included a waste compactor, wormery, food growing, food sharing, and rain harvesting. During the presentation the residents discussed their thoughts on these solutions bringing their own local knowledge. The participants then voted on their favourite solution – rainwater harvesting. Installation of the rainwater harvester was done in collaboration with the residents in terms of location and type as the residents brought the knowledge of how the estate was used. A smart rainwater harvester installed elsewhere was shown to the residents so they could understand how they work before one was installed on site. This section was elaborated on in section 5.

Two calculator prototypes were developed based on Lifecycle Analysis (LCA) data. Both calculators have been designed with a user-friendly front-end that allows community members to explore the quantitative aspects of different infrastructure technologies. A 'Scoping calculator' was designed using input from the Workshop 1: Scoping for use in Workshop 2: Feasibility. It incorporates many of the initial ideas generated in the first workshop, and was presented in conjunction with information sheets that explored other qualitative aspects of the chosen technologies. A Rainwater harvesting calculator was also developed. Rainwater harvesting was the final choice of infrastructure intervention by the community. During the project, the researchers collaborated with KloudKeeper to install a smart rainwater harvesting system on location. The Rainwater Harvesting Calculator was developed to enable the community members to design a larger-scale rainwater harvesting infrastructure for their location. As well as this, visual and tangible outputs were also collected as a part of the workshops which includes: audio clips, drawings, writing and photo diaries etc.

Which learnings emerged?

The tools seem to work and gave a nice framework on which to base future work. Guidelines on how to conduct co-creation at different stages was produced as a part of the project. The community learnt new things and they understood their water, energy and food use in terms of systems. With the support provided, they were able to come up with complex system dynamics solutions and understand their usage in terms of a whole system.

The technical core would have to change depending upon the context. The technical work varies dependent upon the issue/context, in this case the life cycle assessment calculator.

In addition, research ethics discourages paying people for their time. The participants were paid just above London minimum wage as they were considered to be people working on the project. The monetary incentive certainly helped recruitment. In the future however, payment would be dependent upon the group they are working with. There is much tension around the idea of paying participants, but if they are considered truly as co-designers in the project, they should be paid as if they are working on the project – they are bringing their own local knowledge, remember.

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<u>Interviews</u>

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Kat Austen

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inDemand | EU

Chiara Buongiovanni (APRE)

inDemand is a model where Healthcare organizations and companies co-create Digital Health solutions, with the economic support of public regional funds in 3 pilot regions: Murcia Region (Spain), Paris Region (France) and Oulu Region (Finland). It applies at the same time demand-driven and co-creation approaches and aims to solve the challenges

identified by the customers (the Healthcare organizations)- and increasing the capacity of health entities to systematically identify and solve their needs via co-creating opportunities

What is the project/ initiative all about?

InDemand is a model where healthcare organisations and companies co-create digital health solutions with the economic support of public regional funds. It applies a demand driven as well as a co-creation approach. On the one hand, inDemand solves the challenges identified by the customer, i.e. the healthcare organisations. Such an approach is meant to increase the capacity of health entities to systematically identify and solve their needs while creating opportunities for private companies. On the other hand, inDemand requires solutions to be co-created with professionals. The expected results are digital solutions with a high success rate in terms of their application in practice and in market uptake, being developed side by side with the client.

The process is designed and implemented through three phases: Need identification; Call for Companies; Solution development. In the latter phase, co-creation occurs as below pictured.

Figure 1. inDemand model / Phases (source: www.indemandhealth.eu/indemand-model/)

InDemand is designed to facilitate the co-creation between Healthcare organisations and the selected companies as well as the delivery of the business support to facilitate the access to the market. At the end of co-creation, the funder oversees the evaluation and payment process, and all partners of the draft of the lessons learnt and recommendations to improve the inDemand model.

Figure 2. InDemand model / Actors cycle (source: www.indemandhealth.eu/indemand-model/)

The inDemand model is currently being tested by three European regions, namely Murcia Region (Spain), Oulu Region (Finland) and Paris Region (France).

The model aims to be sustainable in time as every year Regional Development agencies, which play the role for Funders within the model, have access to structural funds. The vision is that such an approach is going to be more effective than any other current technology-push approach.

It has been developed and tested in the framework of the H2020 funded inDemand project with an overall budget of 2,499,940 €. Started in September 2017, inDemand includes cascade funding at the co-creation stage. The project is coordinated by the Spanish TicBioMed.

Context and environment: Where does it all take place?

The inDemand model responds to an explicit challenge as framed by the European Commission through the Horizon 2020 - Research and Innovation Framework programme.

Specifically it responds to *the Programme [H2020-EU.3.6.2. - Innovative societies](#) Topic [CO-CREATION-03-2016 - Piloting demand-driven collaborative innovation models in Europe](#).* The specific call is for experimenting mechanisms to facilitate the match between supply and demand for innovative ideas, as well as the development of absorptive capacities

within businesses and other knowledge users. The idea behind is that addressing such issues would facilitate co-creation knowledge among actors that better understand each others needs and language.

The inDemand pilot seems to address the following issues coming up from the innovation eco-system:

- Designing and piloting systematic ways of connecting innovation systems across Europe, so that knowledge flows from one to the other easily and meaningfully;

- Designing and piloting public/ private funding mechanisms aiming at increasing private funding participation in collaborative innovation projects, contributing to bring innovative ideas to the market;

- Piloting concrete measures favouring collaborative forms of innovation from a demand-side point of view.

The context lying behind such an approach is described by the European Commission itself, which is ultimately the funder of the entire initiative.

In the EU Commission view, facilitating open innovation would ensure that ideas and knowledge are transformed into socio-economic value for European citizens.

Adopting an open innovation approach within the European context raises a certain amount of issues asking for solutions. Those issues are mainly linked to the difficulty in matching demand and supply of ideas due to the great amount of information available and to the difficulties in communicating it. The latter issue can be aggravated by the lack of absorptive capacity and the difficulty of certain actors to formulate a demand for innovative ideas or to adopt/ adapt existing ones. Also to be considered is that in open innovation and collaborative innovation projects it is more difficult to find appropriate sources of funding, since investors might fail to identify the potential in there, and they might perceive an increased level of risk stemming from this kind of configurations.

In such a context, the inDemand pilot is explicitly asked for improving the flow of information through a collaborative model with increased business participation. By strengthening business innovation through empowering the innovators to screen, identifying and formulating a demand for relevant information, as well as increasing their capacity to absorb it and turn it into value, the initiative is meant to contribute to boosting innovation across Europe.

According to the inDemand Consortium, some interesting highlights arose from the context analysis, to be hereby mentioned:

- Intermediate organisations like clusters, business associations, and foundations result to be acting in almost every region. These intermediates connected in ecosystems have the potential to deliver much more value if just leveraged and empowered to function as a ´engine´ of growth;

- Ecosystems are not evidently in place. Although regions count with organisations in need of innovation (Challengers in the 'inDemand' model), funding for innovation (Funders) and providing business support to innovators (Supporters), they are rarely connected systematically for impact and often work in silos;

- Connecting these intermediaries (cluster, business associations, and foundations) can help to build more effective quadruple helix systems by, for example, supporting public administrations to cooperate with innovative SMEs and start-ups or accessing to new models to multiply growth and jobs at regional level.

InDemand generates value from the collaboration between local ecosystem actors, through the above described actors - circle: Challengers-Funders-Supporters (Figure 2).

Such a methodology is a common one for the three testing regions. Yet, although there is a common management model for all of the three of them, regional specifications have been included in order to ensure peculiar regional context to be appropriately taken into account. The view is to obtain the best possible results adjusting the methodology to the regional framework from the demand side and not from the offer; making the adoption easier for other regions and engaging the regional actors (key experts, top management, entrepreneurs) well before the launching of the Call for Challenges.

Brief outline of the project/ initiative's pathway

Through the inDemand initiative, 24 companies are in the process of co-developing their solutions with healthcare professionals and validate them into their healthcare organisations.

The inDemand pathway is composed by two iterations with companies in a period of three years. Each of the three pilot regions will follow the same process and similar schedule.

The inDemand process, as currently tested in the three European regions Murcia (Spain), Oulu (Finland) and Paris (France), follows three steps as hereby described:

1) <u>Need identification.</u> The challenger organisation (e.g. a hospital) identifies and selects a number of challenges proposed by the professionals working close to the problems. These challenges are selected by an evaluation team that included the top management and, once selected, are handed over to the funder.

2) <u>Call for companies.</u> The funder launches a call to identify the best company that can solve each challenge. It will leverage own funding (e.g. Regional Structural Funds) to economically support the development of the innovation.

3) <u>Solution development and business support</u>

   a. <u>Co-creation of the solution.</u> The awarded company will work with those who proposed the challenge, to jointly find a solution following an open-innovation approach. The company will then have the opportunity to directly interact with the end users to develop and test the solution.

   b. <u>Business support.</u> Companies will also receive help from professional business supporters. In particular to optimise the business model, access to private finance and future commercialisation of the proposed innovation.

All in all, going through the *phase 1* of the model, 24 needs (1) were so far selected out of the 150 identified through a call for challenges, ranging from *Child obesity support solution for healthcare providers and families* to *support the diagnosis and treatment of chronic wounds*, from *digital patient-doctor communication channel for epilepsy management* to *remote monitoring of real-life patient data to anticipate the occurrence of complications/ degradations in health status*.

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[1] The entire list of the 24 ehealth needs as selected for the inDemand approach is here reported: ACRA (Avoiding Care Re-Admission); MENUDO (Child obesity support solution for healthcare providers and families); EPITIC (Digital patient-doctor communication channel for epilepsy management); HEAT (HEAlthcare Training management platform); OSCAR (Optimisation of continuous monitoring of strokes in Neuro-Vascular Units); SAFEFOCH (Remote monitoring of real-life patient data to anticipate the occurrence of complications/degradations in health status); ePREVENT (e-consultations in the management of alcohol dependency); A solution supporting resource planning for more efficient implementation of rooms; Remote controlled mobile solution for hospital clients (case: children's asthma examination); Electronic guidance and advice pass (case: breastfeeding guidance); Electronic services before and after an outpatient clinic appointment (case: pediatric and adolescent diabetes care pathway); DEEP DIVER (Assistance in the search for diagnoses with suspicion of Professional Illness; GRAVIDITY (Digital card for monitoring pregnancy and puerperium of the Murcia Health Service -SMS-); HECRO (Support for the diagnosis and treatment of chronic wounds); DIGITAL ACTIVA (Tool to help the management and monitoring of physical exercise prescribed for health); Intelligent Screening - Using smart application in patient screening for MRI-scans; Respiratory Rate Monitor – Machine vision on respiratory rate monitoring; Smart Pain Manager; Orientation Game for healthcare professionals and students; ANONYMOUS : Anonymization of patient data for research purpose (GHU PARIS); ARNO: Non-opposition collection electronic system (GHU PARIS); MATCO: Elderly people – Monitoring of multiple data during night (GCSMS 91); A3D: Elderly people – non-invasive and easy to do undernourishment monitoring test (GCSMS 91); ONCO:Improve the long-term monitoring of cancer patients (FOCH Hospital).

As a following step, six calls for solvers were launched (phase 2 of the inDemand model), two per each of the inDemand regions, looking for solvers for the above mentioned needs. More than 110 proposals were received and 21 companies were selected to start the co-creation process. As mentioned, inDemand makes provision for two iterations with companies. During the first iteration, ten selected companies started a co-creation process of seven months with the professionals and each of them received up to 30,000 € for each challenge. During the second iteration, ten companies were involved in the co-creation period of eleven months, receiving up to 40,000 euros (phase 3.1).

The co-creation process combines group coaching, one-on-one interactions and co-creation tables. The approach varies and it is adjusted to the solution and region.

InDemand facilitates the co-creation between healthcare organisations and the companies selected as well as the delivery of the business support. At the end of co-creation, the funder oversees the evaluation and payment process and all different stakeholders involved initiate the identification and drafting of the lessons Learnt and recommendations to improve the inDemand model (phase 3.2).

Figure 3. InDemand model / description (source: www.indemandhealth.eu)

Management & Organisation: Who interacts how to facilitate co-creation?

The inDemand Consortium is made up of ten partners, namely: Ticbiomed (Coordinator) (Spain); Servicio murciano de salud (Spain) ; Instituto de Fomento de la Region de Murcia (Spain); Reseau des acheteurs hospitaliers IDF (France); Paris Region Entreprises (France) (now Choose Paris Region); Medicen Paris Region (France); Pohjois-Pohjanmaan Aairaanhoitopiirin Kuntayhtyma (Finland); Pohjois-Pohjanmaan Liitto (Finland); Oulun Kaupunki (Finland); European Regions Research and Innovation Network ASBL; (Belgium); Oulun Yliopisto (Finland).

According to the inDemand model as above described, partners play a different role, as in line with their own constituency and mission, as visually reported below:

All the partners are taking part in the co-creation phase, with a preeminent exchange between the challengers and the solvers, i.e. those private companies which replied to the call for solutions and were selected precisely for co-creating them with the healthcare organisations, through financial support from funders and advice and coaching from the supporters.

Beyond the inDemand consortium, a wider community is on the way to take shape around the model.

In order to boost innovation and share the lessons learnt, the inDemand coordinator's goal is to create a larger inDemand community of twelve more regions. In order to do so, an open call was promoted. Aragón (Spain); Centru (Romania); Cantabria (Spain); Extremadura (Spain); East Netherlands (The Netherlands); Madrid (Spain); Navarra (Spain); Piamonte (Italy); Pomorskie (Poland); Tampere (Finland) are for the time being the members of the inDemand Community, all sharing a common goal: boosting digital transformation in healthcare for improving patient care.

Added value from becoming part of such a community is that it gives the regions the opportunity for learning how to use their own and structural funds in a more efficient way. This, in turn, will help to boost digital transformation and competitiveness within their territory.

Benefits of being part of the inDemand Community are indeed identified for each type of 'actor' involved, and are featured as follows:

- More efficient utilisation of regional funds earmarked for healthcare and/ or digitalisation while fostering innovation within one's own region;

- A new co-creation and demand-driven model to be tested in the region, with a view to ensuring that the uptake of the digital solution will be more successful as it serves a real, existing and prioritised need;

- Capacity building of health entities to systematically identify and solve their needs while creating opportunities for private companies;

- Close coaching and personalised support from the three inDemand testing regions: the know-how will be transferred through technical webinars and a fully refunded training session in Brussels.

What are the concrete processes and practices of co-creation?

As above in more details described, after the first phase, named 'Need identification', and the call for solutions phase, the third phase of the inDemand model, namely the co-creation phase, gets to the heart.

The co-creation phase basically follows four steps:

- STEP 0 – Set the regional approach: Setting a specific regional approach ensures that all the required resources are available in Phase 3. Regular meetings among regional partners (healthcare organisation, supporter, funder) take place at this stage, to keep all partners updated and all views shared. Healthcare Innovation Management Units will dedicate more time to prepare and guide the involved teams so that they can understand the inDemand model and give tips on how to work with external companies. The co-creation work plan template is updated to ensure that each section in the work plan results as clear as possible.

- STEP 1 – Co-creation Management: Healthcare organisations seek opportunities to have adequate resources to carry out the development work between healthcare professionals and companies.

- STEP 2 – Business Support Management: Regional supporter organisations will offer tailor-made services to the companies during the co-creation in addition to the tools and materials provided. Regional intermediate organisations are encouraged to leverage their health and innovation ecosystems for business support.

- Step 3 – Evaluation and Payment: At the end of co-creation, representatives from the healthcare organisations evaluate the targets *vs* the results of each challenge.

The healthcare organisations will share the information of the successful solutions in different pilot regions as well as the inDemand Community to enhance the potential scalability of the solutions and the adoption for use.

The inDemand scheme seeks a space for co-creation among different innovation stakeholders, whose roles can be described as follows:

- Supplier private company *(the Solver)*: in other words the solution provider.

- Public entity *(the Challenger):* identifies the unmet need and frame it in the form of a challenge. It will also work in close collaboration with the *Solver* to co-create a solution.

- Funding organisation *(the Funder):* launches a competitive call to select the best *Solver* for each challenge. It also provides the economic support to the *Solver* to carry out the development of the solution.

- Intermediate organisation *(the Supporter):* delivers support to optimise the business model, access to funding and commercialisation of the Solver. It will also mobilise the local business ecosystem.

To be remarked that, in the second phase, once the healthcare organisation has selected the challenges, the local funder takes the role to oversee the identification of the best companies to co-create a solution with healthcare professionals. For this selection, the funder launches a public, competitive call. The funders – i.e. partner organisations that manage European funds and are experts in grants and the launch of calls for proposals - have received a financial contribution from the European Commission in the form of cascade funding to be transferred to the awarding solvers for each challenge in the two interactions. The calls are aligned with the requirements and internal procedures of those ones regularly launched at local level - e.g. eligibility criteria, % of funding, etc., in order to assess the model under real-world conditions to maximise the chances of adoption once the project will come to an end.

Specification: What tools and instruments are/ were used to co-create?

The co-creation process combines group coaching, one-on-one interactions and co-creation tables: the approach varies and it is adjusted to the specific solution to be co-created as well as to the regional context.

The pilot regions adapt the defined minimum requirements according to the regional resources they can take advantage of when creating their own regional approach for phase 3 implementation. A regional approach is required to ensure coordinated actions among challenger, solver, supporter and funder organisations. In the regional approach, the most important activities will be defined, still respecting the given workflow: i.e. inDemand Project kick-off day for the solvers, co-creation with users, group sessions, one-on-one meetings, test trial period and the co-creation final event for companies.

These regional approaches are shared with the rest of the consortium partners for feedback, knowledge transfer and validation. An example is provided in the picture below, concerning the co-creation and business support process in the Murcia region.
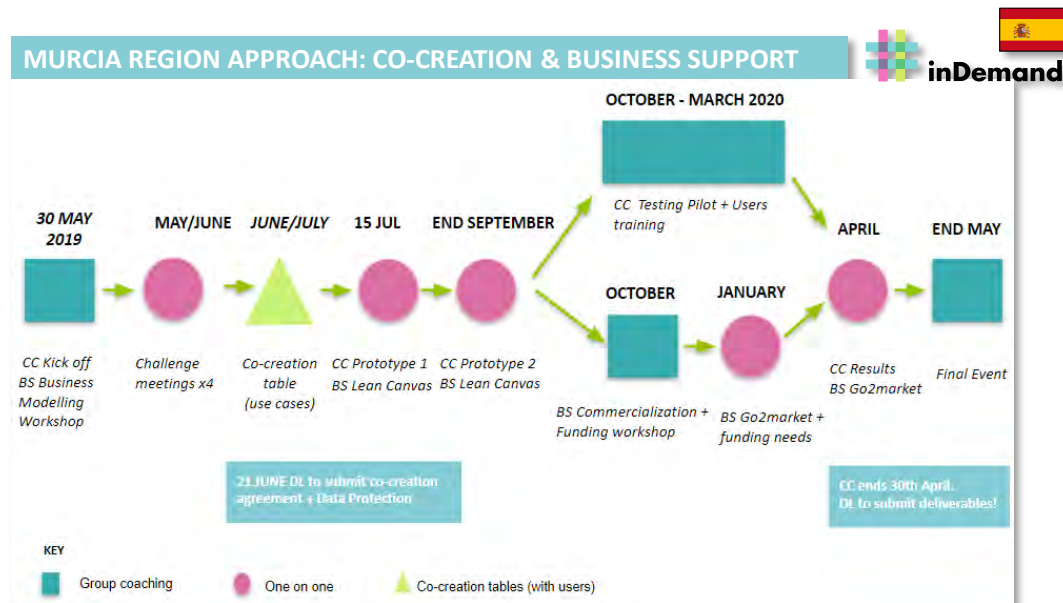
Figure 4.InDemand model / regional approach for the first iteration

A methodology has been defined to coordinate challengers, solvers and supporters from the different regions with a view to enabling them for properly managing the internal work plan. Several activities are to be performed before co-creation and business support interactions start, as the creation of a common framework has resulted to be the key for success. Below, a brief of the needed activities and steps to ensure an effective co-creation process.

- Initiate discussion with each company on the business model approach to identify the specific needs;

- Set a personalised framework including planning for the co-creation period, including the following information: team, calendar, milestones, deliverables, and description of the interactions. Some important specifications need to be highlighted:

    o All materials will be prepared in English (to ensure knowledge transfer), while the implementation may be completed in a local language (challenger organisations' requirements for the co-creation language may differ);

    o There will be at least three business support face-to-face interactions coordinated with the co-creation interactions;

    o Based on the needs of the sub-granted projects, the supporter will assist companies to access services provided by inDemand consortium partners, such as coaching by experienced and qualified coaches, validation with business plan experts, support in the definition of a market development

strategy and business scaling for target markets, and targeted support to access private capital market.

- Provide training to companies focusing in three areas: validation of the business model, access to funding and commercialisation;

- Manage the follow-up of the implementation: when a milestone is reached, a joint assessment will take place and corrective measures, if necessary, put in place. At this stage it is important to discuss these needed measures with all relevant stakeholders.

- Report the co-creation results. Said in further details, at the end of the co-creation process:

  o Solver and challenger interact to discuss the targets *vs* the results of co-creation;

  o Solver and supporter interact to discuss the final go-to-market strategy and find out if any other business support is needed;

  o Solver reports the result to the funder, providing them in the set format.

Which learnings emerged?

Beside the overall on-going testing approach of the inDemand initiative, some learnings have emerged so far, which can be summarized as follows.

- The regional government sector could play a key role to increase regional excellence by changing the way regional actors work together within a quadruple-helix approach;

- Healthcare organisations can benefit from such an approach as the one proposed in the inDemand initiative is not just in terms of efficiency and effectiveness, but mostly important in terms of cultural change;

- Motivation and commitment from professionals and the all diverse stakeholders involved is highly affected by the relevance of the issue, the appropriateness of the need description and the accuracy of the process;

- In such a sector with strong scientific expertise (i.e. healthcare) the uptake of innovation is much more easier and impactful when all stages are shared and planned following an integrated view;

- Co-creation is not to be meant as an isolated step but it is to be designed and assessed in connection with any of the stages within the entire value production process;

- 'Such an approach resulted to be a really agile and inspiring way to dig into the needs of professional', an inDemand challenger said;

- The inDemand model results to be easier and faster to implement than other demand-driven instruments like PCP. Interesting enough, all challengers agree on this.

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E-FABRIK' | France

Tanja Klimek (TU Dortmund University)

This project brings together differently abled people and young adults who are neither in employment, education or training (NEET) to design and build prototypes which respond to the everyday need of differently abled people by using digital fabrication tools in a collaborative design process. E-Fabrik is based in the greater Paris metropolitan area and run by the NGO Traces. Today, it has involved 600 participants in the creation of more than 60 prototypes, which are documented and shared in open source formats.

What is the project/ initiative all about?

'E-FABRIK" is a French digital education project based in the greater Paris metropolitan area and was started 2015[1]. It is run by the Paris based non-profit organisation 'Théories et

Réflexions sur l'Apprendre, la Communication et l'Éducation Scientifiques' (TRACES) and 'Les Atomes Crochus', a company of the organisation TRACES and focuses on the area around Paris[2]. Originally, TRACES and Les Atomes Crochus were thus two non-profit organisations with different focuses. Les Atomes Crochus targeted towards the public (children, parents, families, schools, etc.) and TRACES towards the professionals of science communication. As the projects of the two organisations became more and more interlinked, they were merged into one under the name TRACES.

The key idea and concept of E-FABRIK' is bringing together differently young people, especially disabled people and young adults in NEET (neither in employment, education or training), who do not have access to digital innovation to develop, design and build concrete solutions and prototypes which respond to the everyday need of various disabled people, using digital fabrication tools and digital resources of their area in a collaborative design process.

The five main objectives of the project at the interface between digital, social and professional inclusion of disadvantaged young people are summarised below[3]:

- Bringing together young people and people with disabilities in a creative community

- Designing and building concrete and open-source solutions regarding the everyday needs of people with disabilities

- Linking organisations from different fields: disability, youth and digital creativity like fablabs

- Seizing new technologies through active solidarity and becoming an actor in its territory

- Learning new digital tools by applying and developing new competences

Co-creation can be considered as a central part of the project because it is used in every step of the workshops. Connecting social and health issues and digital technologies attract diverse participants who may not initially be interested in one or the other subject, for example women. By bringing together diverse groups of people who might not otherwise intersect, the needs of one group of stakeholders become a resource for the other and vice versa. This will be deepening in section five of this case study, in which the different educational offers including the co-creation processes in E-FABRIK' are described in more detail.

TRACES is funded by many different resources: European union funding, French public funding (national, regional, and department), private funding, and selling benefits. E-FABRIK' has the same kind of budget, although this project has fewer selling benefits than the TRACES budget. It is an ongoing project for which funding is constantly being sought. There are also plans to transfer the project to other French regions[4].

Brief outline of the project/ initiative's pathway

The idea of E-FABRIK' is not the result of a co-creation process. It was created by Céline Martineau and Vanessa Mignan, two project managers of TRACES, based on their practical experience with young people and referring to the overarching strategy or mission of the main organisation, TRACES:

It is important to our association that the people participating to its activities get a gratifying and empowering experience of science and technology. We have learned that when it comes to scientific concepts appropriation, it is not so much about access to scientific knowledge, but about creating or fostering interest for it, about bringing meaning to its acquisition. It is the same for education to the digital world: learning it has to go with a personal meaning given to it by the learner. This is what we are offering in the E-Fabrik' project: to give a meaning to the development of a digital literacy through social connections[5].

Of great importance for the idea of E-FABRIK' were also the digital communities and maker movements that promote individual and collective creativity, even the re-appropriation of technological and digital production of objects and ideas.

After some time of successful implementation, the grass-root approach is retained, but at the end of each season the feedback, ideas and needs of the participants, practitioners and partners are taken into account. In this way, a 5-month training program was initiated (le Parcours E-FABRIK)[6].

Context and environment: Where does it all take place?

E-FABRIK' is based in the greater Paris metropolitan area. Paris is the political, economic, and cultural centre of centrally organised France. This is also illustrated by the number of

inhabitants: almost every fifth inhabitant lives in the capital city. Thus, the city had just over two million inhabitants at the beginning of the 21st century[7].

In total, there are around 12.82 million in the metropolitan areas of Paris. This makes Paris, along with London, one of the most populous conurbations in the European Union in 2018. This also reflects the high degree of urbanisation of France compared to the other member countries of the EU[8].

Paris belongs to the Île-de-France region and is at the same time city and a department. The city consists of 20 districts; each district has its own administration[9]. Anne Hidalgo is mayor of Paris since 2014, nominated by the 'Parti Socialiste' (PS). She is the first woman in this function[10]. Influenced by the Corona Pandemic, the first round of the current French local elections saw a historically low turnout of 44.7 %. The second round of voting was postponed to mid-June[11].

Overall, the French population continues to age: people aged 65 and over account for 20.5 % of the population. People aged between 20 and 59 make up half of the population[12]. In 2019 France's unemployment rate was just under 8.5 %[13]. Unemployment affects young people in particular. This can be explained by the fact that few young people are active before the age of 25 and those already in the labour market are generally poorly qualified and therefore have an increased risk of unemployment[14].

Thus, E-FABRIK' addresses the problem of youth unemployment in addition to digital and social inclusion by providing young people with a variety of skills in a problem-solving situation, such as meeting commitments, working in teams and using complex digital media tools[15]. Due to the ongoing process of digitalisation, digital competences play an important role in all areas of life.

In the interview, Paris and the surrounding area are described as a progressive area, which has a positive impact on the development of E-FABRIK' because many experiments take place in this area and are supported by the political and economic structures. So it is described as easy to receive back up from politicians on respective levels. Furthermore, there are many projects, organisations and initiatives that have an inspiring effect. The fact that many people (20 % of the French population) come together in Paris and that it is a very international region with many different structures, cultures and ideas make Paris and the surrounding area an innovative environment.

Management & Organisation: Who interacts how to facilitate co-creation?

The E-FABRIK' network includes at least 50 partners from public or private sectors who have different roles and tasks. They can be divided into the following fields:

- Ile-de-France organisations that participated in the project

- Financial partners

- Education and youth partners that work with young adults

- Digital and design partners

- Research and higher education partners

- Organisations that host and work with disabled people

The supporting actions of the partners include financial support and/or funding, personnel and staff support, infrastructure provision, idea development, planning and co-creation of workshops, leading and training the participants, knowledge provision like creating educational content and spreading the idea of the project.

The project partners are in lively exchange and coordinate the project in addition to emails through personal meetings, joint trainings and official events in which all partners and participants participate. In summary, the exchange and cooperation with the various partners are an important part of the E-FABRIK' idea.

What are the concrete processes and practices of co-creation?

The term co-creation is not used directly, but it can be seen as a central part of the project because of the key idea and concept of bringing together differently young people to develop, design and build concrete solutions and prototypes using digital fabrication tools and digital resources of their area in a collaborative design process. Because of this, co-creation takes place in each of the following phases: problem identification/ understanding, ideation, prototyping, verifying/ testing, and feedback and iterate.

On the one hand there is 'the challenge' ('Les défis'). It is an educational program that takes place over 20 half days. The challenge combines a local youth and disability structure and a place of digital creativity. Together, concrete solutions are developed in order to react with digital tools to the difficulties of a person with disabilities in everyday life[16]. Examples are

an egg timer that changes color at different times of the day and is intended for people with autism so that they know what time it is or a device that supports object counting by lighting up a blue light as soon as the required amount has been entered into the device[17].

Young people with and without disabilities in Île-de-France, educational structures that work with young people, facilities for people with disabilities and digital communities, do-it-yourselfers, designers and engineers can take part in the challenge. In a co-creation process young people, so-called trainees, design prototypes together with people with disabilities, as partners. The aim is to bring together different young people with and without disabilities and to facilitate an exchange. This creates unique projects[18]. A season of E-FABRIK' ends with a festive regional event that includes all the participants and should give recognition to the participants and their achievements[19].

Due to the success of the approach, a five-month vocational training at the interface of digital production and social linkage was initiated. 'E-FABRIK' training' ('Le parcours') is an intensive personal and professional course for young people between 18 and 25 years who wish to:

- Build an innovative and original professional project

- Invent and create new and useful objects for the handicap

- Learn how to use digital manufacturing tools (3D printer, laser cutter, connected objects, etc.) and train yourself in 3D graphics and modeling software

- Meet and work with people with disabilities

- Participate in a collective adventure and solidarity with other young people

The focus is on the co-creation work of people with and without disabilities to invent and create new and useful objects. Learning takes place through practice and teamwork. The course is aimed at people who live in the Seine-Saint-Denis department and have a very various profile (origin, gender, job seeking, no degree, disability, graduates). The training is free. Depending on the resources and income, it is also possible to receive a scholarship from the Grande Ecole du Numérique. This vocational training is co-financed by the European Social Fund under the National Operational Program 'Youth Employment Initiative'. Since the project started it has involved 600 participants in the creation of more than 60 prototypes which are documented and shared in open source formats[20].

But co-creation does not only take place between the participants. For example, the professionals who work with people with disabilities help to adapt the workshop better to the needs of people with disabilities. Co-creation also takes place between the trainers because they work together on new educational content. In addition to the target group, the professionals also benefit, by having the opportunity to meet with other professionals in the field and by getting a space for reflection on their practices[21].

Specification: What tools and instruments are/ were used to co-create?

As already explained, co-creation is a central part of the E-FABRIK' concept, so that many different tools and methods are used. The use of the following tools and instruments within the project to co-create is usually really new for the participants:

- Gamification techniques, for example, Lego Serious Play to learn electronics with Makey Makey and Micro Bit

- Prototyping and testing represent the aim and the reason to be of E-FABRIK'. The participants are just all the time prototyping and testing with their team members

- Visual or tangible output like audio clips, drawings, writing, photo diary in order to document the projects

- Co-Design tools and methods like the 5-Why-Method, persona methods, diverge and converge and discussions

Which learnings emerged?

In the interview it was stated that various discrepancies and barriers have occurred within the co-creation processes. The lack of communication between participants is referred to as the main barrier. This includes, for example, that wording and language were not compatible, because disabled people and young migrant adults do not speak the same language, and some of them do not even speak. This can lead to creative processes being prevented. Other obstacles for the co-creation processes in E-FABRIK 'are power asymmetries, wrong selection of stakeholders, and insufficient integration of the user perspective. In addition, the professionals who work with disabled people work in completely different timing and work atmosphere than designers or fab managers. Despite

such difficulties, it is explained that the mix of people and kind of structures is always the best way to go toward innovation and to involve participants.

During the project it was observed that bringing together young people from different backgrounds and people with disabilities created and / or strengthened social connections. In addition, it was possible to create and strengthen a dynamic partnership between neighbouring structures that are brought within the framework of the project, notably in the 16 targeted areas, half of which are located in disadvantaged neighbourhoods[22].

The following learnings were made for a successful process:

• Making explicit the value of each stakeholder participation for themselves and for the others

• Recognition of the contribution of each stakeholder

• Creating an environment of mutual support

• A well-structured and clearly communicated methodological process

Regarding the use of co-design tools, it was explained that they are very useful when they are used for a real context and that they are more useless, if it is just a game or if the activity is just a pretext to use them.

Other general insights from the actors about the project are that it is sometimes difficult to 'finish' the individual project if it is too difficult or if it needs more time than scheduled. The hardest part is always to confront the ideas of the participants and the reality of the construction of the object (skills, time, materials, and prices).

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Innovation Loop Region Västerbotten | Sweden

Eva Wascher (TU Dortmund University)

The innovation loop wants to engage every sector of society and especially students, politicians, scientists, seniors, entrepreneurs to give them the opportunity to 'be the change they want to see in the world'. The innovation loop is a process formed and currently implemented in the county Västerbotten, in the northen parts of Sweden. The main purpose is to create the best possible atmosphere and excellent opportunities for ideas and innovation to flourish.

What is the project/ initiative all about?

The Innovation Loop is a one-year innovation process of Region Västerbotten in northern Sweden. The aim is to develop innovative projects with citizens, private companies and

public administration as well as students from different higher education institutions. Citizen-driven development and international cooperation is especially important to the Region to solve societal challenges and to foster regional development. The process aims to create a working environment for everyone involved, in which actual co-creation takes place for the collaborative development of socially innovative initiatives. The Innovation Loop consists of different event formats that build on each other to develop ideas from event to event in an annual cycle. The single stages of the Innovation Loop are linked by different workshop formats at changing locations, which are not only locally limited to the Västerbotten region, but also take place nationally in Sweden (e.g. annual conference 'Västerbotten på Grand Hôtel' in Stockholm in January and the annual political summit 'Almedalen' in Gotland in summer). At the beginning of a Loop year, an extensive planning phase takes place in which a suitable topic is searched for, found and presented and discussed at the 'Västerbotten på Grand Hôtel' conference in Stockholm. This will be followed in early spring by a series of Idea workshops in which dedicated actors come together with experts from various sectors and form project teams. The topics are also partly determined by the sponsoring of the Idea workshops. The participants of the Idea workshops are therefore selected and invited to specific topics. The collected ideas will then be developed a few weeks later at a two-day side event of Mötesplats Lycksele[1] (meetingplace Lycksele). Mötesplats Lycksele is a regional trade fair. In autumn, prototype workshops will follow, where the teams will discuss their action plans for innovations, etc. in front of a specialist audience, the best ideas are selected and thus receive the financing of a feasibility study for their project idea. Ideally, project teams will form at the beginning of the year, continuing to accompany their idea over the entire period. However, there is also a high turnover within the project teams during the annual cycle, which often means that there is no sufficient willingness to implement the measures by the actors involved. Furthermore, with the Innovation Loop, the Västerbotten region originally aimed to support business start-ups. However, the Innovation Loop is more suitable for creating collective innovation capacity building and empowerment for the region and building new network partnerships.

Context and environment: Where does it all take place?

The Innovation Loop is a one-year innovation process of the Region Västerbotten in northern Sweden. Västerbotten has a land area of 55,190 km^2 which is about 1/8 of Sweden.

In 2018 the population was about 268,887 inhabitants. This means that approximately 2.65 % of all Swedes live in Västerbotten. It is a rather sparsely populated region. Region Västerbotten is a government body with a responsibility of coordinating political fields such as health care and regional development within the county. This includes health care and dental care, public health and social welfare, public transport, regional development and culture as well as research, innovation and education[2]. Region Västerbotten is preparing and deciding on the use of state funds for regional growth. Overall, Region Västerbotten has about 10,000 employees of which 5,700 people work at the University Hospital of Umeå making it northern Sweden's biggest workplace. The political landscape is led by the Social Democratic Party (S) which gained 35.5 % at the last elections in 2018. This is followed by the Moderate Party (M) and the Left Party (V) which both gained each about 13 % of all votes.[3]

17: Region Västerbotten in Sweden (Source: Region Västerbotten 2018)[4]

The Innovation Loop was created for providing space for collaboration among different actors in the region in order to tackle societal challenges that are often related to rural development. For example, for the Region as a governing body it is difficult to engage local actors in innovative environments and networks because of a lack of key network infrastructure as well as changing demographics and the pressures this is putting on the welfare state system. As opportunities to take part in innovation ecosystems is more difficult in sparsely populated areas and in smaller municipalities, the region puts effort into developing methods and tools to strengthen innovation power throughout the county

by taking care of creativity and creative power of actors who are not usually found in already established innovation systems. The city of Umeå as well as other bigger urban centres along the Baltic coastline of the region often have good logistical services by roads, railway, ports and airports. Though infrastructure in the more centrally located rural areas of the region need to be improved. On the other hand, Västerbotten has three universities and many innovative businesses, clusters and networks which provides for a high level of knowledge and skills capacity. Furthermore, northern Sweden has one of the most advanced digital and broadband connectivity networks of Europe. Altogether, Västerbotten's challenging context enables opportunities for innovation. Especially, long-distance infrastructure and communications networks are developed and can be tested for different technical and social service solutions. This knowledge-intensive environment has already given rise to several extensive initiatives of interregional and transnational collaboration such as the Arctic Investment Platform and other initiatives with actors around the Baltic Sea Region. Key industry sectors in Västerbotten include high-tech processing industries, forestry, energy and cleantech, life science, ICT, and service industries.[5] The Innovation Loop is part of a network of actors, organisations and platforms that encourage innovation for the region. Therefore, it is also a part of innovationbyumea.se[6].

**Brief outline of the project/ initiative's pathway**

The Innovation Loop is a process formed and currently implemented in the county Västerbotten, in the northern parts of Sweden. It is a tool for innovation development to advance inclusive, innovative and reflective societies. The main purpose is to create the best possible atmosphere and excellent opportunities for ideas and innovation to flourish and to strengthen the regional innovation system. It was first implemented by Region Västerbotten in 2014.[7]. The Region has been organising and running the Innovation Loop as a co-creation event. It consists of a cyclical well-structured co-creation process whose mission is to allow the co-generation of innovative ideas and prototyping these into innovative solutions (products, services, processes) towards regional innovation ecosystems. Each year new themes are identified between the region and different sponsors that would like to engage in a Loop year. Previous themes have been Talent for Growth, Culture –Driven Growth, Border – Crossing Meetings as well as Digital Transformations. Ideally, the process follows three main phases: 1) Co-identify problems

and ideas to solve them; 2) Co-generate solutions; 3) Implement solutions. These phases correspond to different event types. In the beginning information events such as the annual conference 'Västerbotten på Grand Hôtel' in Stockholm in January and the annual political summit 'Almedalen' in Gotland in summer are used to present the Loop idea and discuss objectives. Different Idea workshops are conducted where different topics are discussed and ideas are developed for possible solutions. Prototyping workshops are the conducted closely connected to the annual trade fair of Mötesplats Lycksele usually each May. Meeting place Lycksele is a partially participant-driven conference with seminars, creative workshops, awards and other meeting formats. The aim of the whole two-day event is to revitalise the region, secure its attractiveness in the future and further develop the innovation climate. It is a power gathering of inviting, engaging and including everyone in the county. Each year more than a hundred peoples join the event. By creating commitment and changing attitudes, the venue opens up for discussion and interaction between opinion leaders and different regional actors, including citizens. The Development Workshops as part of the Innovation Loop take place in parallel with the conference. They are meant for conceptualising and then prototyping outcomes of the Idea Workshops. Finally, concrete prototypes of services and products are developed often for the benefit of the region.[8]

In autumn, prototype workshops will follow, where the teams will discuss their action plans for innovations, etc. in front of a specialist audience, the best ideas are selected and thus receive the financing of a feasibility study for their project idea. Ideally, project teams will form at the beginning of the year, continuing to accompany their idea over the entire period. However, there is also a high turnover within the project teams during the annual cycle, which often means that there is no sufficient willingness to implement the measures by the actors involved. Furthermore, with the Innovation Loop, the Västerbotten region originally aimed to support business start-ups. However, the Innovation Loop is more suitable for creating collective innovation capacity building and empowerment for the region and building new network partnerships.

The Innovation Loop targets all actors in the region with an interest to innovation development. This includes academic and research institutes (public and private), private business companies (of any size and any sector), government bodies (regional but also local and national level) as well as citizens and the media. This follows a broad quintuple helix approach.[9] It is one of the key aspects of the Innovation Loop that the process reaches out

to engage every sector of society – students, politicians, scientists, seniors, entrepreneurs etc. One of the major impacts of the Loop is that people that have been involved in the co-creation process learn about this type of innovation process and build their own innovation capacity (for themselves and their organisations). The Innovation Loop has been considered as relevant Good Practice (GP) in the Interreg Europe database.[10]
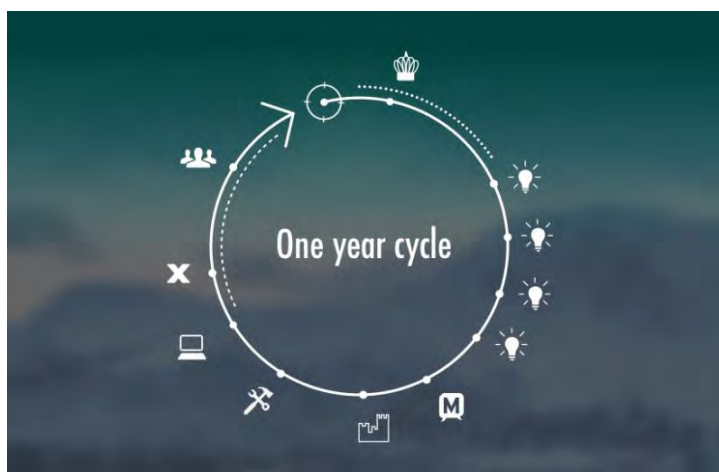
18: Ideal type of Innovation Loop yearly cycle (Source: Hägglund, Region Västerbotten)

Management & Organisation: Who interacts how to facilitate co-creation?

The Innovation Loop started in 2013 as a spin-off of a practice transfer tool from the University of Umeå. It is now implemented under the Communications Department of Region Västerbotten. The Innovation Loop engages up to 1,500 people per year, including approximate 35 public sector organisations and about 35 companies. A yearly budget of 1 million euro is usually invested in the whole annual cyclical initiative by getting financial support from different regional projects and stakeholders.[11] Throughout the years, Region Västerbotten has supported the Innovation Loop financially as the main organiser. Thereby, the overall process Innovation Loop was coordinated by a project manager of the regional administration with a share of about 20 % of his working time. One important part of the Innovation Loop, Mötesplats Lycksele (meeting place Lycksele), is also mainly financed by the regional administration. Furthermore, the feasibility studies for projects, which are selected at the end of the Innovation Loop, are also funded by the regional administration. For the other event formats within the process, new cooperation partners and sponsors have to be found every year. Consulting companies are used as subcontractors to implement the individual workshops. Documentation of the co-creative

progress is an essential part of continuous improvement. Many workshops within the Innovation Loop are documented by videos, e.g. of the pitches done by participants.[12]

What are the concrete processes and practices of co-creation?

Region Västerbotten coordinated the Interreg Europe project 'Open Social Innovation policies driven by co-creative Regional Innovation ecoSystems (OSIRIS)', with a consortium consisting of seven regions from all over Europe (Apr 2016 to Sep 2020)[13]. The project aimed to implement plans for open and social innovation. Solutions to future societal challenges are designed with the help of citizen-driven development, in an international and regional ecosystem.[14] With OSIRIS, the Region wants to further develop the Innovation Loop method for regional innovation support. From a policymaking perspective, the Innovation Loop provides a framework to communicate with stakeholders about actions and implementation progress in the region. But most of all it is an instrument for conducting participatory processes that involve policymakers, academics, businesses and above all citizens interested in the northern Swedish public sector for innovation and regional development. During the interregional exchange of experience activities in the project, the Innovation Loop has been used in several co-creation events in all seven regional and local territories, focusing on introducing an Open Social Innovation approach and tools for strengthening regional development and innovation strategies and improving policy instruments.

Finally, all learnings form the OSIRIS project went into an evaluation of the Loop and an action plan based on these findings was developed for Region Västerbotten. This process consisted of interregional exchange of experience events and so-called Local Stakeholder Group Meetings (LSGM).

The interregional exchange process during the first phase of the project used the Innovation Loop for designing co-creative workshops in all other five OSIRIS regions (Ostrobotnia, Trento, Drenthe, Western Greece, Presov) and municipality (Fundao). The interregional workshops positively stimulated the co-generation of ideas for the design of the action plans of all project partners and provided key feedback for improving the Innovation Loop itself as a tool for participatory governance. The co-creation workshops were followed by study visits and staff exchange. This way, key knowledge on open and

social innovation has been developed and shared among by policy makers, civil servants and local stakeholders of Region Västerbotten.

Learnings from the Region of Ostrobothnia: Knowledge of using open and social innovation for strengthening smart and renewable energy solutions (www.rakennerahastot.fi) including energy efficient housing solutions. This can be done with the help of stimulating synergies between projects through an 'Innovation Loop Express', providing eye-opening and educational events and to open up social participation in ongoing projects to create synergies.

Learnings from the Autonomous Province of Trento: Knowledge about using open data to drive innovation and territorial growth. Gathering open data e.g. from the European Data Portal (EDP) and using this through co-creation events (e.g. the open data lab) can provide useful insights for participants and their ideas, prototypes etc. Innovative tools such as 'hackabots' (i.e. hackatons + chatbots) can be included into co-creation sessions and it is important to analyse other Open Social Innovation tools and success cases for adoption.

Learnings from the Municipality of Fundao: Knowledge about teaching children computational programming (e.g. Academia de Codigo initiative). The Innovation Loop will look at children in the near future as a key target to gather needs of the population for co-designing new policies in education, social inclusion and welfare. Furthermore, Region Västerbotten will further examine how municipalities can stimulate socially innovation initiatives and attract new projects for territorial development. This includes to consider the Innovation Loop as a tool for planning and governing policy instruments.

Besides the interregional exchange among OSIRIS consortium partners important learnings emerged from the local Stakeholder Group meetings organised during the OSIRIS project in Västerbotten. Four of the meetings took place in Umeå and the other four took place in Lycksele. All outcomes of local stakeholder meetings converged towards the need to strengthen the Innovation Loop. Therefore, a SWOT analysis has been undertaken which can be summarised to the following results[15]:

Strengths

- Owned by the Region with support of the Managing Authority;

- Good brand identity built since 2013;

- Well-established co-creation and citizens-driven innovation concept in North Sweden;

- Four years of learning by doing;

- Budget availability to organise it and to reinforce brand awareness (i.e. 1 million Euro per year).

Weaknesses

- More updated website content and social media communication;

- Competitors offer a broad range of tools and services for co-creation;

- Co-creation approach, methods and tools need to evolve;

- Better use of open data and tools;

- Weakly includes social innovation cases;

- Lack of partners and participant engagement;

- Need KPI to track the process;

- Lack of resources to develop new digital tools;

- Difficulties to further develop it in rural areas without a digital tool.

Opportunities

- Central for contributing to Västerbotten ongoing PI, new PI, RDS, RUS and Digital Agenda;

- Synergies with the pilot made by OSIRIS PP2 to customize the Innovation Loop in Ostrobothnia;

- EU funding calls (e.g. H2020) leveraging the uptake of co-creation;

- Open social innovation EU and regional initiatives rely on co-creation and quintuple-helix engagement.;

- Digital transformation benefiting from co-creation approach.

Threats

- Risk of declining interest due to the expansion of the Region;

- Changing the organizational process inside the region towards open collaborative governance;

- Rising concerns on data privacy and security;

- Intellectual Property Right (IPR) generated during co-creation still necessitates clear IPR management rules at any level;

- Hybrid business model engaging governments, business and citizens to co-design and co-deliver services still unproven.

The modular structure of the Innovation Loop makes it flexible and easily implementable for other regions. One partner, Region Ostrobothnia in Finland, has included the Loop idea in their action plan. A Loop pilot was set up in the Finnish region and adapted to the local conditions[16]. Other OSIRIS partners are also including the Loop idea in their action plans based on the learnings that were achieved with the adoption of the Innovation Loop during the project activities. Eventually, the Innovation Loop was included in the Interreg Policy Learning Platform as a Good Practice (GP) for co-creation and innovation.[17]

For example, at the European Week of Regions and Cities in Brussels in 2018, OSIRIS organised a workshop focusing on digital transformation. The workshop was aimed at generating new ideas and sharing experiences between experts and regional representatives from all over Europe. During the seminar, Region Västerbotten presented its concept and methodology for open social innovation. The Innovation Loop has come to be used as a good example to show the importance of citizen-driven development to solve societal challenges. The participants had to test the method on a smaller scale to find solutions to societal problems through new technology.[18]

Specification: What tools and instruments were used to co-create?

Overall, the whole Loop cycle follows the three phases of 1) Co-identifying problems and ideas to solve them; 2) Co-generating solutions and 3) Implementing solutions. The different event formats during the Innovation Loop, such as Idea Workshops or development Workshops, all follow similar design-based innovation methods. Four types of meetings during the Loop year can be distinguished: 1) Information meetings, 2) Idea workshops, 3) Prototyping workshops and 4) Implementation Workshops[19]. The Innovation Loop uses co-creation methods from Design Thinking and Service Design as well as co-creation web-tools and platforms. The whole Innovation Loop process is digitalised to a

certain extent. Making documentation of workshops available for sharing and using it for the next event formats. This is especially important in sparsely populated regions such as Västerbotten[20].

The different workshops have often been facilitated by sub-contracted agencies. Most often Innovation Impact, Dohi Agency[21] and Nicke Berglund[22], innovation consultant, were in charge of organising and moderating the workshops together with employees from Region Västerbotten.

Often, the co-design workshops have similar programmes. An Idea Workshop usually takes off from a brief with a theme comprising visions, identified needs and a general background to a challenge[23]. Workshop participants are then grouped into smaller settings and time is given for an introduction round. In the beginning, participants are asked to explore the brief and to start generating ideas for the specific challenge. Participants are invited to come up with as many different ideas as possible, including ideas that seem to be risky, unimplementable or utopian to the context. Following that, each group has to select their best idea from all the ideas that had been collected before. If the group cannot easily agree on the idea to choose the can use a voting system, merge two good ideas into one or try to 'sell' one of their good ideas to other groups that might not have a satisfying idea at that stage of the process. In the next phase groups have to conceptualise their idea further. This follows a typical innovation method, e.g. NABC. In the Need's part (N) participants have to explain what specific customer needs they are serving or solving. In the Approach part (A) they have to detail their specific solution to the need. In the Benefits part (B) they have to highlight the advantages that their solution might have in contrast to other possible solutions. In the last part, Competition (C), the group has to examine which actors might be competitions in that context and which other possibilities customers might have instead of choosing their solution. The whole process is accompanied by certain deliverables where participants have to engage in presenting ideas and concepts either in their group, up on stage in front of the whole audience, in a short 'elevator pitch' video or in written documentation.

Language is one important aspect of the methods. Usually, the workshop material is prepared in Swedish and English and workshops are only conducted in Swedish if all participants are able to speak Swedish. As soon as one of the participants does not speak Swedish the workshops are held in English. This enables a high inclusiveness for workshop

participants. People then try to create a good mix of Swedish – and English-speaking working groups, including mixed language documentation.

Which learnings emerged?

For Region Västerbotten, there are several learnings on macro and meso -level. In particular, the Innovation Loop is an instrument that makes the innovation ecosystem of the region more inclusive. It enables better collaboration between research and established business resources and includes other actors of the innovation system. The adoption of co-creation workshops of the Innovation Loop can better catalyse young people, women and people that migrated to Västerbotten. Including more stakeholders with different resources contributes to fostering intersections of ideas from different sectors in the region and from other regions and nations. This can positively influence the Upper Norrland Regional Development Fund (ERDF)[24] approach with new collaboration and cross-sectors projects linking research and industry. Though, the 'intersections' between different research areas and industrial sectors that are funded with the programme stay in the realm of 'traditional innovation systems', not following a quintuple helix approach as envisaged by the Innovation Loop concept. Nevertheless, the cyclical approach of the Innovation Loop might improve co-creation tools for engaging meetings within and between sectors and different types of enterprises, organisations and areas of expertise, leveraging open data and open knowledge. Regarding this, the Innovation Loop is examined to function as a tool for participatory governance. This might increase research and innovation collaboration between academia, trade and industry, public authorities and civil society. Furthermore, this increases the innovation activity in enterprises and strengthens the development of and access to innovation-support systems and environments. This way, the goal of putting more products and services on the market more quickly could be achieved and as a result of collaboration, the region's research, education and innovations can develop and become more attractive and relevant to trade and industry, researchers and society.[25]

The theme direction of the Innovation Loop each year is closely connected to funding challenges. As Idea Workshops are funded by sponsors, most often topics for co-creation are related to requirements by the sponsor. On the other hand, this means that certain challenges of the region cannot be tackled by the Loop because there is no funding for the topic available.

There are also several learnings on micro-level. Another challenge that the Innovation Loop process is facing is that workshop participants sometimes do not have concrete 'take-aways' from the workshops. Regional stakeholders that have been engaged in the workshops are interested to receive new added value from the activities performed during the workshops in terms of knowledge and solutions co-generated. This creates the need to update and evolve the Innovation Loop co-creation approach, e.g. to further implement a reward-system for participants. Furthermore, the annual cycle aims at including participants from the start of a year to the end of the process. This is more or less difficult for different participants. Employees of companies or public authorities usually cannot invest as much time into the process as students can do or members of some civil society organisations, e.g. for senior citizens. Groups that worked together in one workshop will therefore likely not be able to work as a team in the following events. It is generally difficult for teams to continue in the Loop in their initial group constellation. Participating in the Innovation Loop as a master's student sometimes yields a direct job advertisement, because the Loop gathers important actor of the regional innovation system.

Finally, one of the most important learnings for the Innovation Loop is its ability to create a level-playing field for all participants. Most people meet at the workshop for the first time without knowing each other's background. All participants have to start with their ideas from scratch. Talking English in groups might additionally contribute to an initial feeling of 'awkwardness'. But usually after a while, participants feel much more welcome and secure in their team constellations. In the end, people are often really excited about ideas and concepts that they have worked on or learned about during the event. Eventually, learning about the way the Innovation Loop works enhances the innovation capacity of each person involved.

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Fab City Grand Paris (FCGP) | France

Kate Armstrong (Fab Lab Bcn) and Marion Real (Fab Lab Bcn)

Fab City Grand Paris is a local network of makers, designers, architects, urban farmers and innovators engaged in the rise of the circular and collaborative economy in the Parisian urban area. The fab City prototype is an experimentation of the fab city approach on a part of Grand Paris. It is a POC (proof of concept) aiming to show the possible scenarios of the local, circular, distributed production, and the challenges and issues of a viable model at the scale of a city or a territory.

What is the project/ initiative all about?

Fab City Grand Paris (FCGP) is a local network of creators, designers, architects, urban farmers, innovators, Fab Labs, think tanks and design offices engaged in the rise of the circular and collaborative economy. It is the Parisian member of a global network, The Fab City Global Initiative (FCGI). FCGI is a loose organisation comprising a globally distributed network of cities, a collective of core researchers and a location independent foundation. The project was launched by IAAC | Fab Lab Barcelona, MIT's Centre for Bits and Atoms, the City of Barcelona, and the Fab Foundation in 2014. It was established to foster a new urban model for cities to produce what they need to sustain human activities locally, while sharing globally information and knowledge in a collaborative approach. Fab City has amulti-layer and multi-scale approach to reach the goals of Fab City: the Full-Stack model. The multiple scales engage a top-down, bottom-up approach from citizens through to policy makers who are connected through action locally and at a distance through the network distributed infrastructure, new forms of learning, distributed design, territorial prototype, platform ecosystem, and cities network for policy and governance.
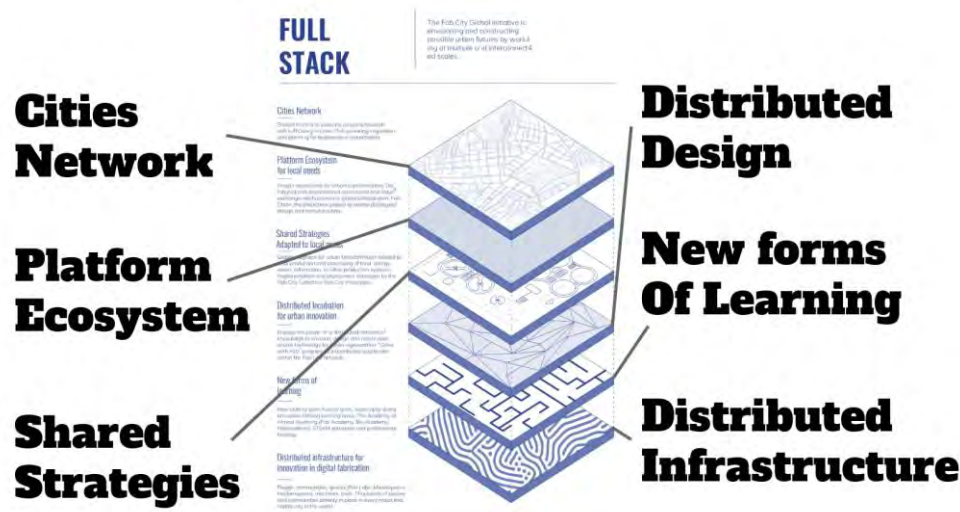
Fab City Full Stack, 2019

The initiative is centred around a challenge to reduce a city's environmental and social impact, by starting a transition to produce everything they consume locally by 2054. There are currently 34 members of the Fab City Network: Barcelona, Zagreb, Thimphu, Shenzhen, (the country of) Georgia, Curitiba, Occitanie Region, Puebla, Mexico City, Auvergne-Rhône-Alpes, Amsterdam, Cambridge (USA), Kerala Region, Sacramento, Plymouth, Hamburg,

Yucatàn Region, Belo-Horizonte, Ekurhuleni, Brest, Boston, Toulouse, Santiago, Velsen, Seoul, Oakland, Somerville, Detroit, Kamakura, Sorocaba, Rennes Region, São Paolo and Recife. To join the network as an official member, each city must have a consortium which includes membership from at least a civic, government and Fab Lab interest but may be organised under any form of governance.

The interest in Fab City developed in Paris through personal connections between key local stakeholders and Fab City instigator Tomas Diez. The original connection was made through alumni of the Fab Academy programme in Barcelona, where Tomas Diez is the Director. Paris joined the Fab City Network of cities in 2016. In July 2018, FCGP and City of Paris hosted the annual the Fab City Summit, an international gathering of the global community. More than 10,000 experts, professionals and citizens joined the event. The FCGP Association was established in the lead up to the summit in 2017 to facilitate both the co-creation of the summit activities, specifically the Fab City Campus (a Fab City prototype and Proof-of-Concept space) and subsequent future tasks required to meet the Fab City challenge of local productivity as well as provide a fund-raising capacity. In France, an Association is a legally binding entity which comprises a management team (president, treasurer etc.) and in the case of FCGP an Advisory Board.

Context and environment: Where does it all take place?

FCGP is located in Paris, but is focused in the 19th Quarter in the north of the city. The location is specific as many of the activities take place within gentrified urban spaces that have been redeveloped into communities, small business, creative business or cultural spaces. Our interview subject told us that the demographics of the association reflect educated and affluent Paris, but contextually it was suggested that this is important as much as the strategy is focused on research and the engagement of SMEs, industry and policy makers who in many ways also reflect this demographic. The wider cultural context of the Maker Movement from which FCGI stems is important in contextualising the approach of the association, which champions making, productivity and local circularity. The Fab City Campus which was implemented in Parc de La Villette, a main public park in Paris to coincide with the Fab City Summit, hosted many hands-on, citizen centric activities around these themes and attracted 10,000 citizens from Paris. This set a tone for the FCGP activities in that it exemplified the need to engage people in the maker-centric movement of

Fab City. This may be why the Summit, AGM and public workshop/open day gathered many representatives from existing organisations such as citizen and community groups, activist groups, makerspaces, fab labs and education centres suggests our Advisory Board member interviewee.

In a general sense, the core co-creation processes of FCGP happens at the association level, with inputs from public sessions. The agenda of the association is created by its members with inputs from the Advisory Board and decisions are taken by majority vote. The Advisory Board is a key source of knowledge and represents stakeholders from the Parisian Maker and SME ecosystem.

Importantly to the context of FCGP, the FCGI approach to capacity building and innovation takes a multiscale approach, from citizens to policy makers. One event, the Fab City Lab, of the 2018 Summit was hosted by the Ville de Paris and Paris City Council with Mayor of Paris Anne Hidalgo and Mayor of Barcelona Ada Colau. Following this collaboration, the City Council appointed an officer to work directly on the Fab City agenda. This is the first of its kind in the global network and sets a benchmark for other cities. Our interviewee was not certain how the relationship worked exactly between FCGP and the association, but there was a firm answer that FCGP applied for and receives funding through tender processes. During interview it was suggested that FCGP has a successful working relationship and is well supported by Deputy Mayor of Paris, Jean-Louis Missika who is in charge of town planning, architecture, the Greater Paris projects, economic development and attractiveness.

A member of the FCGP association board also sits on the Supervisory Board of the Fab City Foundation, the non-profit governance body of the FCGI.

Brief outline of the project/ initiative's pathway

The FCGP Association mainly comprises representatives of Parisian maker and local production community and is focused on the implementation of small to medium scale interventions and prototype activities which can serve as action research for the Fab City challenge. This includes specific focus on the Fab City Store, Fab City Research Hub and Food Lab and Urban Farming facility. Each project aims to implement the Fab City 'Full Stack' model.

The key actors of the FCGP were associates before engaging in the Fab City initiative. The initial motivation to begin FCGP and therefore create the Association came in 2017, when Paris was awarded the European Capital of Innovation by the European Commission. This global recognition meant increased opportunities for investment in activities which boosted innovation and civic urban initiatives. The three key founders of FCGI, who each represent SMEs in the maker movement, design, development and architectural fields in Paris, were involved in leveraging this opportunity, with the support of the founder of FCGI, to bring the annual summit to Paris. The connection between the key actors in Paris and Barcelona was made through the Fab Lab community. With the support of the Paris City council, FCGI and FCGP were awarded finances through a bidding process to implement the summit with a special focus on the Fab City Campus prototype space. The summit was conceived as the kick-off of the Fab City prototype areas in Paris, which have become a strategy for a series of long-term local initiatives in different urban areas that will shape Paris' future as a more locally productive city with a circular economy strategy.

The annual general meeting of FCGP was held 26 January 2019. This was the meeting of the associated members, advisory board and was open to a public audience. To enable the long-term local activities at each level of the Full Stack model, FCGP hosted a public workshop/open day following the AGM to co-create working groups around specific thematic areas which had been proposed during the annual general meeting of the association. Thematic areas: 1) Fab City Territorial Prototype, 2) Fab City Store, 3) Foodlab and Urban Agriculture, 4) Radiation and International Collaboration, and 5) Fab City Research Lab. These thematics created working groups began discussions around possible strategies at the public workshop/open day with the aim of continuing these through action and action research.

The key aims of the FCGP association is to promote the Fab City movement locally through the organisation of the Fab City Summit in Paris in 2018 and then to perpetuate the deployment of its approach. The association also wishes to participate in the reflection and overall strategy of the international network of Fab City.

Two research projects are also key to the FCGP narrative and play important role in the implementation of their local co-creation strategy. The Creative Europe funded project Distributed Design Market Platform (2018-2021) which is the structural and strategic research basis for the work being done in the Fab City Store working group. REFLOW is a Horizon 2020 EU funded research project which brings 28 partner together across Europe to

implement six pilots around circular material lifecycle in cities. Paris will be one of those six pilots, supported by the FCGI. The engagement in EU research consortiums strengthens the FCGP through funding and connectivity with other Fab Cities. It also provides opportunity to engage paid workers under certain research or project implementation tasks.

Management & Organisation: Who interacts how to facilitate co-creation?

FCGP is an Association Loi 1901, a term used in France for a non-profit-making organisation of two or more people. The FCGP website describes the network as a 'local network of makers, designers, architects, urban farmers and innovators'. It includes a logo-list of members of the association, but a confirmed public list of active memberships is not available. FCGP processes membership to the association using the online tool Helloasso.com. There are two kinds of annual membership offered: Supportive and active member for an organisation, 100 € and Supporter member and active individual 20€. The benefits of membership made publically available. Members of the association 'apply the Fab City vision naturally' says a representative in an online article, which illustrates how the association too is a community of practice like the Global Initiative.

The association meets through both board meetings and annual general meetings. The board comprises key actors, who are the founders of the FCGP: Francesco Cingolani an Architect and founder of Volumes; Minh Man Nguyen, an Architect and founder of WoMa; Vincent Guimas, an educator and founder of Ars Longa and Sarah Goldberg founder of Bagel Lab. These actors are key to facilitating the funding and connections to the local and global FC network. In the interview it was suggested that the approach of the board is 'top-down' as the association establishes their position both locally and in relation to the FCGI. It was suggested that as both organisations are fairly young, the roles of each (local, FCGP and global, FCGI) are not well established and this cause some confusion during decision making. The example given was the naming of the Fab City Research Lab, a large project to legally occupy a gentrified space in the north of Paris. There are currently conflicts in naming the space and understanding the trademark, benefit and costs associated with naming the space 'Fab City' as opposed to naming it using a local organisation's name. Further inquiry would be needed to understand the state of this discussion/conflict and to

understand what method is being taken to resolve it as it is a discussion occurring inside a working group/discussion group the interviewee is not a member of.

Following the first AGM in 2019, working groups were set up through a topic round-table event. Given strategic themes from the agenda of the association, the themes gathered interested parties from the Parisian ecosystem to discuss approaches to these themes. Themes included 1) Fab City Territorial Prototype, 2) Fab City Store, 3) Foodlab and Urban Agriculture, 2) Radiation and International Collaboration, 5) Fab City Research Lab. The interviewee suggested that this model of co-creation was decided through a round-table approach. The roundtable approach was used to facilitate debate on each of the themes. It was not used to take decisions, it was intended that this process would be the beginning of a discussion phase around these themes that would later become a practical working group. It was indicated in the interview that this process is still ongoing.

What are the concrete processes and practices of co-creation?

Co-creation is crucial to the Fab City multiscale approach. Collaboration is key to the implementation of the Full Stack, it follows a 'community of practice' approach in that each aspect of the stack is implemented individually, yet is interconnected, at least in purpose.

The model of Fab City is interesting in the way it practices co-creation at both local and global scale using Fab Lab practices of prototyping and documentation of an open source sharing as a mode of knowledge exchange and development. On a local level FCGP is in its infancy with their approach, namely because the target of their cooperation is the year 2054. In terms of reflecting the SISCODE co-creation journey the project has an inherited problem, which also drives the global collaboration: the global reliance is on a linear economic model. Locally, Paris has understood this problem as a need for the city to innovate to evolve the economic model it relies on. It has been assumed as an urbanisation issue, from the perspective of the built-environment and business models. It was discussed in the interview that the ideation stage has been undertaken by the board, who developed the subjects for the public roundtable sessions, and was then expanded upon in the roundtable sessions with members of the public. This phase of the co-creation process is still ongoing.

However, through research into the summit and Fab City Campus delivered by FCGP in 2018, the complete SISCODE co-creation process is evident. The campus was co-designed through roundtable and discussion tools with local actors and facilitated by the four founders of the association and the FCGI team. The prototyping and documentation of an open source sharing as a mode of knowledge exchange and development is evident in that the approach taken to build the FC Campus in Paris is now inspiring the new Summit which is in development in Montreal for August 2020.

Specification: What tools and instruments are/ were used to co-create?

As mentioned, co-creation is crucial at the global level of FCGI and at a local level in Paris. It was implemented during the development of the summit and is currently being worked on by the FCGP association.

For the Fab City summit, the collaboration between the partners permits to build three major events: the Lab, the conference and the campus dedicated to different types of audiences and with different types of access, duration and activities. During one day the Fab City Lab gathered local political leaders, experts in innovation ecosystems and companies that were invited to share experiences and best practice around concrete projects to demonstrate their collective commitment to the Fab City movement. It consisted of three conferences and three workshops. The Fab City Conference was a two-day event designed as a cross-disciplinary mix of the best ideas and practices from the Fab City network destined to professionals. A fee of 150€ was asked to participants with a reduction to 30€ for students and unemployed people. The conference was divided in different types of topics (emerging, possible, reversible, scalable), sectors (wood, textile, plastic...) and activities (11 meetups, 1 party, 7 talks, 16 workshops) run by a large diversity of local and international speakers and facilitators. Finally, the Fab City Campus was a one-week free event for families, exploring productive cities in a hands-on, fun environment with more than 40 stands, various participative activities like bike-tours, DIY workshops, and other forms of performances.

Beyond the summit, the following tools were being used to assist this journey of the FCGP: Problem identification/Understanding. *Open discussion* and *stakeholder mapping* are the key approaches being used at this stage. Whilst not included in the interview, it was found through additional desk research that one member of the association has carried out an

analysis of the Fab City stakeholders Parisian ecosystem. Through non-formalised means the ideation process has been carried out in the organisation of the AGM and public open day/workshop using *roundtables* with specific themes as a tool. At the association level, *membership* by payment is used as a method of inclusion and *voting* is used as a decision making method.

Which learnings emerged?

The key learnings of the FCGP project can be described in seven points:

- The power of « design global, manufacture local »: The project is a good practice of how local and global actions can support and reinforce each other. The co-construction of the summit between FCGP and FCGI, the diverse partnerships in EU projects and regular contacts has enhanced the proximity between the stakeholders. While local actions are transformed into good practices for other cities, tools and projects provided by FCGI are inspiring FCGP in building their activities.

- Global branding vs local appropriation? The case-study shows the complexity of the identity construction of co-creation processes in a specific territory, which needs to be build in between language, local culture, openness and transparency. One example is the discussions that occurred to find the right names of the local project. The Fab City is branded in English, so the issue occurs how parts of the french public won't feel excluded because of a language barrier.

- The diversity of funding strategies – weakness or strength? The Fab City case-study shows the need to diversify the funding strategies, to be agile to both EU funds and private/public partnerships. Behind the difficulty of the ongoing system to effectively fund in a sustainable way long term initiative, the members of Fab City look for diverse ways to pursue their project, with the objective to be as self-sufficient as possible locally and use the global network to support key investments and disseminate results.

- An adhesion for a common vision to engage people. The Fab City case-study is based on a clear and inspiring vision that seduced and convinced a lot of partners to be part of the challenge. This vision was built through discussion and a clear communication strategy, activities on social media and through key publications.

- <u>The use of prototypes at the city level to enact a vision.</u> The originality of the case-study, in term of co-creation the cities are themselves prototypes for building new productive models. This means the timeframe is radically different so it could happen for product or service. In that case, prototyping is the only way to enact the vision and to propose system changes.

- <u>The use of existing networks to consolidate and experiment further.</u> The case-study is based on existing networks and communities that facilitate the realisation of activities both locally and globally. The Fab Lab Foundation and the Peer2peer community act both as value keepers and springboards to impulse new projects like Fab City.

- <u>Gathering ideas and ideals through one event, as a demonstration to buildemerging futures.</u> The case of FCGP shows how far it is possible to envision new scenarios thanks to the creation of events. In a short period of time they created moments, sort of ephemeral living lab where people are immersed in future models of production and new ways of living, where they can interact with people in fictive scenarios already building new partnerships for more tangible activities.

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4. Innovation Biographies

The biographies focus on questions of how one particular co-creative process has emerged, evolved and overcome barriers – or not. In writing an Innovation Biography, we try to assess how a socially innovative practice developed and encountered successes and barriers in specific contexts through a co-creation process.

4.1. Theoretical approach: The social innovation spiral as a heuristic model for the innovation biographies

The 15 biographies serve to deepen SISCODE's understanding of innovation processes, develop-mental trajectories and stakeholder interactions at the micro-level of the single co-creation initiatives in specific contexts. It is important to note that biographies are not stories of the organisation conducting the innovation, but rather of the innovation process that occurs in an original surrounding.

The co-creation biographies in SISCODE follow an approach of in-depth interpretation and analysis of narratives of participants and initiators experiences of co-creation practices in relation to the larger cultural matrix of society. The key methodological principle of innovation biographies "is to follow the innovation idea by analysing the interactions of innovation actors (Butzin 2013). Through the combination different stakeholder interviews as well as desk research, it will be possible to reconstruct co-creation processes from the first idea to its implementation. Thereby the foundation (e.g. preliminary stakeholder mapping) has already been built up through the survey and the 40 case studies (D2.1 and case study writing). Writing an innovation biography is a methodology from qualitative research that allows the structured display of results in analysing innovative ideas and reconfigurations of social practices (in example via design). In innovation studies, case-study research decisively builds upon generalized assumptions about how innovative practices come to light, as well as on presumptions towards the determining factors and variables of an innovation.

The social innovation spiral as a heuristic model for the innovation biographies

The overall goal of Task 2.3 is to collect and connect sufficient contextual information on the concrete practices / cases to describe their specific co-creation culture and 'innovative ecosystem', and their path-dependencies in the overridden narrative of social change. The

case-studies already are one part of the biographies and contain a broad overview on the necessary information. The following figure exemplifies the underlying process model: It is a heuristic description of typical stages a 'co-creation process' case will go through – or not, because there are always exceptions from the rule.

The social innovation spiral (Murray et al., 2010)

(1) Problem context: Prompts (challenges) – societal challenges and motivations to develop a new solution that is different from the ones tried out already; the problem identification is part of this first phase.

(2) Starting point of the co-creation process: Proposals / Ideation – first ideas and try-outs

(3) Further development of the co-creation process: Prototyping – a more formal-ized pilot project addressing the challenge; often improvised and not a regular practice

(4) Follow-Up of the co-creation process: Sustaining – adapting / refining the pro-totype; enhancing its viability and long-term resistance through verifying and testing

(5) Scaling – Further development of the approach and expansion of the idea – maybe only on a minor scale through reaching new target groups or extending the group of addresses, feedback and restarts are part of this phase

(6) Systemic change – the impact the co-creation already gained, is supposed or expected to gain

Visualisation of „Ups and Downs during the Co-creation process"

All Innovation Biographies contain a graphic showing modes of co-creation over time. This graphic visualises the progress of the co creation process in a simplified way. It is a

simplistic representation intended to reduce complexity. With reference to the comparative analysis, to be done by TUDO, the graphics will help to identify different patterns of progress in co creation processes.On the ordinate, four different possible varieties of the status that a co-creation process can be described with are differentiated (Highlight, business as usual, stormy times, crisis). The abscissa shows the timeline (authors could choose a time unit differentiation that was suitable for their case). We differentiate four varieties characterising the status of a co creation process:

1. Highlights (Code=4): Important targets or milestones were achieved. For example the actors found a solution for a problem or did an important step towards the solution. Bringing together all the actors needed for the co creation process could be a highlight too.

2. Business as usual (Code=3): As the title says this stage covers times the process runs without certain incidents. Cooperation works good and there is no reason to worry.

3. Stormy times (Code=2): Some problems occurred. For example one (or more) of the stakeholders oppose against the agreements concerning collaboration. Or an event was planned and it had to been canceled because there were not enough participants. One more sign for stormy times could be struggle with funding organizations.

4. Crisis (Code=1): One had to fear the project could fail. Main actors were short before leaving the process. There is no resonance from important groups (e.g. ´civil society). Financial resources break away.

4.2. Innovation Biographies case selection and data collection

It was the aim oht the Innovation Biographies to investigate single co-creation processes in detail over a longer period of time with an in-depth analysis of how single co-creations proceed. Though, we gain valuable insight with the Biographies in some case it was not possible for all partners to make in-depth inquiries as was orginally planned. This is due to the fact that it was not possible in every case to get access to relevant stakeholders for interviews. Therefore, for some cases we gain a rather holistic perspective on contexts of co-creation instead of in-depth knowledge about critical elements of doing co-creation. Though, for some cases we have this in-depth knowledge and altogether, the Innovation Biographies highlight for each case what enabling and hindering factors for co-creations are.

Cases for the biographies need to provide enough information regarding the context that the 'co-creation process' is embedded in as well as sufficient information over the whole process (starting point, problem identification, phases of participation, implementation, impact etc.). A case for which a biography will be developed should provide sufficient information on all these aspects. But there are also cases that did not "complete" all phases. This is because we also look for examples with a clear cut in one of the final phases. Generally, we are particularly interested in the development of success factors, hindering factors, interventions and setbacks which we call 'bibliographical turning points' of the co-creation process. Criteria for biography case selection:

- The biographies focus strictly on one particular process of co-creation in a specific context
- A biography needs to be expressive towards the practices, which were part of this specific process, and the inherent difficulties, bottlenecks and interplays (bibliographical turning points).
- Therefore, the availability of sufficient information of all phases of co-creation needs to be secured.
- Most important source of information are the interviews with relevant actors that have been involved in the process plus on-site visits
- All Task 2.3 partners are free to decide upon which case study they find suitable for a biography they prefer to examine (research partners have to guarantee the feasibility of the research process).

The following Case Studies have been chosen to be further developed into Innovation Biographies about specific co-creation processes:

Co-Creation Innovation Biographie	Main Stakeholder(s)	Scope (City, Region, State)
Co-Creation Process ninux.org	Single citizens/ interest groups, Consumers/ Users of a specific product, Employees and volunteers, Digital-divided People	City
NESTA & 10:10	Single citizens/ interest groups, Consumers/ Users of a specific product, Inhabitants	Urban district

Engineering Comes Home	Single citizens/ interest groups, Business/ Economy, Low income inhabitants/tenants and landlord, Greater London Authority, Environmental consultants, Water efficiency charity	Neighbourhood
inDemand – Demand Driven eHealth Co-Creation	Administration	Region
Smart Kalasatama: Health & Well-being Centre	Single citizens/ interest groups, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	Urban district
Ilona – Robot Brings Joy in Elderly Care	Consumers/ Users of a specific product, Employees and volunteers, Older people Administration	City
Apulian ICT Living Lab	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Administration	Region
Sience Frugale	Single citizens/ interest groups, Civil Society Organisations, Employees and volunteers, Academina	World-wide
Smart Citizen (Making Sense)	Single citizens/ interest groups, Platform makers	Urban district
Enhancing Sustainable Youth Citizneship: LoCY's Examples	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Employees and volunteers	Neighbourhood
LTsER Montado	Single citizens/ interest groups, Civil Society Organisations, Business/ Economy	Region
Developing a Table for PIKSL	Single citizens/ interest	Nation state

Laboratories	groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers, People with disabilities, Refugees	
Sharing City Umeå – Framtidens Mobilitet (Mobility of the Future)	Single citizens/ interest groups, Civil Society Organisations, Consumers/ Users of a specific product, Business/ Economy, Employees and volunteers	Region
Den Koldioxidsnåla Platsen - The Sustainable Restaurant Network	Municipality/ Private, Business/ Consumers	City
Den Koldioxidsnåla Platsen - Klimatvisualisering Innovationsprint	Municipality/ single citizens	City

Table 4 List of Co-Creation Innovation Biographies

4.3. Co-Creation Innovation Biographies

Co-Creation Process ninux.org | Italy

Stefano Crabu (POLIMI)

Summary

The Ninux.org Community Network (CN) is one of the oldest and most widespread CN in Italy. Technically, it is a decentralised wireless infrastructure for digital communication that allows interconnecting people (i.e. their computers, notebooks, mobile phones and other smart devices) by means of wireless antennas, usually installed on the roof of participants' home, or on those of informal groups and collective federated with the community (see Figure 1). These decentralised networks are fully independent from the 'mainstream' internet, even if it is possible to access to the 'regular web' through ninux.org. Nowadays, ninux.org represents an informal umbrella organisation composed of several various local 'islands', based in different Italian cities. Despite the different degree in

network development, in 2019 ninux.org was deeply-rooted in the following Italian cities: Bologna, Firenze, Pisa, Roma, Torino, and Verona[1].
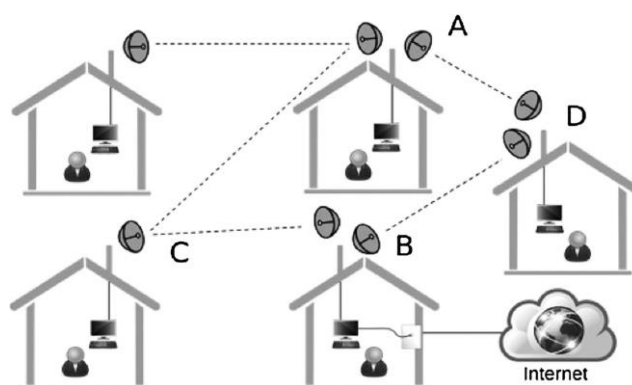

Figure 1. The structure of a CN[2].

Focussing on the co-creation processes, ninux.org is characterised by being built and self-managed by not-for-profit communities of voluntary people (such as hackers, engineering students, political activists and lay people). Accordingly, ninux.org community is enlivened through a completely voluntary work of co-creation, occurring from the ideation to the implementation phase. Usually, community members organise technical task forces aimed at (mainly during the weekends) installing antennas on the roofs of the buildings where citizens interested in joining the community lived in. At the same time, other expert members are involved in developing protocols, or in the network configuration activities. In this way, ninux.org community aims at co-creating a broadband wireless network operating at the urban/ local level, as well as the co-creation of technical devices (such as routing protocols and *do it yourself* wireless antennas) that help to achieve this aim.

Interview Box n. 1

These networks are the summa of the nerdist culture. Here, if you are a nerd, you can find everything, all aspects related to right there. From the software development, up to make an antenna from the scratch, with the soldering iron. [Member of ninux.org]

This quotation allows to better capture the dynamics of co-creation in ninux.org: In the media activists jargon, the word 'nerdism' indicates on the one hand the tendency to reject and overcome the role of the passive user of technologies, and on the other defines a propensity toward the critical use and manipulation of technological devices which

populate our everyday life. Therefore, the reference to the 'nerdist' attitude allows us to see how co-creation practices in ninux.org are framed within a cultural landscape in which the use and experimentation of technologies represents a usual and recurring dimension of the ordinary experience of the participants. Under this perspective, co-creation practices within ninux.org community circumscribe a bottom-up organisation, being self-organised, decentralised, and emerging as the result of a process of spontaneous engagement where the role of 'end-user', 'designer', or 'software developer' substantially overlap.

Context of the 'co-creation process'

Generally speaking, CNs in a few countries (for example in Spain, France and Germany) are becoming popular as a less expensive, and sometimes more reliable, alternative to commercial Internet Service Provider connections as well as a suitable grassroots strategy to cope with the digital divide[3]. With reference to the Italian context, ninux.org started originally in Rome, following other similar projects, such as the Seattle Wireless created in 2000 in the Northwest United States. In recent years, ninux.org has expanded beyond Rome to other Italian cities, where similar local grassroots networks have been launched under the same acronym. In this respect, ninux.org community is not operating as 'formal association' recognised under the Italian law, and its initial spirit was mainly targeted at experimentation, ICT tinkering, and hacker/ nerd culture. Indeed, the name of the network 'Ninux' stands for 'No Internet, Network Under eXperiment'. Each Ninux community active within a specific urban context (or Ninux 'island' as the Ninuxers usually state) is run by an independent and informal group of people. Even if participants have many different (and sometimes ambivalent) motivations that push their participation in co-creation practices, in general they agree that all people can build and access a network without paying unfair fees to commercial telecommunications providers. Even more, they want to directly deal with privacy policies and data security concerning their personal digital data, by assuring a more transparent management and ethical confidentiality of the communications occurring within the ninux.org network.

Interview Box n. 2
What we try to do with these community networks is to decentralize the infrastructure. That is, we want to get to a point where the infrastructure that you use to communicate is

> *no longer hierarchical, is no longer centralized and in the hands of someone else. It will be completely distributed and based on a community of people. [...] In the philosophy of community wireless networks, we have this fact of using free software, open source software; we have a "sharing attitude" in general.* [Ethnographic fieldnotes, public presentation of the ninux.org in Bologna]

This quotation highlights how the co-creation practices within ninux.org are also characterised by some political issues shared with the free/ libre open source software (FLOSS) movement, which is the need to release free software and open-source software with the aim to encourage people not only to use, but also to voluntarily improve the design of the software itself. Indeed, a relevant point is the most active members of the community are also particularly influenced by the 'hacker culture', thus developing informal (although particularly fruitful) partnership with several informal collectives engaged in co-creating hardware and other digital resources through a peer-to-peer production model, that is a way of producing goods and services that relies on self-organising communities of individuals. Under this perspective, co-creation processes within ninux.org are aimed not only to set-up an operational wireless network by the installed WiFi antennas on the roofs of members' buildings, but also in producing and sharing information and actionable knowledge in the field of Information and Communication Technologies.

Starting point of the 'co-creation process'

Within the ninux.org community, the network located in the metropolitan area of Rome, which is the most consolidated one, got underway in 2001 as a technical experiment, thanks to the effort of about ten people, including informatics students, experts in network operating systems, media activists, home-grown hackers, and geeks. The pioneer collective originally meet in a popular local café, called by ninux.org members 'nerd pub', and subsequently in the spaces of a non-profit associations Fusolab 2.0, which is engaged in promoting countercultural and artistic activities in Rome. Fusolab 2.0 is a formal association traditionally engaged in developing and disseminating a critical and alternative perspectives about the existing cultural and economic social model, by promoting sharing of knowledge in the following areas: cultural production (music and art), critical consumption, sustainability, degrowth and common goods, information and media,

interculturalism, digital cultures and technological innovation. Thus, ninux.org is highly embedded in this kind of counter-cultural milieu, and Fusolab 2.0 has traditionally represented a situatable place to interact with a pool of potential collaborators. It is worth noting that, as mentioned before, ninux.org has historically had a greater rooting in the following cities: Bologna, Firenze, Pisa, and Roma. In general, these cities have been characterised by a strong tradition of collective mobilisation and political activism related to left-wing social movements. Therefore, this aspect has undoubtedly influenced the generation - at urban and metropolitan level - of a social and political climate particularly suitable for the development and support of co-creation practices within ninux.org, as a political alternative to the commercial exploitation of digital communications.

Initially, the building of the network in Rome was almost entirely crafted, and for this reason it was necessary – besides a great passion and technical expertise – to purchase prototypes, and manually assemble the components (such as the antennas and routers) necessary to make network infrastructure operative. Furthermore, in the early period, the groundbreaking group began to collectively test emerging wireless networking hardware and software, building up experimental connections between wireless antennas (also homemade) installed on their own home roofs. Year after year, thanks to the implementation on the network of services such as file sharing software and tools for cooperative writing or code development, the infrastructure attracted a growing number of participants, thus turning into a relatively wide urban decentralized wireless network, which in 2019 numbers about 350 nodes. In this regard, a turning point for the significant development of the network both in Rome and within other Italian cities happened in 2008, when a private company (Ubiquiti Networks) started to market low-cost wireless devices and antennas, gradually adopted as 'gold standard' by all members of ninux.org. The adoption of these devices has considerably facilitated the construction, maintenance and repair of the infrastructure, thus lowering the threshold of technical expertise required to be active part of the community.

The economic sustainability of ninux.org represented, since the very initial phase, a very complex issue, touching many interrelated social, political and legal dimensions. In this respect, ninux.org has always been totally self-funded by the community, and every participant is expected to pay for the technical devices require to make the network operative (e.g. routers, WiFi antennas, cables, and so on). Furthermore, there is no a formal structure of compulsory fees, and people in the community offer their own

resources (both tangible and intangible, such as skills, voluntary work for installing antennas and for the maintenance and repair of the network) following the logic: 'do and pay what you can'. As ninux.org is non-profit, commercial activities aimed at profit-making are not part of the community's agenda. Finally, another point regarding the ninux.org community as a whole concern the issue of the emerging forms of digital innovation within our network society, which attracted in the very last few years the growing interest of the European Commission, especially for what concern the following two societal challenges: 1) 'Smart, green and integrated transport' and 2) 'Europe in a changing world - inclusive, innovative and reflective societies'. Ninux.org community represents an emblematic case on how these major societal challenges can be addressed through a bottom-up co-creation approach, as a way to engage lay people and other relevant actors in boosting responsibility and ethical sustainability within ICT and digital innovation. Indeed, ninux.org community engages citizens in building a digital infrastructure that can be managed and used in a free and openly accessible manner, thus generating positive externalities that benefit society as a whole, especially by sustaining active citizen engagement in responsible entrepreneurship, social ties generation and community building, and by animating awareness in the critical and responsible use of digital technologies, with particular attention to the millennial generation.

Further development of the 'co-creation process'

Landscape of stakeholders

As previously argued ninux.org community, composed by the different local islands, does not have any formal legal status officially recognised under the Italian law. Even if this condition implies fewer constraints in terms of public accountability, it also prevents the community to shape formal reliable and long-lasting partnership with stakeholders, and with both public and private organisations to be engaged in the co-creation of the infrastructure. In this respect, local islands active in Rome and Pisa have experimented few kinds of occasional indirect relationship with institutional actors (such as local municipalities, and public universities) with the aim to install Wi-Fi antennas in the premises of public building.

The bottom-up approach that characterises ninux.org is reflected in the lack of internal hierarchical structure. Indeed, there is not any internal centralised and formal body that

can monitor members behaviours or assess the overall process of co-creation. Furthermore, a user that shares his/ her connection is not liable for third party conducts, and the absence of a formal representative body prevents - de facto - to apply the regulatory measures defined by the national and supra-national normative frameworks.

Concerning the profile of the actors, ninux.org is run by volunteers: hackers, geeks, engineering students, political activists, and lay people. Each of them runs one or more than one node, participates to the meetings and is active in the promotion and advocacy for the network. Even if they have many different (and sometimes ambivalent) motivations that push their participation, in general they agree that all people can build and access a network without paying unfair fees to commercial telecommunications providers. Even more, they want to directly deal with privacy policies and data security concerning they personal digital data, by assuring a more transparent management and ethical confidentiality of the communications occurring within the ninux.org network.

More in details:

- The first 'cluster' of members is composed by hackers, geeks, and engineering students, with an age between 18 and 40 years. They are well educated (with BA, MA or Ph.D. degree), and they have strong expertise in science, technology, and engineering. Usually, they work for high tech companies active in the ICT sector. This group of members compose the technical staff-core of ninux.org. They are manly motivated by the enthusiasm arising from experimentation with technical devices or the joy of building one's own technical equipment and software, and configuring the network. Furthermore, the services provided by the community (such as anonymous file sharing, tools for cooperative writing and software development) are considered as relevant incentives, especially when the respective services offered within commercial broadband infrastructure are of worse quality;

- Media/ political activist and lay people identify the second group. They are all well-educated, with heterogenous backgrounds, mainly rooted in social sciences and humanities. They are motivated by the possibility to take part in a project oriented to criticized and put into question the well-established neoliberal and for-profit governance of Internet imposed by the oligopoly of Internet Service Providers.

Alongside these peculiarities, the high level of anonymity and digital data confidentiality that the Niunux.org network can guarantee is undoubtedly one of the many features of the

community. This aspect has become particularly relevant after the so-called 'Edward Snowden affair' during which it has been revealed several global surveillance programs run by the US National Security Agency in collaboration with telecommunication companies and European governments. Accordingly, the central aspect of the co-creation culture of the ninux.org project is not so much related to the technological dimension in itself, but rather on the actual institutional governance of the Internet, based on a top-down centralised infrastructure, which does not allow the self-determination of the user experiences and the control of their personal digital data, thus compromising the individual privacy. Indeed, ninux.org members stress the idea that the conventional model of the consumer needs to be replaced with the figure of an active co-creative user, who should participate actively in some of the co-creation activities required to make the network work.

Another crucial network for ninux.org development, in terms of stakeholders engagement, is the Italian hack-meeting: an annual meeting of digital countercultures engaged in co-creation of ICT. Furthermore, the so-called Linux Day network represents a crucial partnership, since it organises an annual initiative occurring in several Italian cities, with the aim to spread the culture of the free software movement, and where ninux.org community usually organises activities to promote its project. Finally, ninux.org developed collaboration with several sister projects, such as the Metro Olografix Camp (MOCA) - an international meeting organised in Italy until the 2016 (and now working as an online community) where people are invited to observe, experiment and question everything about computers and ICT using the hackers' approach.

Phases of co-creation

<u>The co-creation of the ideation and conceptualisation of the network</u>

Ninux.org is based on a distributed or mesh infrastructure, in which each node (i.e. a wireless antenna installed in the roof of a member's community) allows the generation and sharing of digital data within the network. In order to access the online features available in the regular web through ninux.org, it is sufficient that only one node of the network should be connected to the Internet (see Figure 1). In this case, the node is called 'gateway', since it allows the sharing of the Internet connection among the community members. From a descriptive point of view, the co-creation of the ninux.org network presents all the major features of a grass-root initiative, being bottom-up, self-organised, decentralised, and emerging as the result of a process of political and technological engagement from-below

where the boundaries between the role of end-users and developers are faded. This aspect has been summed up by one of the funding participants in the network in Rome:

Interview Box n. 3

'You cannot define our services really as "services", in the sense that normally a "service" implies that there is a supplier for these services. In this case, being completely self-managed, the services have emerged when people, who had a need to do something, put up a solution and offered it to others. So, early things that came out were services to communicate, then chat and do other stuff like file sharing; someone also started to implement a search engine that searches within the files of all hard drives that are around'.
[Member of ninux.org]

As it emerges from this quotation, the participants in this inverse infrastructure conceive and describe in a peculiar way the ideation of the network, stressing a critical deconstruction of the taken-for-granted relationship between consumers and commercial Internet Service Providers, thus questioning the conventional demarcation between end-users and designers.

<u>The co-creation within the design and implementation of the network</u>

In general terms, co-creation within the design and implementation of the network start with the involvement of an individual: each potential member of the community is invited to join the community, present him/ herself and be active, but no formal engagement is required and no identification is requested. Within ninux.org community, engagement and co-creation processes in the design and implementation of the network unfold trough the following stages:

5)   Introduce him/ herself to the community, via the national and/ or specific island-based mailing lists, or using telegram channels;

6)   Create a 'potential node' in the ninux.org mapserver[4] available on the community website (online tool that acts both as technical entry point in the community and monitoring device of the network; see paragraph 4.3 for more details), which correspond to a venue where the member can physically install a network node. More in detail, a 'potential node' is a new placeholder in the online Mapserver, that anybody

can set-up to express the willingness to enter the community. In this way, a new member can find the existent or potential nodes that are likely to be in communication and then connected with his potential node. Once such nodes are identified, the members who are in charge to manage them can be contacted in person or directly via the Mapserver;

7) Once verified the possibility of installing a new node connected to some other existent node, the new member will be supported in the process of acquiring the necessary hardware, modifying the firmware and mounting the node. This procedure is guided with practical documentation that the community has been producing since its beginning, and by means of the voluntary efforts of the experienced participants;

8) The new member is invited also to actively participate in the face-to-face meetings and general assemblies that ninux.org islands organize. The frequency of such meetings depends on the specific island. In the most active islands they are typically held weekly, or bi-weekly;

In general ninux.org community is developed through a completely voluntary work of co-creation. Usually, community members organize technical task forces engaged (mainly during the weekends) in installing antennas on the roofs of the buildings where citizens interested in joining the community lived-in. Other expert members are involved in developing protocols, or in the network configuration activities. Even if there is no structured entity, some ninux.org users take the responsibility for some online services that would not be possible to develop in a collective way, involving non expert people.

As already mentioned in the paragraph 3 about the 'Starting point of the co-creation process', a turning point in the extension of the user base took place around 2008, as a consequence of lowering the costs of wireless equipment (antennas and routers) and the increasing importance that the issues of privacy and control over the Internet gained within the public opinion. In particular, the rise of public concerns about privacy over the Internet — especially generated by the Snowden affair, Anonymous' actions, and Wikileaks' revelations — is a contingent element that substantially contributed to spurring participation and engagement in the construction of this self-managed network, as an alternative to the Internet. This means that the co-creation of the network resulted from the intersection between, on the one hand, the participants' technical efforts and competences and, on the other hand, their political beliefs and motivations. As a consequence, in 2013

the ninux.org project also expanded in other cities, such as in Florence, Bologna, and Pisa in Centre-Northern Italy or Cosenza in Southern Italy, where smaller local WCNs have been implemented. These other local networks still remain in an experimental stage, as each of them have between 5 and 30 antennas connected. Even if these smaller local networks remain technically separated from each other, they share the same name, a common political framework, and tools supporting a collective cooperative work for the development of software, hardware, and protocols.

A common and relevant aspect related to the co-creation within the implementation of the network is that all people interested in the project have to assume the responsibility of the antennas installed on their own roofs; as one participant stated, 'below every antenna there must be an active member of the community':

Interview Box n. 4

'A tacit rule is that below every roof, below every node, below every antenna, there must be an active member of the community. This is because the network is being conceived as something that we do and then we put in common. You cannot imagine building up the network like: "Oh well, I'll come to your house, and I install the antenna… and then everything will be ok and you will never have to worry". The key issue is that, by joining the Ninux network cable that comes down from the roof, you are not just replacing the commercial ISP cable, and nothing more has changed for you. Behind this network there must be people who are aware of how the network works, and therefore there's this tacit rule that for every antenna, there must be a human head'. [Member of ninux.org]

As this participant has argued, antennas need to be installed, maintained, and setup, and these activities are essential for the development and efficient working of the network. At the same time, committing themselves to the care of their own antennas has an important meaning, as it means participating in and taking care of the co-creation of the infrastructure. Regarding the handling of these antennas, it is not required that all members master all the technical knowledge required for their full installation and maintenance, but their owners at least have to know how to manage the basic settings. On the one hand, this limits the possibility of the network's growth, since it may be difficult to enrol new active and well-motivated participants; but on the other hand, this choice reflects a political vision about the organisation of the infrastructure, also ensuring more horizontal

participation and more effective decentralisation of the network's maintenance. Hence, this specific shared configuration involving antennas, their technical maintenance, participants, and their skills is at the core of the process of co-creation within the ongoing design and implementation of the network.

Impact monitoring, measurement and evaluation

As it has been already argued, ninux.org network is composed of several local islands spread around the Italian peninsula. Being an informal organization, it is quite complex to measure and define the impact of ninux.org, due to the lack of statistics and other meaningful data. According to the statistics generated by the Mapserver (see Figure 2), ninux.org is currently made of 338 nodes, most of which located in the metropolitan area of Rome, and the rest are distributed in much smaller islands spread across Italy. Furthermore, it is not easy to identify all the services that members rendered available on the network, since each island has its own services and the lists of available services are not regularly updated. The most popular services concern: content sharing (such as local clouds and backups services), collaboration tools (git repositories, etherpads), and online communications (chats, videoconferences).
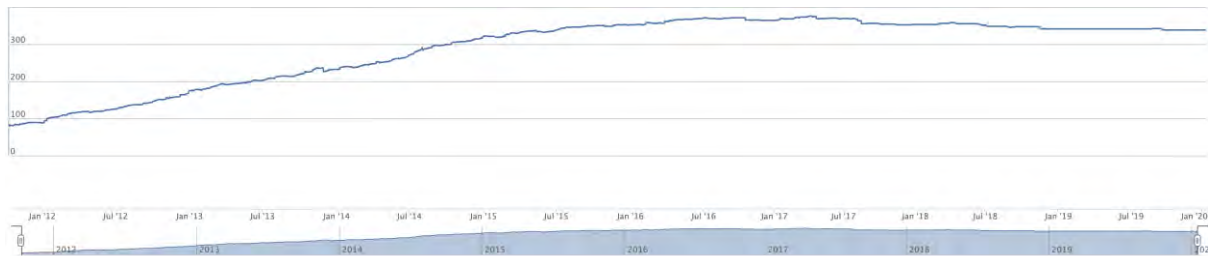

Figure 2: The growth of the ninux network in the last 8 years: January 2012 - December 2019[5].

Specification on methods, tools and communication

Ninux.org members have developed several tools oriented to manage the co-creation activities, interaction and internal communication:

- *Mailing Lists*: every island set up and manage its own mailing list, created on request by the participants. In addition to local mailing lists, there are two others national mailing list (wireless@ml.ninux.org and not-wireless@ml.ninux.org) in which generic issues related to the community can be discussed, such as the organisation of national meetings, relevant public events, discussions on the technological development of the

infrastructure and its maintenance. Concerning online communication, a subgroup of members are engaged in replying e-mails sent to the address contatti@ninux.org. This e-mail represents one possible main entry point"to the community, thus to provide information to interested people in more mediated way;

- *Website & Blog*: the website of ninux.org is a wiki, collaboratively realised by the community. Some of the pages are translated in English, but the language is primarily Italian. The community has also developed a Wordpress blog, where members can write on issues of common interest. The website hosts general information about the community; a frequently asked questions section; several online handbooks devoted to give more technical information. These technical guidelines are organized according to five levels of complexity: 1) starting members, 2) novice, 3) intermediate, 4) student, 5) advanced. According to some testimonies collected during the interviews, the website – in the form of wiki – does not seem to be particularly effective as s tool for attracting the attention and interest of novel potential members;

- *Face-to-face meetings*: each island organises periodic meeting (weekly or fortnightly), in form of horizontal assembly, with the local community. From time to time a national meeting – called ninux Day – is organised. The last one was organized in Bologna on the 26th of November 2017. Furthermore, local meetings are conceived as skill-sharing happening, where members perform an informal pedagogical arena to share and learn relevant technical skills useful to network management. In this regard, one of the most problematic issues raised during both interviews and mailing list discussions relates to the fact that local meetings are not perceived by starting members and newcomers as inclusive discussion spaces, due to the hegemony played by the nerds and geeks which are mainly interested in discussing network engineering issues;

- *The Mapserver*: this online tool is a key instrument in the ninux.org community because it acts both as technical entry point in the community and monitoring device of the network. The Mapserver is updated periodically by a software that is configured to load all the topologies from the various ninux.org islands: each island publishes a topology file at a public URL using one of the supported formats, and the active nodes and links can be visualised in the map. It is not only a public mirror of the state of the network, but it is also a fundamental instrument for new users that want to enter the network, that can use it to find other nodes nearby, compute an approximated distance and contact the owner of existent or potential nodes in order to set-up a new link;

- *Internet Relay Chat meeting*: recently the community start to organise national online meeting using IRC protocol in order to take collective decisions about specific technical or organisation issues. These meeting are organised about every two weeks, with the participation of about ten/ fifteen members. After every online meeting a summary report is automatically produce by a BOT, with a summary of the main points discussed by the participants. Thus this report is send to the national mailing list: wireless@ml.ninux.org. However, the format of the meeting summary is extremely concise. In this sense, it would be advantageous to produce a more narrative report of the discussions occurred via IRC protocol, thus to solicit two-way feedback from members who did not take part in the discussion;

- *Telegram group*[6]: each island has its own local telegram group to coordinate face to face local meetings, or specific activities both technical and organisational. In addition, a national Telegram group has been set up, where there are about one hundred people. Apparently, the Telegram group is now the most used communication tool. The management of this group is quite crucial, as by now it represents the main entry point for newcomers. The centrality assumed by Telegram groups resulted in a noticeable reduction in online discussions within mailing lists, both nationals and locals. It is worth noting that interactions occurring in Telegram groups are much more ephemeral if compared to other communication tools (e.g. mailing lis,; video conference etc.). This is due to the high amount of daily messages which does not entail an easy overview of the conversation log;

- Ninux Experimental (NNXX): starting from February 2017, a subgroup of ninux.org members launched the NNXX experimentation initiative. This tool is handled through the following tools: 1) Telegram channel for real-time support in co-creation activities; 2) 'Trello board NNXX'[7] to plan and monitor co-creation activities (such as the experimentation of novel hardware or routing protocols; 3) a mailing list called 'ninux-dev'[8] for non real-time support. This last tool initiative has the following main objectives: sustain the generation and growth of new ninux.org islands, simplify connections between different network nodes, thus to increase overall infrastructure resilience, simplify the configuration and updating of the infrastructure, sharing new knowledge in the field of mesh network.

Specification on cooperation and conflict

Due to the 'technical' turning-point related to the lowering of the costs of wireless equipment triggered by the private company 'Ubiquiti Networks' (see paragraph 3 and 4.2), community participation has grown resulting in the need to develop 'internal governance tools', and especially the so-called 'Ninux.org manifesto'[9], in which the community mission, strategic goals, as well as a set of common principles and visions in supporting cooperation and conflict management have been summarised. Even if the local networks based in different Italian cities remain technically separated from each other, they share the same name, a common political framework, and governance tools supporting a collective cooperative work for the development of software, hardware, and protocols. This shared framework is the result of an on-going collective effort of negotiation, which occurs through the mailing lists, and thanks to periodic national and local meetings, such as the desultory 'ninux Day' national happening. In this respect, a crucial issue concerns the political framework that sustains co-creation processes, and that pollinates the co-creation of the network, relying on the larger social movement for alternatives approaches to the existing Internet regimen[10]. Indeed, both the motivations that help to mobilise the participants and the decisions about technical details in the adoption of a certain type of technology for the co-creation of the network are heavily influenced by a set of political ideologies shared by participants (e.g. use or not use exclusively materials released under an open license). These political ideologies not only represent a relevant motivating framework for the enrolment of new participants into the project, but they also can play a central role in shaping the decision making procedures and the resulting specific technical solutions to be adapted to the infrastructure. In this sense, political motifs can be the driver of disagreements and conflicts concerning the ways in which the infrastructure should be developed at large. This is evident in the controversial relationship between the 'seniority level' of members and competences, recently emerged in the network located in Rome, where an early core group with strong technical competences had to include other people with weaker, or with no technical skills. As a key member argued, this decision produced a shift in the average technical competences required to be active participant of the project, thus triggering a conflictual change in the approach the community has in managing the daily work of development and maintenance of the network. In this regard, a crucial element to understand the recursive interweaving of participation, and competences is constituted by the tension involving two different dimensions of learning to be part of the co-creation process of the network: the exploitation, or rather the use and implementation

of 'naturalized' set of knowledge, and the exploration, indicating the experimentation activities, the deviation from and variation of stabilised frame of knowledge, which simultaneous implies generation of new knowledge[11]. The relationship between these two dimensions engendered a 'conflicting pluralisation' of visions on the ways in which the infrastructure project requires to be carried out. This conflictual dimension, involving alternative visions about the possible developments of the network, appears as a constitutive and dynamic element of the process of co-creation, as it has been elucidated by a senior member of the community:

Interview Box n. 5

"At the beginning of the project, people participating had strong skills. Maybe not specific skills in wireless technology, but in any case people with a "technical brain", people with whom it was possible to have a technical discussion. Instead, now more new people are arriving through advertising on Facebook or because they read articles in mainstream newspapers [...], so this has meant that the community now has grown hugely as well as the network has. However, of course the average technical level fell, and this turned into the fact that, when you propose a [technical] change, you could not make this change acceptable to all, as many participants neither understand it, nor they know how to handle it'. [Member of ninux.org]

This quotation reveals how the co-creation of the network is stratified around different conceptions, sometimes conflicting with each other, regarding the options about the digital network development: alongside a vision of the infrastructure as a place of continuous experimentation and innovation, the community can however develop attitudes that hinder the construction of new knowledge, privileging instead the network stability and its technical sustainability.

Specification on political influence

The co-creation of the ninux.org network (and in more general terms the shaping of similar Wireless Community Networks) is conceived by their members as political alternatives to the global, business-oriented governance of the internet[12]. Analytically speaking, ninux.org represent peculiar digital resource, distinctively characterised by the need to materially build and maintain a technical infrastructure, thanks to the creative adaptation and co-

creation of technologies by activists and concerned group of citizens. In this sense, it should be highlighted that ninux.org embody alterative economic and cultural visions. They are oriented towards a non-profit economic paradigm, demarcating an alternative to the for-profit and centralized models adopted by commercial internet service providers (ISPs), on which the internet is today largely organised. Furthermore, this socio-economic approach, rooted in a non-profit logic of action, is also supported by alternative cultural and political discourses about the use of internet and the active role citizens should achieve in digital society. Indeed, ninux.org community present itself as specific common resource, which may enact and support civic engagement to strengthen a more sustainably access digital networks, more respectful of users' rights. Indeed, emic discourses over co-creation in ninux.org stress the idea that the conventional model of the consumer needs to be replaced with the figure of an engaged user, who should participate actively in some of the activities required to make the network work. This alternative political vision of the ownership and the role of users comes together with an explicit criticism about the lack of privacy and the increasing surveillance and tracking efforts over the internet.

Follow-up of the 'co-creation process'

Within ninux.org each member has to agree on the 'Ninux.org manifesto' (see also section 4.4), that is a foundational document inspired by the pico-peering agreement adopted by other European CNs[13]. Thus, the manifesto explain some shared principles and the potential legacy that inform the co-creation of the network, such as: 1) the non-discriminatory routing, that is all the nodes (and users) in the network should guarantee the transit of the traffic regardless of origin, destination or content, 2) organic growth, i.e. all that is required to join the network is to find someone that is already connected and make arrangements directly with them, 3) distributed networking, because volunteer work will continue to be the core of the community, it seems important to render the ordinary maintenance of the infrastructure a sustainable and as less time-consuming as possible. Distributed networking allows new nodes (and users) to be automatically be detected and integrated into the network.

Concerning the nature of relationships enabled by the co-creation of ninux.org, it worth noting that local islands developed strong relationship with left-oriented 'squatted social centres', which in the last two decades played an important role in developing critical

discourse about the role of technologies and digital innovation within our globalised societies.

In this way, co-creation of ninux.org network mobilised not only a technical interest in experimenting with emerging technology as in the case of user-innovation theory[14], but also the collective embodiment of political concerns, since in ninux.org a culture of technical experimentation (such as the learning-by-doing attitude as a style of practice among geeks and informatics students) meets issues and practices belonging to political and media activism, incorporating the discourses focused on making digital infrastructures more sustainable, democratic and open to participation.

In this respect, a crucial dimension in the co-creation of ninux.org regards the learning trajectories of technical knowledge and skills, relevant in the self-management of the infrastructure. Precisely, to ensure the sustainability of the network, the infrastructure requires the combined and parallel growth of the technical capabilities of its user base. For this, expert knowledge learning and sharing are particularly important, as they enable members without technical backgrounds to acquire the set of capabilities required for the daily use and management of the network and to build new infrastructure's nodes and, ultimately, to be fully part of the management and governance of the communal network. At the same time, the co-creation of the network implies that geeks and technicians engaged in its building and maintenance are supposed to reframe their technical expertise in a dialectic relationship with political activism and with an anticapitalistic critique of neoliberal pressures on the internet. Under this light, geeks, activists and technical experts intersect technical skills with political engagement: expert members and geeks are not simply ICT technicians, but are also teachers of an expert knowledge, which is articulated according to specific political views and agendas. At the same time, political activists and other lay members learn new skills and techniques and reconfigure their political expertise on the basis of the technical competences gained during their participation in building a politically oriented infrastructure.

Scaling

A central aspect which affect the scaling and diffusion of ninux.org is related to the high degree of informality which characterises the community management, as well as to the difficulty of recognising and valorising the free work performed by voluntary members.

Interview Box n. 6

The fact that we are not well-structured make everyday management quite complicated. Without a formal association, or clear organizational structures, it is impossible to give roles to the people. You are not in a condition to encourage them. All this informality does not help. For example, there are people who have worked so hard, but then they disappeared. You do not see them anymore. They have lost their interest, and since they are not obliged to do something specific because there are no clear responsibilities, these people are volatile. [Member of ninux.org]

The relevant issue emerging from this quotation concerns the necessity to recognise and give value to the free work done by community members. This aspect is closely related to the vulnerability of the community, whose integrity can be jeopardised in case of systematic non-recognition of the member's voluntary contributions. This problem becomes particularly relevant in the case of ninux.org, since the community has not yet implemented a system of incentives, or a mechanism to recognise and account for the free work and contributions offered by members. In this respect, the establishment of a formal association could facilitate the introduction of a system of accountability aimed at recognising and adding value to the voluntary work. Indeed, as argued by different members, a first form of valorisation of voluntary work could involves the development and strengthening of a clear and effective system of incentives. In this sense, the incentive system may identify a set of rewards that is self-managed by community members so as to attain common goals. Concerning the implementation of a system of incentives, it is crucial to consider three different and interdependent dimensions that characterise ninux.org. The first one is the political dimension which concerns the way that the community network is governed. The second one is the socio-cultural dimension which relies on the activities of creation of services and applications, as well as on the distribution of content. The last one is the economic dimension, or the way that the economic benefits are generated. In this regard, the tasks and actions that are most valuable and relevant for members to be performed are those that are most rewarded by the incentive system.

Systemic change

The participation in ninux.org is voluntary and is not subject to any form of discrimination. Any potential member has the right to apply and become part of the community. Considering the overall trajectory of the ninux.org, we may distillate some relevant impact achieved by the community as an 'engaged' social organisation: 1) Development, in a responsible manner, of wireless digital telecommunication technologies close to the needs and expectations of members, 2) Establishment, development and maintenance of a fair wireless network connecting people, and offering services, in different urban context across Italy, 3) Training of lay people in the usage, in a consciously way, of digital technologies, 4) Promoting and disseminating, among the general public, knowledge and information about the social and ethical consequences of the development of digital technologies, and 5) Informing the general public about the potentiality of community network, in terms of defence of fundamental social rights and democracy.

In terms of potential impact in the near future it worth noting that ninux.org, it worth mentioning that some members of the community are engaged in lobbying activities, both at the national and European level, aimed at renewing the regulatory framework about digital telecommunication in a way to support and encourage the constitution of broadband symmetrical digital telecommunication services in cooperation with non-profit and cooperative Internet Service Providers.

Visualisation
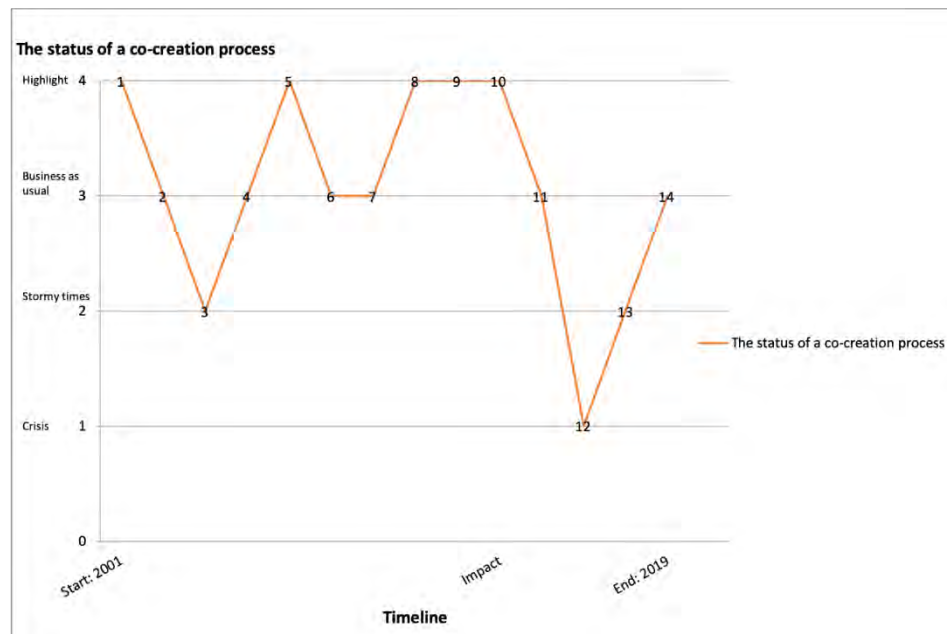
1) The co-creation process starts in Rome, in a popular local café, called by ninux.org members 'nerd pub' with the aim at experimenting the building of a citizen-based wireless network.

2) The first experimental nodes, with traffic exchange, are put into operation in the city of Rome.

3) The cost of wireless devices and the technologies required to operate the network is lowered. It becomes economically more sustainable to install new nodes.

4) The community starts to organise public meeting in spaces of a non-profit associations, like Fusolab 2.0, and within squatted social centres. These are situatable place to interact with a pool of potential collaborators. The community in Rome recruits an increasing number of participants.

5) A private company (Ubiquiti Networks) started to market low-cost wireless devices and antennas, gradually adopted as gold standard by all members of ninux.org. The adoption of these devices has considerably facilitated the construction, maintenance and repair of the infrastructure, thus lowering the threshold of technical expertise required to be active part of the community. The community in Rome recruits an increasing number of participants.

6) The network is developed in other Italian cities, like Florence, and Pisa. development,

7) A growing number of services are developed and offered within the network.

8) Ninux.org manifesto is developed by the members of the different local networks operating in Italy.

9) Due to the 'Edward Snowden affair', during which it has been revealed several global surveillance programs run by the US National Security Agency in collaboration with telecommunication companies and European governments, an increasing number of people are interested in the ninux.org project. Local communities recruit new members. The network is also founded in Bologna.

10) Ninux.org network is operating in various Italian cities, and mainstream media reports about the success of the project as a form of democratization of digital innovation and citizens empowerment.

11) New services are offered within the network.

12) The network is stratified around different conflicting conceptions, regarding the options about the digital network development: alongside a vision of the infrastructure as a place of continuous experimentation and innovation, a subgroup of the community develop attitudes that hinder the construction of new knowledge, privileging the network stability and its technical sustainability.

13) The conflict between the two different vision over the network development in translated in the issue about the possibility to build a formal association operating under the Italian law.

14) The community decides to operate as an informal collective. Toolkits and guidelines are developed to facilitate the installation of new nodes and to develop the network.

Which learnings emerged?

The focus of co-creation activities within ninux.org is mainly on the internal services of the network, and not on offering a low-cost internet access. The community has a strong commitment in sharing this message to the newcomers, that should be attracted by the possibility to obtain a free internet access but neglect the communitarian aspects of

ninux.org. In this sense, members tend to discourage newcomers whose only interest is to access the Internet at a lower price than the price offered by commercial ISPs. This does not mean that there is no Internet access within ninux.org network, but this decision (to offer or not an internet access as a community service) is delegated to each ninux.org island, and it is not sponsored as a main feature of the community. In general, therefore, the co-creation and management of the ninux.org wireless network should not be considered as an activity of innovation driven by utilitarian and instrumental drives, but rather as a process of involvement of the several actors within a wide ecology of socio-technical relationships that allow them to express creativity, passion, and a political engagement through voluntary participation in the community network development project. In this respect, the overall approach regarding the management of the co-creation activities in Niunx.org adheres to the so-called 'do-it-yourself' culture. This approach in managing communities' life implies a cooperation among members, which can acquire a specific role in relation to their expertise, competencies, and kind of task in which they are involved, rather than through formal process of nomination. Under this perspective, ninux.org members believe that they are building a network that is more than an infrastructure for digital communication. Indeed, they are aware that what is at stake in ninux.org project is a sort of 'digital commons resource'[15] built by means of co-creation processes performed by communal communities of people. In this way, ninux.org members adopt a peer-to-peer production models and shape organisational arrangements which are alternative to – or even antagonist of – for-profit and business-oriented logics of action. This peer-to-peer approach is characterised by features like a horizontal internal coordination and by the fact that their members generally do not receive direct monetary remuneration for the time consecrated in producing a specific digital commons resource.

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NESTA & 10:10 | UK

Melanie Smallman and Trupti Patel (UCL)

Summary

NESTA is an innovation foundation in the UK. Their Inclusive Innovation team funded five projects to demonstrate to policy makers the value of engaging the public on innovation issues and to show a range of interesting and exciting ways this can be done[1] under the 'Everyone Makes Innovation Policy' (EMIP) programme. The aim was to test creative methods of public engagement on innovation policy in different locations around the UK[2]. The team at NESTA funded the projects to analyse how the policy context in which these projects were situated affected them. Simultaneously, they looked across the high-level innovation policy strategies of a selected group of countries around the world. Their aim was to develop a framework to analyse the ways in which innovation policies can be inclusive, and then to find out how far and in what ways these countries and local areas addressed aspects of inclusion in their overall approach to policy[3].

One of the projects was initiated by the environmental charity 10:10 who organised a 'heat seeking quest' where the public were invited to walk through urban areas with thermal

cameras, recording where waste heat was being lost and how it may be recycled. The aim was to approach the issue of decarbonising heat as an issue that people can connect with and not simply a technical or policy problem, but a fun, cultural experience[4].

Context of the 'co-creation process'

NESTA were interested in conducting research on inclusive innovation in light of evidence that the benefits of innovation do not trickle down to all members of society. In addition, there was recent evidence that children were more likely to become innovators if they had parents with higher incomes. As researchers and policymakers were beginning to consider the role of innovation in inclusive growth, NESTA found there was no comprehensive approach to the integration of inclusion into innovation policy. They also identified there were tensions between ideas of integration and general innovation policy thinking. The research they wanted to conduct was in order to make suggestions about what inclusive innovation policies could look like and what could help this along.

10:10 wanted the public to engage with the Bunhill Energy Project in an interactive, fun, stimulating way to get them to begin to talk about decarbonising heat and waste heat. The Bunhill Heat Network produces heat and electricity in a combined power plant. It uses the heat created from producing electricity to create hot water that is piped into people's homes. This makes it more environmentally friendly than a normal power station, for which heat is usually a waste product. As a charity, they were set up in 2009 with the aim to campaign for a 10 % reduction in carbon emissions in 2010. Since, their projects all focus on carbon reduction. At the time, Islington council (a local authority district in London with powers on local policies and strategies) was conducting the first stage of the Bunhill Energy project which aimed to provide cheaper, greener heat to over 800 homes in the Bunhill ward, Finsbury Leisure Centre, Ironmonger Row Baths and offices on Old Street (all in London)[5]. Launched in November 2012, the heat network is fed by a local energy centre close by which produces both electricity and heat in a combined heat and power plant. The energy centre uses the heat created from producing electricity to create hot water that is piped into people's homes, making it more efficient than a normal power station, for which the heat is ordinarily a waste product. Phase 2 of the Bunhill Energy Project was about to be funded at the time of the project and involved building a new energy centre and connecting another estate to the network, thereby adding capacity to supply a further 1,000 homes. The

core of the new energy centre is a 1MW heat pump that will recycle the otherwise wasted heat from a ventilation shaft on the Northern Line of the London Underground network, and will transfer that heat into the hot water network. During the summer months, the system is reversed to inject cool air into the tube tunnels[6].

The societal challenge the NESTA co-creation process is working on is *Europe in a changing world – inclusive innovation and reflective societies*. The specific project by 10:10 was on Climate action, environment, resource efficiency and raw materials. 10:10 was interested in highlighting heating in this work, as most heating in the UK comes from fossil fuel boilers and a third of all greenhouse gas emissions in the UK arise as a result of heating and cooling buildings[7]. In urban areas, this results in the 'urban heat island effect' where the temperature in urban areas is higher than its surroundings.

10:10 used the money provided through NETSA's 'Everyone Makes Innovation Policy; programme to run a 'heat-seeking quest' to get people talking about waste heat, especially as it is an under recognised source of energy loss.

NESTA funded the work in order to analyse the policy context in which the ideas which came out of the projects emerged. To do this, they had been looking across the high-level innovation policy strategies of ten selected countries to develop a framework to analyse the inclusivity of innovation policies. They then wanted to find out how far and in what ways these countries address these aspects of inclusion in their approach to policy.

Starting point of the 'co-creation process'

NESTA came up with their research project called 'How inclusive is innovation policy?' in September 2017. The call for projects was opened by NESTA in February 2018 and closed in March 2018 with winners announced in April 2018. The launch event was in May 2018 and the heat seekers quest project began in June 2018. The final event, in which all funded projects presented what they had done, took place at NESTA in December 2018[8].

The main actors involved in the foundation phase of the co-creation process are described in more detail:

- Dan Walker and Neil Jones, 10:10– project coordinators, responsible for organising and running the heat seeking quests as well as developing the proposal.

- Max Wakefield and Leo Murray, Directors of 10:10 – Principal Investigators, responsible for overseeing the heat seeking quests as well as developing the proposal.

- Neil Jones – project manager who took over from Dan Walker. He was responsible for running the three more recent heat seekers quests.

- Madeleine Gabriel – Head of Inclusive Innovation, NESTA, responsible for developing the project on 'How Inclusive is Innovation Policy?' which NESTA funded the Everyone Makes Innovation Policy projects.

- Tom Saunders – Principal Researcher in Inclusive Innovation, NESTA (then UKRI), initiated the research project, fed into the 'How Inclusive is Innovation Policy?' report and analysis, and took the findings to inform how innovation policy can be more inclusive at the newly formed UK Research and Innovation in his new role as head of public engagement.

- Alex Glennie – Principal Researcher in International Innovation, NESTA, fed into the 'How Inclusive is Innovation Policy?' report and analysis.

- Isaac Stanley – Researcher in International Innovation, NESTA, fed into the 'How Inclusive is Innovation Policy?' report and analysis.

The project was developed by Dan Walker when he was at 10:10.

The action for more inclusive innovation policy project was initiated from the top-down as NESTA had decided on the call based on research they were conducting for the 'How Inclusive is Innovation Policy? : Insights from an international comparison' project. In terms of governance level, the project focussed on comparing national policies.

Each project was awarded £5000. In return, NESTA requested each project write a report on what they did and present their work at a final event. 10:10 used the money for catering and to hire the thermal cameras. As the cameras did not arrive at the expected time, the charity got a refund which they used to purchase thermal cameras which can be attached to mobile phones for future events. The project was initially funded for two heat seekers quests, one being a trial, but then won further funding for an additional three quests. The first was a trial event at NESTA involving the staff, the main initial quest was one in Islington and centred around the Bunhill Heat Centre. The further three were located in Manchester, Portmeirion (North Wales) and another final heat seekers' quest again at NESTA.

Further development of the 'co-creation process'

Landscape of stakeholders

NESTA –implemented, benefitted from and evaluated the process

NESTA is an innovation think tank based in the UK and was formed in 1998 as a non-departmental public body and transitioned into a charity in 2010. NESTA funded the project as they wanted to use it to research how inclusive innovation varies across policy contexts. By funding projects, they could see how they operated and in turn evaluate how their policy context effected their progression and outcomes. NESTA brought finances to the project as well as hosting the pilot heat seekers quest and providing feedback to 10:10 on how the policy landscape effects how effective the engagement is at including diverse groups. They also provided the project with legitimacy and authority. NESTA put out the call online which 10:10 responded to. After the project was funded, communication about the formal EMIP scheme was done formally through email but communication about the first pilot heat seekers quest held at NESTA was done informally through email.

10:10 – facilitated, implemented and benefitted from the process

10:10 climate action is a charity which aims to speed up action on climate change. They run interactive projects focused on tackling climate change at the community level, aiming to turn these local actions into a force for bigger changes. 10:10 wanted to pilot and develop heat seekers quests as a method to engage the public on waste and recycled heat which they could later reuse. 10:10 brought their expertise in public engagement exercises on the issue of climate change. In addition, they provided the project with legitimacy. 10:10 applied formally for money to run the quests to NESTA's EMIP initiative. They used social media as a method to engage the public with the events. 10:10's project was selected because they showed a clear policy implication to the work they proposed and suggested a novel, fun, interactive way in which citizens were engaged. 10:10 were incentivised to be a part of EMIP as they got money to run the heat seekers quests.

Participants – benefitted from the process

The participants were a mixture of ages and social backgrounds. They were recruited through a social media campaign and newsletters. 10:10 also directly invited people already engaged in their work interested in engineering, cities, policy, environment and guests (plus ones) for the event in Islington. The pilot event was run with participants being the

employees of NESTA. The participants were primarily people who were interested in resource waste, climate change and thermal cameras. They wanted to learn about waste heat, the potential for heat networks and thermal imaging. They brought with them ideas on how the heat network could be extended locally and knowledge of where heat is being wasted in their own communities. The events were advertised to the public through 10:10's newsletters as well social media. 10:10 found the thermal images taken during the pilot event were useful at drawing in interest on social media. Citizens signed up to the event on Eventbrite. There was not an oversubscription so all that signed up came to the event – there was no selection. The participants were incentivised by being told they could have the thermal images they took sent to them via email.

<u>Bunhill Energy Project & Islington Council – facilitated and benefitted from the process</u>

The Bunhill energy project is a heat network set up, run and owned by Islington Council and began operation in November 2012 to use recycled heat for hot water and heating in local buildings. The centre wanted to be involved as they could publicise their work and get more people invested in the idea of heat networks. The project could learn about how people perceive their work as well as other areas of waste heat in the local area. They brought expertise in heat networks and recycling of waste heat. The Bunhill energy centre were contacted through Islington Council who were known to 10:10 through a project on parks. Contact was made directly with the centre manager. The Bunhill Energy Centre was chosen as it is a good real-life example of how waste heat can be recycled. In addition, they were able to offer events space. Islington council and its heat network were incentivised because they were keen on its publicity as they were proposing an extension of the network at the time.

Phases of co-creation

Citizens were recruited through a social media campaign and newsletters. They had to sign up through Eventbrite. The event was not oversubscribed. The initial pilot quest took place in September 2018 with the event at Islington taking place in November 2018. Three follow up quests took place after the funding from the EMIP ran out between December 2018 and April 2019. Food and drink was provided during the final session of all the events. Please note, the tools used are described in the next section.

1. Pilot Heat Seekers Quest

The pilot took place at NESTA's offices. The event began with the first session in which two presentations were given from experts. The first was about novel technological solutions to recycle waste heat and the second was about social problems of heating such as fuel poverty. The event then moved onto the second session where the attendees were split into 'heat seeking' groups with each team sent out with cameras in the streets, to explore where heat was being lost and absorbed in an urban environment.

The heat seekers were set challenges, such as 'what is the hottest thing you can find?', 'what is the weirdest thing you can find?', 'what made you ask questions?'. Indoors, participants were set challenges such as 'whose phone charger was the most wasteful?'. After the quest, the heat seekers were brought indoors for the third session where they discussed what they found and to think about innovative ways to recapture lost heat in the environment. They brought their knowledge of their local areas and potential places where heat is lost. They also considered what technologies might or might not work based upon their knowledge of what would be acceptable to them.

2. Heat Seekers Quest in Islington

After feedback from the pilot quest, it was found that the participants did not get much out of the first session, the expert presentations. So, in this quest this section was replaced with a talk about the Bunhill Energy Project and a tour around the centre. The remainder of the quest remained the same. The thermal cameras had been hired and due to arrive one day before the event. They failed to arrive on time and instead only an hour before the quest was due to start. Because of this, and because the team leaders were different to those who supported the NESTA heat seekers quest, they were unfamiliar with the interface. 10:10 got a refund from the hire company which they then used to purchase less expensive thermal cameras which attached onto smart phones. This meant they were able to run further heat seekers quests and the interface was a more familiar a smart phone.

3. Three follow-up heat seekers quests

After the EMIP project ended, 10:10 conducted three follow up heat seekers quests, one each in Anglesey, Manchester and NESTA. During these workshops, during the heat seeking sessions when the participants search for waste heat, the facilitators decided they had gone too far during the Islington quest in terms of asking participants to find which objects were 'the hottest' or 'the coldest' – the facilitators said it had become an exercise to find objects, instead of being used as a trigger to discuss waste thermal energy.

The role of major drivers and barriers in these phases is described below:

Drivers

- The thermal imaging cameras proved popular and fun.

- The images produced during the events incentivised the participants to take part – they saw them on social media and were able to take home the ones they took

- The thermal cameras proved to be useful in being a trigger for discussion – when other people saw them on the street, they began a discussion about what they were doing and how waste heat could be recycled. In one case the participants took the thermal camera to a kebab shop where they engaged the owner on how heat was being wasted differently from the different methods of cooking the kebab meat. The owner began asking the team leader about alternative methods of cooking the kebab meat. In another case, a bus driver became interested in areas of the bus where heat was being wasted.

Barriers

- The thermal imaging cameras had an unfamiliar interface which made them difficult to use.

- Because there needs to be a high differential between areas of waste heat and the general atmosphere, the activity works best during the winter. The quest in Manchester took place during April and the weather was quite warm. Because of this, the images produced were not great and the issue of waste heat seemed less big.

In the following reference is made to the time and space dimension. The initial pilot quest took place in September 2018 at NESTA's offices in London with the event at the Bunhill Energy Project in Islington taking place in November 2018. Three follow up quests took place at the Biomass District Heating in Portmeirion, Manchester Metropolitan University's district heat network and another at NESTA after the funding from the EMIP ran out between December 2018 and April 2019. During every event the 'thermal camera' session took place in a combination of indoors and outdoors – the groups each decided if they wanted to go outside. Indoors, there were hidden objects.

Co-creation only took place within the early stages of ideation from the perspective of 10:10, but in the impact monitoring and evaluation stage from the perspective of NESTA. Co-creation is an overall working principle in the case but the emphasis is less on the process of the co-creation spiral, and more on increasing awareness of the issue. The organisers from 10:10 based the events on the 'theory of change' which states that everyone has to have

a stake in the solutions and so this project focused on that stage of cocreation – generating a sense of 'stake' in the issue. Ideas for changes which can be made in a local neighbourhood were produced in the process. Design is discussed in relation to local knowledge and what would and would not work.

The point was to stimulate discussion about heat, as people only tend to talk about heat when there is an extreme, for example when it is too hot or cold, without considering the underlying energy implications. 10:10 wanted to do this using a novel method. As the participants were on the street, interest was generated within other observers. One group took the cameras onto a bus, which triggered the bus driver's interest in emissions from vehicles and 'hot spots' within the bus. A dog owner became interested in the amount of heat emitted from their pet's faeces and finally, during the quest in Manchester[9], one group took the camera to a local kebab restaurant and got the owner interested in alternative methods of cooking in order to waste less heat.'

NESTA was a co-creator of the project and conducted the evaluation phase. They monitored the impact of the heat seekers quests in terms of their contribution to the advancement of heat networks and increasing their profile amongst the local community. They also looked to see how public opinion fostered through the events had an impact on the local council environmental strategies. They found that public support helped gain council funding for further projects and helped increase awareness amongst others in the local community. In addition, with public support local councils were able to demonstrate this as a form of success to central government.

Specification on methods, tools and communication

When recruiting the participants, communication was ad hoc through social media and 10:10's newsletter. In addition, 10:10 invited a selection of people interested in engineering, cities, policy, environment and their partners known to the charity from previous work. If they were interested in taking part, they were asked to get their ticket through Eventbrite but the events were free. After the event thermographs were shared with participants who consented to receiving emails and posted on social media. The dialogue before each heat seekers quest was sent through the Eventbrite ticketing system and email with the same information sent to all participants. During the heat seekers quests the dialogue was done by a facilitator.

NESTA advertised the call through social media and their newsletter. They communicated to 10:10 via both formal and ad hoc email and phone calls. Formal emails were used to communicate the needs and expectations from all grant holders and informal emails were used to organise the first pilot heat seekers quest at NESTA. In addition, NESTA regularly spoke to 10:10 about their influence on local policy during the life of the project.

There was neither a protocol nor strategy for a dialogue between the actors. The heat seekers quests were run by facilitators from 10:10. Each group on the quest had a group leader from 10:10 who both facilitated and knew how to operate the cameras.

The co-creation methods used and the stakeholders' experience with them are described in more detail below:

Presentations

The pilot heat seekers quest began with two presentations from experts. The first was about novel technological solutions to recycle waste heat and the second was about social problems of heating such as fuel poverty. At the end of the pilot heat seekers quest, the participants provided feedback and suggested the presentations to be the less interesting part of the event and wanted an alternative. The future events were all held in areas with district heating, so instead a presentation was given about the particular district heating project followed by a walk and talk.

Walk and Talk

A walk and talk was organised for the events at Islington, Portmeirion and Manchester to see the local district heating networks in each place. The participants discussed how the infrastructure worked, areas in which waste heat was being recycled and how it was implemented.

Thermography

Each heat seekers quest was then followed by a challenge in which the participants were split into groups and set challenges such as "what is the hottest/coldest/weirdest thing you can find?". They were able to search either indoors or outdoors and had a set time to come back to the meeting room. Indoors, the facilitators had planted objects around the room for the participants to find.

<u>Discussions</u>

After the challenges the participants reconvened indoors. They discussed what they found on their quests and each group presented the weirdest object they found. They used this as a trigger point for discussion about where heat was being wasted and the potential to recapture and recycle it. The facilitators encouraged conversation on where these objects are found in the participants' local areas and their suitability for being integrated into a recycled waste heat initiative such as a district heat network.

The participants completed a feedback form after each heat seekers quest. The facilitators at 10:10 reviewed them after each workshop and had a dissemination meeting to discuss how they felt the event went and what could have been better. During these meetings they also discussed the feedback forms to decide if changes had to be made for the next quest. One person from 10:10 took notes during the event on how the participants were interacting with the exercise and any observations on whether or not the quests were successful in generating debate and increasing public awareness. The facilitators considered the feedback and implemented the changes they thought were necessary. NESTA also conducted a reflexive assessment of the tools and method by seeing how effective they were in different contexts at influencing local government strategy. They also evaluated the inclusiveness of the events and how this effected local government action.

Specification on cooperation and conflict

<u>The Phrasing of the Quests</u>

The questions or 'quests' the heat seekers are sent on determine whether or not the discussion would be about waste heat or something else, which is seen in asking heat seekers to find the coldest or hottest thing. Whereas, when the question 'where is most heat being lost' was asked, which is in effect the same as 'what is the hottest thing', the discussion which followed was more based on waste thermal energy and the activity became less of a competition.

<u>The Quests just being Quests</u>

After the heat seekers quest in Portmeirion, the facilitators observed that the participants became too interested in finding the objects they had been given tasks for, such as the hottest. This became distracting and made the activity more of a competitive task instead of a thought triggering activity.

Seasonal Activities

Because the thermal cameras require a high temperature difference between objects and their surroundings to detect heat loss, the activity works best in the winter when it is cold outside so there is a higher temperature difference. The images produced during winter appear more impressive.

The uniqueness of the tool as a conversation starter

It is innovative in that the method used works by using novel and exciting objects (thermographs and thermal cameras) to engage people but also generate interest from observers and not just participants. This created a trigger for further conversation and exploration of solutions which extended beyond simply the people who would be predisposed to coming to an event such as this.

The whole activity took place during one day and only one person left the event half way through – they said they had to leave due to other commitments, so the intensity did not diminish during the course of the activity. In terms of social media, a facilitator said that it seems like the intensity increased when events happened as images were posted online and shared but when there was a lull in quests over the summer the intensity diminished. But, when the next set of quests was posted in September 2019, the intensity increased again.

A "disaffection – effect" had not been observed. Conflicts between participants were minimal and were handled through facilitation to other topics.

Specification on political influence

NESTA wrote a working paper called 'How Inclusive is Innovation Policy? Insights from an International Comparison.' using this work. In the report, they used a framework which looked at the innovation policy statements across ten countries and analysed their overall objectives, the direction of innovation, participation in innovation and governance of innovation. With the UK being one of the countries, they examined the policy framework in which the project was situated and how its impact then proliferated. This included the expansion of other district heating networks both in Islington and other parts of the country and how the heat seekers quests supported these. They also considered how different local governments reacted differently to the public support as a consequence of the events.

As Islington wanted to promote their heat network to expand the service this was the preferred site for the second workshop because the event increased awareness and support for the project.

Regarding the impact of the governance level on the result, it can be stated that the report compared national policy making across different global contexts and the projects influenced local strategy of increasing the local areas' heat networks.

Follow-up of the 'co-creation process'

After the EMIP funding ran out, 10:10 began running heat seekers quests alongside co-design activities to create a card game (Carbon Zero City) about the future of heat in the UK[10]. The process created solutions in terms of an understanding of objects which heat could be absorbed from and how recycled heat infrastructures could be built and be most effective in local areas. This created the ground work for future events to co-design a card game with participants in future events. It is innovative in that the method used works by using novel and exciting objects (thermographs and thermal cameras) to engage people but also generate interest from observers and not just participants. This creates a trigger for further conversation and exploration of solutions which extend beyond the people who would be predisposed to coming to an event such as this.

The councils have received publicity of their heat networks with Islington succeeding in winning funding to expand theirs. The card game has received funding on Kickstarter and has been launched to purchase. 10:10 have gone onto develop the card game with Manchester Metropolitan University and continues to run events as they were able to purchase cameras through the project.

An institutionalisation of the heat seekers quests process and the card game has been developed. The work was initially developed to run the heat seekers quests as activities to get people discussing waste heat and increased awareness of recycled heat projects. The initiative helped garner local support for the expansion of the Bunhill Energy Project.

Scaling

After the EMIP funding ran out, the heat seekers quests were run in three further workshops. In addition, the method has now been used in workshops in collaboration with Manchester Metropolitan University which have consequently resulted in forming a card game which people can purchase to decarbonise a city.

10:10 have continued to run the events and the Carbon City Zero card game is available to purchase which acts to increase public awareness. The councils are able to show public support for the heat networks through the events and NESTA have distributed their working paper through their website, newsletter, social media and events.

Systemic change

The project was funded by NESTA who continue to work to make innovation policy more inclusive. The report has been distributed via NESTA's website and newsletter and direct email to relevant policy professionals. Within it, NESTA outline an 'Inclusive innovation policy framework' which they test in future work. Their main findings suggest that whilst governments are starting to think more strategically about the range of impacts innovation has on different groups of society, they do not yet have a clear idea on how to implement an inclusive innovation policy agenda effectively. At the time, UK Research and Innovation had recently been developed which shifted how the UK's innovation policy is designed and delivered. UKRI has a mandate to support social and cultural impact to support society to become 'enriched, healthier, more resilient, and sustainable'. So, NESTA have since argued that there should be a clearer focus on directly policy towards goals that meet the needs of everyone in society, encouraging more participation, and on creating more opportunities for more voices to be heard when discussing and shaping innovation policy. One of the researchers (Tom Saunders) working on the project at NESTA has since become head of public engagement at UKRI and now influences discussions on more inclusive innovation policies.

Since the Everyone Makes Innovation Policy program, the Inclusive Innovation team at NESTA have worked more widely on diversity in innovation start-ups and social enterprises. A report 'Innovation Population' has been produced which looked at public perception towards attitudes to innovation and innovators. They also held an event to

discuss how young people from diverse backgrounds can be supported to become innovators.

10:10 continue to run heat seekers quests with the thermal cameras they purchased. The card game is available to purchase and is promoted and played during heat seekers quests.

Visualisation
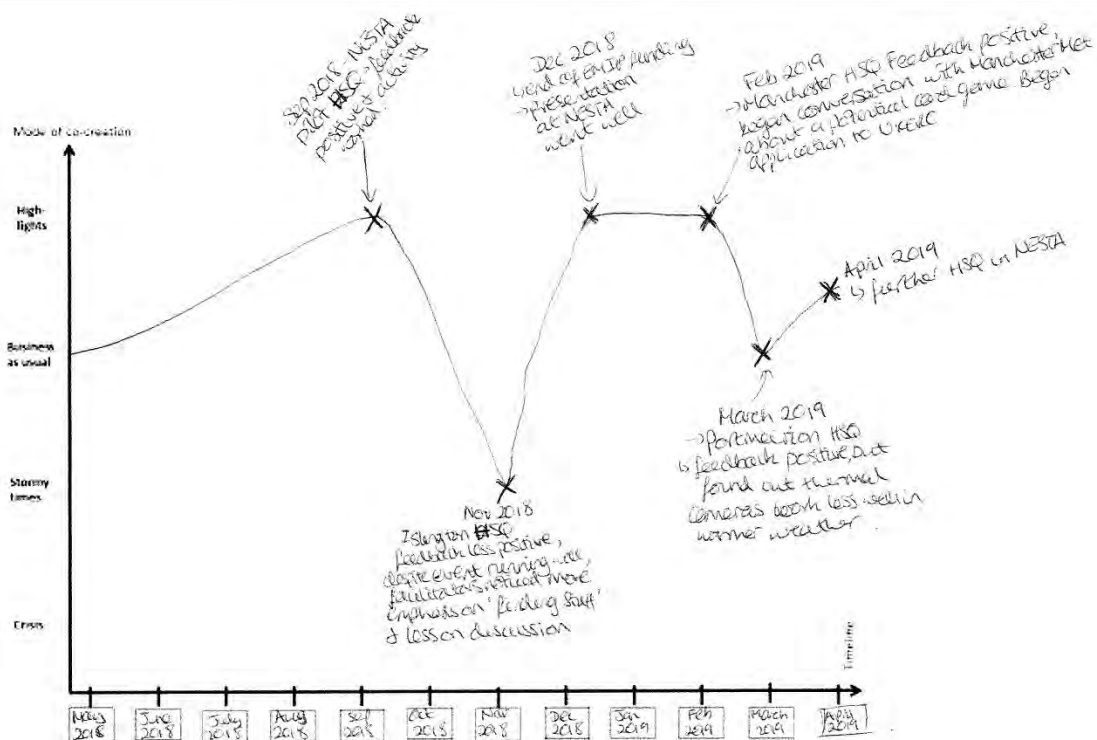
The project began in May 2018 with business as usual. In September 2018 a pilot heat seekers quest was run at the NESTA offices. The feedback provided was positive and the thermal camera activity worked so this was a highlight. In November 2018 the first main heat seekers quest was run in Islington where the feedback was less positive despite the event running well. The facilitators noticed a greater emphasis on simply 'finding stuff' and less on discussions about heat loss, so this was 'stormy times'. In December 2018 the Everyone Makes Innovation Policy funding ran out so 10:10 presented their work at NESTA – the presentation went well so this was a highlight. In February 2019 a heat seekers quest was run in Manchester which received positive feedback and allowed 10:10 to begin a conversation with Manchester Metropolitan University about a potential card game to be

developed around heat loss. As a consequence, an application for funding was submitted to UKERC. In March 2019 a heat seekers quest was run in Portmeiron. Despite the feedback being positive, the facilitators found the cameras did not work as well in warm weather. This brings it back down to just below 'business as usual'. In April 2019 a further heat seekers quest was run in NESTA. The feedback was positive and the project was in a 'business as usual' phase.

Which learnings emerged?

By making the quests less restrictive, participants were able to find objects they themselves found interesting as a trigger for discussion. The thermographs worked well as a unique tool to excite people and make them sign up for the event as well as a useful tool to promote the events through social media.

In terms of co-creation, this project does not come to an iterative phase. It does however act within a network of actions to support heat networks and decarbonise society. It raises the profile of waste heat and heat network projects and legitimises them for policy makers by garnering public support.

One of the organisers found that it was better to have a variety of indoors and outdoors and a variety of buildings so the participants have a lot to work with. They also said the timing of the event depends on who you want to come, e.g. after 6pm for people coming from work. They found that it can be a good idea to set a challenge to help get your heat seekers thinking creatively - e.g. 'what's the hottest thing you can find?', 'what's the weirdest?', 'what made you ask questions?'.[11] However, 10:10 found that it was important not to be too prescriptive. It was important that the challenge be the stimulus but not the purpose of the entire event. In the first quest there was only one hot water bottle hidden in the room but during the second, there were many more, as well as ice packs - it was found that many participants became too motivated in simply finding the hot and cold objects instead of the broad theme being discussed. This may be however that the first event was the initial trial at NESTA where staff members of NESTA were invited to take part who may already be engaged with the concept of wasted heat and the effects on climate change as they work at an Innovation think tank. The second event had a much more mixed audience who may not necessarily be thinking about the link between wasted heat and climate change directly.

One of the organisers commented that it was good to think of a venue for after the quest for the participants to talk about what they found.

From the feedback after the first events in NESTA and Islington, the charity decided to remove the two academic presentations as it was found that the discovery and discussion after the quest was what people found the most interesting.

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<u>Interviews</u>

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Engineering Comes Home | UK

Trupti Patel and Melanie Smallman (UCL)

Summary

Engineering Comes Home was a project set up by Prof. Sarah Bell at University College London (UCL). Sarah had previously worked on a project called *Demolition or Refurbishment* which found that there was a need to include residents and tenants more in decisions made about refurbishment and/or demolition in their community. A call by a UK government funding body provided an opportunity to address this issue and trial an engagement method which allowed citizens to actively be involved in decisions in their community. The research team found a group of residents who were already being engaged on issues relating to the infrastructure of their community. A series of three workshops were set up. The first was to understand how water, energy and food were being used within their community and with the knowledge of the residents, located the areas in which resources were being wasted and brainstormed possible technological solutions. The second workshop evaluated the feasibility and desirability of the solutions and the third focussed on final design characteristics of the technology and other interventions using the same technology. In between, the project team evaluated the workshops and produced supporting material. The researchers found that co-design worked as a method to include local knowledge into solutions as well as making the community feel that their opinion was valued. As this project was a pilot to help understand the use of co-design in action research, from this experience, a set of 'method statements' which outline what should be done at each stage of the co-design process was developed. These 'method statements' have since been used in other projects in which members of the team have been involved so the co-design procedure has been institutionalised. Further, the company which manages the estate now use co-design exercises as a method to engage community members in other estates it is responsible for.

Context of the 'co-creation process'

The project took place in the Meakin Estate in Bermondsey, South London, which is a former council estate that is currently undergoing regeneration and is composed of a mixture of social housing tenants and private tenants. This means that there is a great

income disparity between residents, with those who have recently moved into the estate having a significantly higher income than longstanding residents. The project team decided to work with this community because they were upgrading their heating system at the time which meant they were already discussing infrastructure within their community. Prior to this work, the Principal Investigator (PI), Sarah Bell, had worked on a project called *Demolition or Refurbishment* which produced findings showing that community participation from an early stage reduced impacts of refurbishment on their wellbeing and highlighted differences in the effects of any changes for leaseholders and tenants. She was motivated to develop a project which tested co-design as an engagement method. By doing this, she wanted to develop a standardised procedure to be used when engaging community residents on issues relating to their infrastructure.

The project is working on the *Climate action, environment, resource efficiency and raw materials* societal challenge. The topic of water, food and energy was chosen by the researchers as they are important issues for London but ones which are not often connected as a whole system. As a result, it provided an opportunity to open up discussions about whole-system analysis amongst stakeholder groups.

Sewage and water are both pressing issues in London as a growing population and an infrastructure system which was built in Victorian times are beginning to affect how the infrastructure functions, e.g. fatbergs in the sewage system[1]. Climate change is likely to impact on these systems further[2].

The project aimed to use co-design to reduce the impact of the community on water, energy and food resources, reducing environmental impacts and improving wellbeing in the community[3]. Water, energy and food are conventionally delivered using centralised infrastructure systems. Working with community members, the co-design method aimed to identify alternative options for meeting community aspirations. The project was a pilot to develop resources for future projects employing co-design and is mainly concerned with the societal challenges of aging infrastructure and climate change.

Starting point of the 'co-creation process'

The project ran from November 2015 to November 2017, with the cocreation process starting in April 2016. The UK research funder EPSRC funded the project up to the

prototyping stage, in order to develop co-design practices, including the method statements and co-design tools. The budget for this was £296,437. The FCC funded the installation of the prototype rainwater harvester with a budget of £10,000. Within the funding application the wider theme of the water, energy and food system had been identified and within the first workshop was presented to the participants who identified areas within the estate where interventions would result in system-level energy savings.

The main actors involved in the foundation phase of the co-creation process are described in more detail:

- *Prof Sarah Bell*, UCL Engineering – Principal Investigator and project initiator.

- *Dr Charlotte Johnson* – postdoctoral researcher, responsible for identifying the community group to work with and previously worked on *Demolition and Refurbishment* with Sarah Bell. This project formed the evidence base calling for co-design as a method of community participation.

- *Information Innovation Lab (iilab)* – a social enterprise focussing on technology for social impact – developed workshop plan and co-design tools.

- *Dr Aiduan Borrion* – Senior Research Associate, responsible for helping develop the research plan.

- *Dr Richard Comber* – Lecturer, Newcastle University Computer Mediated Communication, responsible for development of the research proposal.

The project was set up by Professor Sarah Bell in UCL's Built Environment School who wanted to develop a project engaging citizens on infrastructure refurbishment within their communities. Her work on the *Demolition or Refurbishment* project showed that wellbeing of community groups improved if they were involved in infrastructure decision-making in their estates. In addition, differences between the effect these changes have on private compared to social housing tenants were realised. A call was put out by one of the UK research funding bodies which happened to be asking for this type of project. Sarah applied for and won the grant.

The postdoctoral researcher had previously worked with the PI on the *Demolition or Refurbishment* project. They were responsible for scoping an appropriate active community group who were discussing infrastructure in their community at the time. Dr Aiduan Borrion brought expertise in using a Life Cycle Assessment (LCA) to support decision making. Dr Richard Comber brought his expertise in communication with user

groups through digital media which was useful in informing how the LCA Calculators should be designed and introduced to the citizens. Iilab were interested in the project as it aimed to understand how community groups could be better engaged in infrastructure which fit into the remit of their work.

Further development of the 'co-creation process'

Landscape of stakeholders

Decima Street TRA– facilitated, implemented, benefitted from the process

The Decima Street TRA acts as a gateway to the community, residents and tenants and was suggested as a good site by the management company. It offers in-kind support (no money) in terms of contacts, catering, and an events space where workshops took place. The TRA is a grass-roots organisation formed of residents and represents them on issues around social life, repairs and rent. The Meakin Estate was chosen because the TRA already existed so there was a strong community group ready to be engaged. Also, the hot water system was being upgraded at the time so provided an opportunity to talk to the residents about infrastructure in their community. Members tend to be the more longstanding community members. They bring experience in engaging the members of this particular community. The project is legitimised from the perspective of the residents as the TRA has authority within the community.

The contact to the TRA chair was made through the management company. The TRA encouraged residents, especially those who regularly attended meetings, to come to the workshops and supported the project. As consultation exercises about changes in the estate are typically done through them, they have benefitted from the 'method statements' produced as a part of the project – the TRA use them in their meetings.

The Residents – facilitated, benefitted from the process

The residents were incentivised to take part with £100 if they completed all the pre-workshop activities and attended all workshops. They provided their local knowledge. Before, the researchers were unaware that waste overflow was an issue, so a waste compactor was suggested as a solution. Initial contact was made through door knocking by the PDRA, posters in communal areas and word of mouth through the TRA. Once residents

expressed interest in taking part, their email addresses and phone numbers were taken to send reminders about activities, newsletters, and to keep residents informed about project updates. The researchers got 10 % of the community to take part and aimed for a mixture of social housing and private residents, age ranges and cultural backgrounds which they achieved.

<u>The Greater London Authority and Southwark – facilitated, benefitted from the process</u>

The GLA is the devolved regional governance body of London which has existed since 2000. It has jurisdiction over Greater London and the City of London. Its planning policies are detailed in the *London Plan*. The GLA sits on the project's advisory board and the contact here was already known to the researcher. Through them, the contact with the London Borough of Southwark was made. By being named partners on the project relationships between the researchers and the GLA were enhanced and provided the project legitimacy and credibility. In return, the findings were useful for future *London Plans.* The GLA has highlighted the environment as a major theme within the London Plan so were interested in the project for this reason. Southwark council wanted to support the project as Leathermarket JMB manages many estates within the borough. There was a follow-up project in Southwark and they have developed a programme to empower communities.

<u>Leathermarket JMB – facilitated, implemented, benefitted, and evaluated the process</u>

Leathermarket JMB is the private management company which maintains social housing in the London borough of Southwark. They were contacted by the PDRA. They previously worked with the PI and were interested in the project as they wanted to conduct more inclusive participatory methods instead of traditional consultations. The management body look to the TRAs in all the estates they are responsible for as a way to communicate, consult and deliver improvements. Thus, they were interested in understanding how the project works and if it is an improvement on traditional consultation exercises. They would also like to know if the technological solution chosen by the residents would be good to have on other estates. The pilot RWH is used and maintained by the management body. The contact within the TRA was provided by the management company. In addition, they provided catering, as well as the events space for the workshops. They also allowed the pilot RWH to be implemented on site. An ongoing relationship with communities living in estates managed by Leathermarket JMB has developed as a consequence and the researchers are now working with another housing estate run by the same company. Neither policy makers

nor the representatives for the management company were present at the workshops but their influence is at a higher level in terms of continuous efforts from the PI, in particular in developing new co-creation initiatives across London.

Iilab – facilitated, implemented, benefitted, and evaluated the process

Iilab, a social enterprise focussed on technology use for social impact, were known to the PI. They brought their technological capability – they were able to produce the LCA Calculators and the website on which to place the tools, method statements, and document the workshops. They also had conducted co-design exercises previously so brought this experience and were able to design, deliver and evaluate the workshops. They were also responsible for developing the co-design tools and exercises to be used in the workshops. They helped the PDRA analyse the qualitative study preceding the workshops and analyse the workshops themselves for the method statements. Iilab wish to promote technology for social impact, so wanted to be involved in a novel engagement exercise as it connected the need for a technological solution, but the engagement process meant social impact should be achieved. In addition, the webpage is hosted on the iilab's website so the tools and method statements produced are associated to them, including the LCA calculators.

Academics – facilitated, implemented, benefitted from and evaluated the process

The universities are the drivers behind the project and initiated the work in the first instance. Researchers include the PI Sarah Bell (Institute of Environmental Design and Engineering), Aiduan Borrion (Civil Engineering) and PDRA Charlotte Johnson (Institute of Environmental Design and Engineering) at UCL. A collaborator at Newcastle University (Richard Coombe) was known through previous work, and helped facilitate the workshops and collaborated in the academic outputs. He was also a named co-investigator on the grant. Sarah brought expertise in urban water systems, Aiduan brought expertise in LCA Calculators so helped the technologists at iilab understand the models behind them. Richard brought expertise in communication with user groups. The PDRA was hired to facilitate the project and conduct the initial qualitative research. The researchers used the project to further their research and helped facilitate the events. They were also able to act as neutral stakeholders allowing for open discussions. UCL hosted the project so gained financial support for the work. The project also attracts prestige for the university and academics and allows them to develop a track record with the funding body.

<u>KloudKeeper – implemented, benefitted from the process</u>

Kloudkeeper is an SME which focusses on internet-connected technologies to manage flooding. KloudKeeper manufactured a pilot RWH and were known by the PI's collaborators. The company wanted to develop RWHs which can be monitored real time and this project allowed them to test a prototype version. KloudKeeper won funding from the FCC, so brought funds as well as the technological capability to implement a prototype RWH. KloudKeeper benefitted by being able to advertise and test their prototype RWH.

<u>Over the Air Analytics – implemented and benefitted from the process</u>

OTAA is an SME which focusses on producing software which allows users to monitor and manage technological tools (in this case a RWH) in real time. OTAA developed the interface software for the RWH which can be controlled by KloudKeeper remotely. This project allowed them to test and develop further software used to monitor and control internet-connected technologies. They brought their own technological capability to the project. OTAA were able to advertise and test their prototype software to be used with the KloudKeeper system.

Phases of co-creation

A proportion (10%) of the residents were recruited through door-knocking, posters and directly through the TRA who recruited residents who attended their meetings conducted between November 2015 and April 2016 as described in the previous section. A qualitative study was conducted by the PDRA to understand how water, energy and food were being used by residents in the estate between April 2016 and October 2016. This was followed by three workshops conducted in October 2016, November 2016 and March 2017. Please note, the tools used are described in the next section.

1. Pre-workshop qualitative research

Four activities took place: initial semi-structured interview, home visit diary, final semi-structured interview. The aim of this part of the process was to understand how water, energy and food were being consumed within the residents' homes and on the estate and why they were being used in this way. In the final interview, they were asked about how these resources could be better managed on the estate. The PDRA also conducted an ethnographic study in the communal areas observing how they were being used and to get a sense of the types of people living and working on the estate.

2. Workshop 1: Identifying the Challenge

Initially, a 2-4-8 exercise (see the next section) was used to understand what the residents wished to personally get out of being involved in the project. Then, 'Nexy' tokens (see the next section) were used with images of the estate. The images were selected based on the responses given in the final interview of the qualitative research on how resources could be better managed. The tokens are discs with images on them representing either water, energy or food. In groups, they were placed onto areas of the images to create stories describing how the resource(s) were used in that area, e.g. how food waste is related to bins. By using these stories, a list of areas in which water, energy or food were wasted was created and the residents brainstormed and discussed ideas for dealing with these waste areas as one group. They decided to focus on reduction of wasting resources instead of generation of energy, e.g. solar panels. This made it easier to narrow down their options and they voted on their top three which the researchers took away and developed tools to assess their feasibility in the second workshop.

3. Workshop 2: Evaluate the Options

In advance, the researchers and iilab created fact sheets (see the next section) and LCA calculators (see the next section) for the options voted on in the first workshop. Workshop 2 began with a presentation of the shortlisted options which were: rain water harvesting and automatic irrigation, waste compacting, food growing, food sharing, and a wormery. The LCA Calculators and fact sheets were presented to the participants. The residents split into groups which discussed the practical implications of each option using the fact sheets and calculators. Each group discussed each option at the same time and gave their opinions to the wider group before moving onto the next option. The researchers and facilitator were in the room in case anyone had questions. At the end of the session each participant was asked to vote for their preferred option using a voting sheet. The preferred option was a rain water harvester (RWH). The researchers agreed to develop a detailed design of this for the final workshop.

4. Workshop 4: Developing the Design

The final workshop aimed to evaluate the design options for a RWH. At the start, an overview of the co-design process used so far was presented with a poster summarising the outcomes of the previous workshops. The PDRA explained that in between workshops 2 and 3 KloudKeeper had contacted the PI to find a site to install a pilot RWH in zone 1 in

London. The researchers had contacted the TRA and Leathermarket JMB to ask if they could install it there. They agreed, so a pilot smart RWH had been installed on the estate. A researcher gave a presentation about the RWH and the theory behind the LCA Calculator for a RWH which had been further developed after workshop 2 so that different design configurations, e.g. tank size, could be tested alongside environmental conditions, e.g. rain flow. The residents used the tool to better understand how the RWH would work and they voted on the preferred design configuration of the RWH. The participants were split into two groups to walk around the estate and discuss how rain water harvesting could be expanded on, e.g. more tanks or other options. The residents created annotated maps of the estate showing where they saw possibilities. Through the walk and talk (see the next section), the residents learnt about infrastructure indirectly. At the end of the walk the pilot RWH was shown to the residents. Once they returned to the meeting room, they discussed their maps (see the next section) and options for further rain water harvesting in the estate. A summary in which the preferred design option was discussed and how the residents would be able to take this and the other rain water harvesting options forward took place.

The role of major drivers and barriers in these phases is described below:

Drivers

- KloudKeeper unexpectedly contacted the PI as they had won money to install a smart RWH. So, there was a driver to develop a final object even though the initial project was to test the co-design process but not to develop the technological solution.

- The residents said they felt happy to see the project had resulted in an actual output for the estate.

- The PDRA was driven by the fact they saw a final output for the project as they had previously only worked on projects which critiqued but did not produce a final output.

Barriers

- Food growing in the gardens had already been discussed in a TRA meeting so was eliminated as a final option. It was already considered to be non-viable as the discussion in the TRA meeting considered the area to be an unhygienic place to grow food because of pollution and safety concerns around drug problems in the local area.

- The PDRA had hoped to do more ethnography at the beginning which would have fed into the workshop design.

- The users of the RWH (gardeners and cleaners) were not present, so the technology is not currently being used

- The residents mentioned a better place for the RWH to have been installed would have been in the car park so they could use the water to clean cars.

In the following reference is made to the time and space dimension. The workshops took place in the community hall used by the TRA and located on the estate. There were refreshments available; the facilitators ensured the space was comfortable and large enough. The workshops were planned to be over convenient times (evenings and weekends), and not over meal times. The first (October 2016) and second (November 2016) workshop had only one month between them but there were four months between the second and third (March 2017).

The co-creation took place in the ideation phase as the problems and solutions were identified by the residents even though they were limited by the broad theme of water, energy and food and they had to come up with solutions. They voted on their preferred option. The design phase was co-designed as the residents used the more sophisticated RWH calculator to help them design a final configuration for a RWH. The pilot RWH had already been installed before the residents had input into its design but their preferred design was discussed. Implementation of a final resident-designed RWH was not done. Evaluation of the process was done through a questionnaire in the final workshop but co-creation has not been used to monitor the impact.

Specification on methods, tools and communication

During the participant recruitment phase communication was both ad-hoc, and through the TRA and management body. The TRA contacted the residents who went to their meetings and the management company sent letters to all the residents about the project. Both provided the PDRA's email address to contact them if they were interested in taking part. The researchers also knocked on the residents' doors to recruit them. If the residents were interested their phone numbers and email addresses were taken - email was used to keep in contact with all the residents and arrange times for interviews, and home visits. During the qualitative research stage, the communication was informal and through email. On the day of the workshops the TRA phoned regular TRA meeting participants to get them to come to the workshops. The communication was not formalised.

At the workshop stage communication about the problems and solutions were only done in the workshops with the facilitator present. Reminder about the workshops were sent using emails but beyond this, communication was only conducted in the workshops.

The dialogue before and in between the workshops was ad-hoc but the interviews, home visits and workshops were done following a research protocol. The workshops were run by professional facilitators. The pre-workshop qualitative research was done by the PDRA.

The co-creation methods used and the stakeholders' experience with them are described in more detail below:

<u>2-4-8</u>

During the first workshop value elicitation 'games' were used to understand what the residents wanted to get out of being involved in the co-creation process and what they thought co-creation would achieve. A 2-4-8 game in which residents were first asked to sit in pairs to discuss what they wanted to get out of the co-design process and come up with two reasons. They then joined so they were a group of 4 and discussed what they came up with and whittled them back down to two, and then again as a group of 8. Then, there were only two groups in the room so each presented what they wanted from the process to one another. Residents found this process useful in setting an understanding of what their expectations should be and what they want from being a part of it.

<u>Walk and talk</u>

The residents went on a walk around the estate to discuss where infrastructure elements were so they had a better understanding of it before talking about what issues they had in the first workshop. In the last workshop this was also done with a map where residents could draw other areas where rain water harvesting could be used. The residents said they found the process really useful and interesting as they learnt about the infrastructure of the estate. One of the participants was a young person and became interested in studying engineering at UCL because of this exercise.

<u>Nexy Tokens</u>

During the workshop 'nexy tokens' were used alongside pictures taken around the estate. The tokens had images of an element of water, energy or food. The residents were asked to create 'stories' about how that resource (from the image on the nexy token) was used in the

area of the estate shown in the image. This was done by placing the tokens onto the relevant areas of the images and annotating them. The residents found the tokens good in opening up their imagination. It was useful the facilitators did not dictate a certain way of using them because some residents preferred using them as part of a network of water energy and food uses in one area and others used them as a representation of one of water, energy or food. Both produced stories though.

Nexy token with image representing lights in a building.

Fact Sheets

Fact sheets were produced to help the residents evaluate the options in the second workshop. The fact sheets explained what the approaches were, how they worked and what the costs and benefits are. These were useful because the residents felt they were able to make an informed decision. The cost-benefit analysis was commented on because issues were highlighted which residents wouldn't have thought of and extra benefits were also considered.

LCA Calculators

LCA Calculators were produced for and used in the second workshop to understand the quantitative aspects of the shortlisted technologies, e.g. it shows how much food is wasted per day, month and year. These were useful because the residents felt they were able to make an informed decision. It also made the abstract ideas more concrete because they could see, for example exactly how much food waste would be saved.

A reflexive assessment and evaluation of the tools and instruments was done primarily through note taking during the workshops by the researchers. After every workshop there was a debrief session between the researchers and facilitators through which the tools and instruments were evaluated. They felt the tools worked really well, but they noted there could have been a more interactive way to get the residents to brainstorm potential options instead of a discussion. The walk and talks were very well received by the residents and the researchers think this is because it allowed them to get up and move whilst making water, energy and food directly relatable to their home. The LCA Calculators were really useful in getting the residents to understand the quantitative effects of the interventions and how water, energy and food could all be related to e.g. rain water harvesting.

Specification on cooperation and conflict

<u>Tensions between feasibility and co-creation</u>

There was a tension between the push for the most feasible option and co-creation. A facilitator said that although the decision of which solution to develop further in workshop 2 was made by residents voting, this was influenced by a researcher who emphasised feasibility and the savings calculated in the LCA Calculators. These were emphasised as factors which residents should consider when making their decision. Other researchers said they should have not influenced the process and instead developed a plan for whatever the residents preferred based less on feasibility and environmental benefits but more on what the residents felt would be most likely to be used. Even if implementation would not have been possible, a plan could have been drawn up which the residents could pursue if they wanted to.

Feasibility was also used by the residents as a tool to block options which were more sustainable, but asked them to compromise or make lifestyle changes such as losing the communal garden for a wormery or composting. One facilitator remarked "Some solutions seemed fine as long as you were not the one to live with them!". The reasons the residents gave for not wanting the other options were based around the changes they would have to make. Food sharing was dismissed because of health and safety and responsibility reasons, the waste compactor was too large and expensive. The RWH was the most passive option from the residents' perspective as the primary users were gardeners and cleaners.

Tensions between Local knowledge and Best on Paper

In the co-creation process some options were not explored due to a combination of local knowledge and micro-politics. One researcher commented that food growing in the community garden was shut down as the TRA had already discussed this in their previous meetings and had decided against it. They considered it inappropriate as they had concerns about dog faeces, pollution and disposed drugs due to high levels of drug dealing in the local area - there seemed to be a sense of the area being an unhealthy environment to grow food in, so the idea was shut down. Despite positive environmental effects, in particular after the use of the LCA calculator, it was still considered unfeasible.

One option which came up in workshop 1 which the researchers had not considered before was waste compacting. Overflowing waste was not something the researchers had considered was an issue, so local knowledge in this case won out.

Power within the co-creation process

A researcher said that when the citizens were leading the work it was not a particularly positive experience as the members who regularly went to TRA meetings dominated the discussion whilst others were side-lined. One of the researchers referred to local knowledge as "parochial" eliciting a hierarchy within the group. They also said one resident was an architect so had more specialist knowledge allowing them to influence decisions more effectively.

Tensions between what the residents want from the process vs. what the project was funded to produce

Emotional engagement with the solution was important. Here, the description of works pointed towards certain types of solution but a researcher said alternative solutions which the residents had more emotional investment in would have resulted in it being used more.

In the first workshop the residents were asked to consider what they wanted to get out of the co-creation process. One group said they didn't want anybody else to benefit from the work they were doing. But the research project was funded to develop co-creation procedures, so as a result anybody who now uses these benefits from their work.

Cooperation in decision making

Overall the residents were very cooperative in making final decisions through voting. They were able to narrow down options effectively with facilitation, for example in workshop 1 the facilitator brought up the difference between waste reduction and energy production. In workshop 2 this was brought up in the discussion again and the residents were able to decide that waste reduction was their preferred route making the selection process easier

The researchers experienced recruitment issues – it was difficult to get people interested in the project and willing to contribute their time. They found they had to rely on regulars at TRA meetings, especially for workshop 1. A core group of residents attended every workshop and a few came to only one. Only one person took part in both the qualitative study and all three workshops. Work and family life and competing priorities were the most common reason for not attending everything. But the method meant not everybody had to attend everything. There was a 4-month gap between workshops 2 & 3 which a researcher claimed dissipated the enthusiasm for the project. But, in workshop 3 when the residents saw a RWH had been installed in that time, they were very impressed. So, I wouldn't call it disaffection – more loss of momentum.

A researcher said 'It would have been good to have more stakeholder involvement throughout the process' where 'stakeholder' referred to the management company, local and city council. The researcher would have liked to see the stakeholders at the workshops. But they were included in feeding back the success of the co-design process so the research group are now working on a project with a neighbouring estate run by the same management company. A researcher said there was no need for the same people to be involved throughout the process and that it was ok for people to be involved in some of the work but not all.

The conflicts were quite low intensity and the stakes of the project were not high, so when conflicts arose they were dealt with through facilitation towards other topics.

Specification on political influence

The GLA was on the advisory board due to the project's emphasis on sustainability and the environment. The GLA have made climate change a key issue in their most recent version of the London plan so were invested in the project for this reason. In Southwark, the council have learnt from the project so now have an Empowering Communities

programme. EPSRC as a public body funder would have expected a technological solution which guided the result.

The governance level was regional but did not have a direct impact on the result. This may be as the workshops focussed on a local scale of one estate, so the solution was specific to the preferences of that one estate.

Follow-up of the 'co-creation process'

As mentioned before under 'Tensions between feasibility and co-creation' the solution was influenced by the need for it to be feasible and the residents used this as a method to discount options they did not want. Also, other stakeholders were not present at the workshops and did not take part in the decision-making process. This includes the management company, gardeners and cleaners who would be using the RWH. The policy partners, the GLA and Southwark were also not present at any of the workshops. As a result, the RWH is not being used by the gardeners and cleaners. But, the policy partners, in particular Southwark have learnt from this project and begun and Empowering Communities programme and the management company now use co-design as a method to engage citizens in decisions to be made around their estates.

This project began with social research before conducting the co-creation phase (the workshops) which meant there was already an understanding of how water, energy and food were used in the estate as well as waste areas. This helped guide how the first workshop was run. This was innovative because the co-creation phase did not start completely from scratch. Also, relationships had been built from the social research stage which meant the residents were more invested in the workshops before they began.

A Pilot RWH was implemented but the co-created plans for more RWHs around the estate have not been implemented. Guidance was provided by the researchers on raising funds but this has not been pursued. No follow up with the stakeholders was agreed, but the researchers have been back to the Meakin estate since the end of the project and have found there is a new head of the TRA. The gardeners and cleaners working for the management company appeared to have had no knowledge of the RWH on site and therefore had not been using it. The researchers are unsure if this is a consequence of the change in leadership of the TRA but it may also because neither the gardeners nor

management company were involved in the co-design of the RWH. All the researchers commented they would like to go back to speak to some of the residents but were concerned that they would be disturbing people who have already given up a lot of time to the project.

A young person from the estate contacted one of the academics about applying to UCL as a student and became engaged in infrastructure from the walk and talks as part of the workshops.

An institutionalisation of the processes of co-design has emerged. The work was initially funded by EPSRC to test the co-design method and one output was the method statements which are on the project website. These outline the processes which should take place at each stage of a co-design project. Thus, in projects run by the group which encompass co-design and have begun since the method statements were developed, they have employed them to guide the process.

The management company are now using co-design as a method to make decisions with residents within communities they manage through the TRAs. And the local council has learnt from this project and has begun an Empowering communities programme.

Scaling

The process is currently being replicated within another project *Community Water Management for a Liveable London* (CAMELLIA) run by the same research group. A group of community gardeners who live in one of the estates managed by Leathermarket JMB contacted the project team directly after having heard about the Engineering Comes Home project. As CAMELLIA is about implementation, it focuses on making sure there is something in it for the citizens. As the researchers found, the Engineering Comes Home project was useful in building literacy, even though this was an unexpected outcome, they took some time before starting the CAMELLIA project to consider how 'capacity building' could be worked within the process more coherently.

New partnerships have developed for the PI and the research team at UCL, e.g. with *Thames Water* as a consequence of this project. In addition, the PI and a PDRA have also begun conducting other co-design projects with sister estates managed by Leathermarket JMB. Energy consultants from iilab have also reused the method statements for other

bottom-up infrastructure projects. A facilitator is working to create an online repository for these methods and is developing a cradle to grave infrastructure design process in their new role.

Further, as the method statements are freely available online, they are free to use by others who wish to run co-design activities. Since this project took place, the funding council EPSRC has placed an emphasis on co-design as a method of public engagement and UKRI emphasise co-production as a pillar for public engagement.

Systemic change

The project was funded through an initiative called 'Design the Future' by EPSRC. One of the aims of this call was to explore novel methods in which engineering designers engage with users and other stakeholders. The projects were to be feasibility studies. Thus, by using the outputs of these feasibility studies EPSRC and other funding bodies went on to fund further co-design projects once proof of concept had been achieved.

Further impact appears to not be in the use of the technological solution (especially as the RWH is no longer being used) but more around the methods of engagement with residents living in social housing estates. Leathermarket JMB has been proactive in using co-design as an engagement tool through TRAs alongside traditional consultations in order to make community decisions. The longer lasting impact of this is that residents feel more empowered to make decisions which directly affect their community.

Within the project itself, impact has been achieved for the researchers, facilitators and energy consultants themselves as they have continued to work using co-design. The PDRA in particular felt that it has allowed them to move towards a more interventionist way of working. They were surprised that a project which initially sought to understand co-design tools and methods could win funding to build a RWH – this was the first time she had been involved in a co-design project.

Visualisation
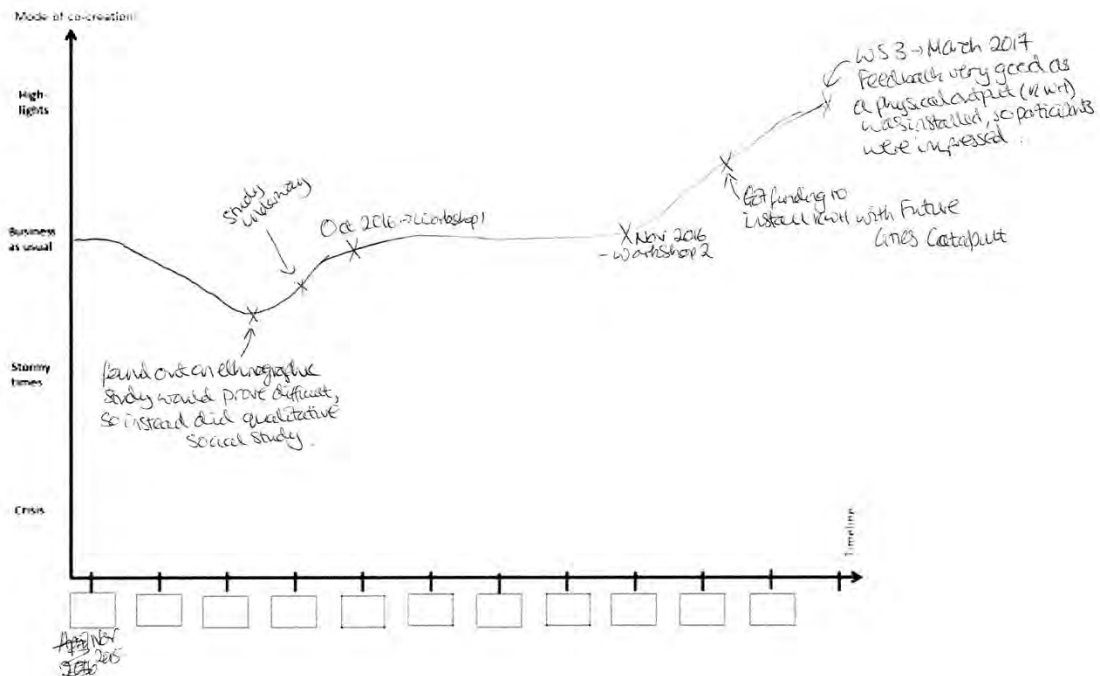
The project began in November 2015. In February 2015 it was found out that an ethnographic study would prove difficult so instead a qualitative social survey was conducted instead. Thus, the project entered 'stormy times'. It began increasing in positivity afterwards though once the study was underway. In October 2016 the first workshop was conducted. 'Business as usual' continued until the second workshop in November 2016. After this, the project received funding to work with the Future Cities Catapult to install a rain water harvester on site. Thus the mood increased to above 'business as usual'. In March 2017 the third workshop was conducted. This was a 'highlight' as the feedback was very good – because a physical output was installed (a rain water harvester), the participants were impressed.

Which learnings emerged?

The tools seem to work and gave a nice framework which future work is based upon. Guidelines on how to conduct co-creation at different stages was produced as a part of the project. The community learnt new things and they understood their water, energy and

food use in terms of the whole system. With the support provided, they were able to come up with complex system dynamics solutions. The technical core would have to change depending upon the context as the technical work changes, so in this case LCA calculators and the pilot RWH.

The maintenance of the rainwater harvester however has now become an issue as no direct funding has been allocated to it. But, the researchers do not wish to intrude; especially as they have begun writing more bids and developing other projects with the management company so do not want to interfere at this stage. General personal relationships have developed as a consequence, for example a young person gained advice on applying to UCL for a degree.

The researchers said the project was useful in building literacy so co-creation might be a useful method to achieve learning. Local knowledge shaped the decisions made which adds to the potential for solutions to be more likely to be used. The researchers are now focussing on building in the opportunity to provide knowledge to residents in future projects and adapting the method statements to reflect this. They have yet to recognise the need to formalise the procedure to bring out local knowledge however.

The field itself, infrastructure engineering, is not often associated with co-design so this project was innovative because it introduced engineers to this concept. Many people I speak to about this project are surprised an engineering project could encompass co-design.

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inDemand – Demand Driven eHealth Co-Creation | EU

Chiara Buongiovanni (APRE)

Summary

The Horizon 2020 inDemand project, started in September 2017, applies both demand-driven and co-creation approaches in the field of eHealth. Its model is meant to increase the capacity of health entities to identify and solve their needs, while creating opportunities for private companies. InDemand represents in fact a new model where healthcare organizations and companies co-create digital health solutions, with the economic support of public regional funds. The added value of the co-creation process between healthcare organisations and IT companies is the creation of digital solutions with higher success rate in terms of market uptake, having been developed together with the client. The model is currently under implementation in three pilot regions: Murcia Region (Spain), Paris Region (France), Oulu Region (Finland). Based on the scheme of two iterations with companies in a period of three years, to take place in each of the pilot regions, inDemand facilitates the co-creation between healthcare organisations and the companies selected as well as the delivery of the business support.

The inDemand process basically follows three steps: Need identification, Call for companies (first and second iteration) and Solution development (Co-creation and validation; Business advice). The co-creation process combines group coaching, one on one interactions and co-creation tables, while the approach varies and it is adjusted to the solution and region. At the end of co-creation, the funder oversees the evaluation and payment process while lessons learned and recommendations are shared to improve the inDemand model. Interestingly enough, InDemand has a high potential for replication,

with a view for boosting a community of regions interested in promoting innovation in health and in other sectors, although the project will test and develop models only in the health sector. With such a view, the initiative also provides for special mentoring of twelve 'mirror regions' to receive coaching to implement the model in their own ecosystem, leveraging existing regional structural funds. Other regions will have also the chance to access to best practices and lessons learnt even after the project ends.

Context of the 'co-creation process'

The InDemand model responds to an explicit challenge as framed by the European Commission through the Horizon 2020 - Research and Innovation Framework Programme. Specifically, it responds to the Programme H2020-EU.3.6.2. - Innovative societies - Topic CO-CREATION-03-2016 - Piloting demand-driven collaborative innovation models in Europe. The InDemand co-creation model has been designed to respond to a quite specific context: the European eHealth innovation ecosystem.

A proper and in-depth analysis of challenging peculiarities as well as of emerging needs from the ecosystem has worked out to be a key point for the inDemand co-creation process to be successful. Seven major issues seem to be driving the inDemand approach, as following reported through the analysis by the inDemand coordinator, Myriam Martin, from Ticbiomed, Spain.

- o   Adoption of innovation is limited due to the required level of funding: Organisations delivering financial support to this kind of instruments usually establish a minimum budget of several million euros. This complicates the sustainability within the public entity for replicating the instruments, as it is highly dependent on the success of obtaining third party co-funding. Also, challenges and opportunities of smaller size may not fit into these instruments due to the minimum thresholds required.

- o   The implementation of the PCP/PPI calls usually require cross-border collaboration: As a consequence they often set common needs, which may not be easy for sectors like healthcare which are indeed very dependent on local contexts.

- o   There is a need for tools able to leverage internal knowledge: Bottom-up challenges identified by motivated personnel closer to the problem (so called intrapreneurs) are more likely to find appropriate instruments to be solved.

- o Public buyers still take a risk-averse approach to their bids for innovative solutions: The instruments´ complexity and the level of investment require both financial resources and qualified staff. Changes in the standard procurement practice sometimes meet with internal resistance.

- o It is not easy for private companies to have a fluent exchange with public entities: Even if they are geographically close, as in their own region. This limited contact often leads to solutions that are not completely tailored to the public needs, especially for those produced by start-ups and small and medium enterprises (SMEs). In addition, the knowledge of this type of companies about the ´culture´ of public administrations and their procurement processes is low. As a result, they often regard public sector as complex client, requiring too much time and effort.

- o It is still challenging for some early stage companies to come up with business models that go beyond the immediate pilot and address global markets: Besides, the lack of appropriate commercialisation strategies and of the funding to fuel them limit the initial technological success of the pilots. This is especially true for some IT providers who tend to be blinded by technological fascination rather than the go-to-market strategy.

- o Better matching between private companies (supply) and public entities (demand) is highly desirable: It would in fact increase the levels of innovation and competitiveness in Europe by nurturing potential ´global champions´ that deliver socio-economic value to the continent and elsewhere.

Starting point of the ‘co-creation process’

The first phase in the overall inDemand co-creation process follows five steps. All actions at this stage are conducted, as below described, by the healthcare organisations in the three partner regions (Murcia, Oulu and Paris) with a view to launching the Call for Challenges for companies. InDemand provides cascade funding for the co-creation, with an allocated amount of 35,000 € to 40,000 € per company.

The steps and actions are as follows:

o   STEP 1.0: PREPARATION: to prepare and launch a call for identifying challenges
    with professionals. This step prepares the documentation, process and tools
    followed and used in order to select the Challenges in each region. First, the
    Executive team (ET) is appointed by the healthcare organization to lead the process,
    define the calendar, responsibilities and dissemination strategy. The objective of the
    ET is to manage and support the process of challenge identification. This team is
    formed by technical staff, knowledgeable about innovation management and with
    access to the political decision makers. Typical candidates come from Innovation
    units of the public entity. Following, the key topics are identified in each region with
    the top management to make sure that challenges are aligned with internal strategy
    of the healthcare organisation. Final step is the preparation of the questionnaire and
    the tools to receive the challenges proposed as well as the definition of the
    evaluation methodology.

o   STEP 1.1: RECRUITMENT: to disseminate the call to successfully engage with
    Intrapreneurs, to encourage the submission of quality ideas. The objective is to
    ensure that the identified Intrapreneurs in Step 0 (with the support of the top
    management) has a fully understanding of the project, the process, the objectives
    and especially their key role in the project. One of the activities of this step is the
    organisation of a workshop to present the methodology and the coming Call for
    Challenges, ensuring that Intrapreneurs have a fully understanding of the
    importance of the project and their role.

o   STEP 1.2: CALL FOR CHALLENGES: to collect via an online tool (platform or Google
    doc) the most important needs the hospitals may have today, and which could be
    solved with an innovative eHealth solution. The identified Intrapreneurs (Cf. Step 0
    and 1) are invited to fill in a specific online questionnaire to submit the most critical
    need/ Challenges they have in their hospitals at the moment.

o   STEP 1.3 EVALUATION: to evaluate the applications received based on the eligibility
    & selection criteria. A regional Evaluation Committee is appointed counting with
    relevant experts to assess the challenges submitted. The best challenges in the three
    regions are selected.

- o STEP 1.4 COMMUNICATION OF RESULTS: to interact with awarded Challenges to better define the selected challenge before transferring the information to the funder.

- o STEP 1.5 ASSESSMENT: to assess the outputs and management of the acquired knowledge to improve the model.

Figure 19 inDemand methodology for the Phase 1: challenge identification[1]

Further development of the 'co-creation process'

In the second phase, once the Healthcare organisation has selected the challenges, the local Funder oversees the identification process of the best Companies to co-create a solution with healthcare professionals. For this selection, the Funder launches a public, competitive call (inDemand Call for Challenges).

The Funders (partner organisations that manage European funds and are experts in grants) have received a financial contribution from the European Commission in the form of cascade funding to be transferred to the awarding Solvers for each Challenge in the two interactions. The calls are aligned with the requirements and internal procedures of those ones regularly launched at local level - e.g. eligibility criteria, % of funding - in order to assess the model under real-world conditions and maximize the chances of adoption after project end.

In the third phase, where the solutions co-creation process occurs, the steps defined are as follows:

- o STEP 3.0 REGIONAL APRROACH. It is important to set a regional approach to ensure all the required resources are available in Phase 3. It is useful to have for example regular meetings among Regional Partners (Healthcare organisation, Supporter, Funder) to keep all partners updated and all views shared. Healthcare Innovation Management Units will dedicate more time to prepare and guide

Intrapreneur teams so that they understand the inDemand model and give tips on how to work with external companies. The co-creation work plan template will be updated to ensure each section in the work plan to be as clear as possible.

o STEP 3.1 – CO-CREATION MANAGEMENT. Healthcare organisations will seek opportunities to have adequate resources to carry out the development work between healthcare professionals and companies.

o STEP 3.2 –BUSINESS SUPPORT MANAGEMENT. Regional Supporter organisations will offer tailor-made services to the companies during the co-creation in addition to the tools and materials provided. Regional intermediate organizations are encouraged to leverage their health and innovation ecosystems for business support.

o Step 3.3 – EVALUATION AND PAYMENT. At the end of co-creation, Healthcare organisations evaluate the targets versus the results achieved under each Challenge. The Healthcare organisations will share the information of the successful solutions in different pilot regions as well as the inDemand Community, with a view to enhancing the potential scalability of the solutions and adoption of use.

Landscape of stakeholders

The inDemand scheme seeks a space for co-creation among four groups of stakeholders, categorised as follows: Supplier private company; Public entity – healthcare organization; Funding organisation; Intermediate organisation. They are all primarily involved as key actors within the innovation process, yet playing each of them a different role, as below described.

o Supplier private company (the Solver): It is the solution provider.

o Public entity – Healthcare organization (the Challenger): Identifies the unmet need and frame it in the form of a challenge. It will also work in close collaboration with the Solver to co-create a solution.

o Funding organisation (the Funder): Launches a competitive call to select the best Solver for each challenge. It also provides the economic support to the Solver to carry out the development of the solution.

o Intermediate organisation (the Supporter): Delivers support to optimise the business model, access to funding and commercialisation of the Solver. It will also mobilise the local business ecosystem.
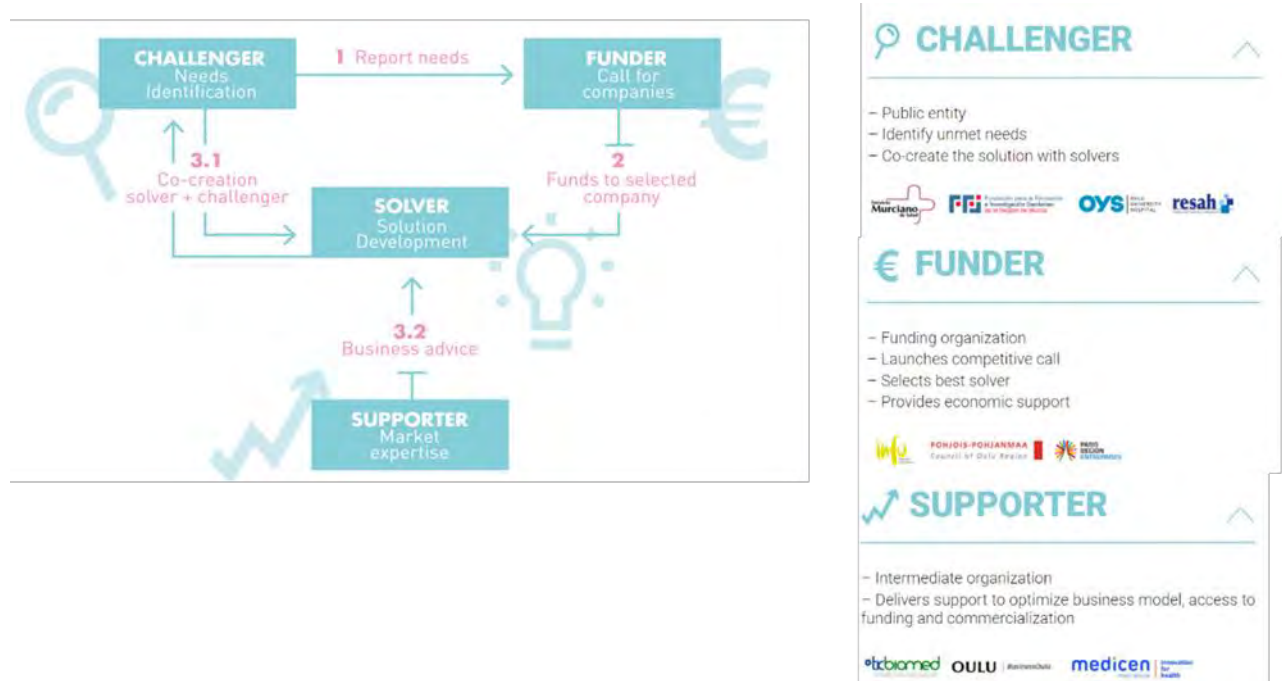

Fig. 2 – inDemand model[2]

Phases of co-creation

Before launching the third phase of the inDemand model, named 'Solution development', a methodology was defined for coordinating Challengers, Solvers and Supporters of the different regions to deal with the definition and validation of the internal work plan.

Several activities are needed before the actual start of co-creation and business support interactions to take place. The objective here is to create a common framework for the inDemand co-creation and business support. Following, the needed activities are described.

o Initiate discussion with each company on the business model approach to identify the specific needs.

o Set a personalised framework including planning for the co-creation period with the following information: team, calendar, milestones, deliverables, description of the interactions. At this stage:

   o All materials will be prepared in English (to ensure knowledge transfer);

- o The implementation may be completed in a local language (Challenger organisations' requirements for the co-creation language may differ);

- o At least three business support face-to-face interactions will be scheduled coordinated with the co-creation interactions;

- o Based on the needs of the sub-granted projects, the Supporter will assist companies to access services provided by inDemand consortium partners, such as coaching by experienced and qualified coaches, validation with business plan experts, support in the definition of a market development strategy and business scaling for target markets, targeted support to access private capital market.

- o Provide training to companies focusing in three areas: validation of the business model, access to funding and commercialisation;

- o Follow-up of the implementation:

  - o When a milestone is reached, a joint assessment will take place and corrective measures, if necessary, are put in place. It is important to discuss these needed measures with all relevant stakeholders.

  - o Reporting of the co-creation results, at the end of the co-creation process:

  - o Solver and Challenger interact to discuss the targets vs results of co-creation;

  - o Solver and Supporter interact to discuss the final go-to-market strategy and if any other business support is needed.

  - o Solver needs to report to the Funder the results and provides those in the set format.

The pilot regions adapt the defined minimum requirements according to regional resources in creating own regional approach for Phase 3 implementation (namely Solution development). The regional approach is required to ensure coordinated actions among Challenger, Solver, Supporter and Funder organisations. In the regional approach, the most important activities will be defined (i.e. inDemand Project kick-off day for the Solvers, Co-creation with users, Group Sessions, One-to-One meetings, Test Trial Period and the Co-

creation Final Event for companies). These regional approaches are shared with the rest of the Consortium Partners for feedback, knowledge transfer and validation.
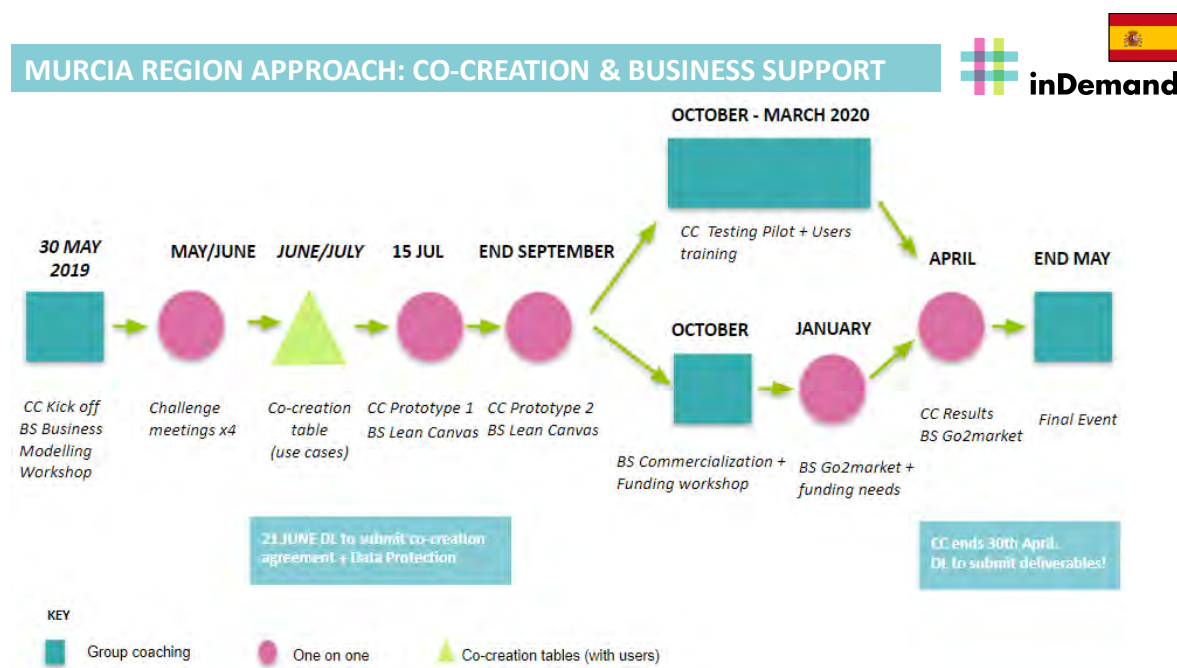

Figure 3 – Murcia regional approach[3]

Specification on methods, tools and communication

As previously described, the inDemand model follows three phases. Each of these phases is implemented through the most appropriate methods, tools and communication procedures, as below summarised, according to the regional approach, as defined by each Region.

1. NEED IDENTIFICATION
Internal and private consultation in which healthcare professionals report those challenges that could be solved with digital health solutions. Out of all the proposals, each regional committee will select four main needs in each iteration and report them to funders.

2. CALL FOR COMPANIES

Regional public funders launch a call for companies – to finance a maximum of 60 % of the project development.

o   First call for companies: first half of 2018 (Iteration 1)

o   Second iteration call for companies: 2019 (Iteration 2)

3. SOLUTION DEVELOPMENT

3.1. Co-creation and validation.

Four selected companies for each region and iteration (i.e. twenty-four companies during the all project) will co-develop their solution with the healthcare professionals (Challengers). Besides, the solutions will be tested and validated within the participant healthcare organisations.

3.2. Business advice

Companies will receive business advice from supporters in order to optimise business model.

Specification on political influence

The inDemand model allows the government sector to take the opportunity and the responsibility to play a key role in increasing regional excellence by changing the way regional actors work together. This is to be realised within a quadruple-helix approach, focusing on a wider regional development agenda and a consistent ecosystem-based way of thinking.

The public administration is in charge of creating a legislative framework for innovation-friendly environment and it could steer financial support for effective co-creation between the actors to take place. Governments also have financial instruments at hand, such as Public Procurement of Innovation (PPI) that can drive innovative solutions forward, but – according to the inDemand Coordinator - the sector would still need awareness raising and capacity building to maximise its innovation capacity.

At European funding level, Horizon 2020 INNOSUP Programme offers space **to Innovation Agencies** for further experimentation. In this framework, one of the inDemand partners – as reported by the inDemand Coordinator - submitted a proposal to enrich the model with the clinical trials methodology in a 'randomised control trials' format. The behind idea has been to check the benefits of this approach in comparison with the very weak current standards for checking the effectiveness of the aid provided to Innovation Agencies in the framework of European Structural and Investment Funds (ESIF).

InDemand Consortium recommends fostering the adoption of new instruments in the organisations managing EU funding. The view should be improving the efficiency in the utilisation of those regional funds (ERDF) earmarked for healthcare and/ or digitalisation

with the aim to foster innovation within regions, while combining them with other funding such as H2020.

The inDemand project has tested a new co-creation model with H2020 funding, which will be later economically supported with yearly available European Regional Development Funds (ERDF). The funding model applied follows both the requirements of H2020 as well as of ERDF, as the Funder organisations within inDemand are Research and Development Agencies (RDAs) and other types of entities managing ERDF at local level.

Follow-up of the 'co-creation process'

Tangible follow up of the inDemand co-creation processes throughout the involved regions are already in place. In this paragraph some examples are shortly reported.

DELFOI - Digital Health to support efficient implementation of rooms in Oulu Hospital[4]
DELFOI company was selected to solve a health need detected by the Oulu University Hospital (Finland), looking for a solution supporting resource planning for more efficient implementation of rooms.

SENSE4HEALTH - Trans-disciplinary co-creation has greatly helped to improve the product[5]
SENSE4HEALTH was selected to solve a health need detected by the Oulu University Hospital (Finland), looking for *a remote controlled mobile solution for hospital clients (case: children's asthma examination).*

SEMEIA: Data in hospitals avoid unnecessary hospitalisation[6]
SEMEIA company was selected to solve a need detected by the Foch Hospital in Paris (France), looking for remote monitoring of real-life patient data to anticipate the occurrence of complications/ degradations in health status.

COSTAISA: HEAlthcare Training management platform[7]
COSTAISA company was selected to solve a need detected by the Reina Sofía Hospital in Murcia (Spain), looking for a healthcare training management platform.

Scaling

In order to boost innovation and share the lessons learned, inDemand set the creation a larger community of adopting regions, as one of its own goals. Aiming to add twelve more regions to the existing inDemand community, an open has been published and disseminated.

Aragón, Cantabria, Extremadura, Madrid, Navarra, East Netherlands, Pomorskie, Piemonte and Tampere are already reacted positively to the open call and joined the inDemand Community, sharing the common goal: boosting digital transformation in healthcare for improving patient care[8].

A not secondary added value the model is providing to the community members (i.e. the adherent Regions) is the opportunity for learning how to use their own funds as well as the structural funds in a more efficient way. This, in turn, will help to boost digital transformation and competitiveness within their territory.

Systemic change

'Healthcare organizations see in the inDemand proposal a channel to facilitate the cultural change needed for innovation, which is in turn a key element for digital transformation to succeed. The inDemand model fosters the innovative profile of healthcare professionals, while becoming an agile tool to ease their relation with tech companies, thanks to co-creation', explains Jorge González, CEO at Ticbiomed and inDemand Coordinator.

During the first iteration (2017-2018), ten digital health solutions were detected by healthcare professionals from six hospitals within the European Union and co-created hand in hand with European IT companies. Professionals and companies are currently being surveyed by the inDemand Consortium, with a view to keeping on learning on how improving the model.

Quite an impact seems to be registered so far, through the inDemand co-creation activities and experiences, as reported from the involved stakeholders themselves.

The inDemand Consortium has been investigating in fact on how healthcare organisations are dealing with the innovative inDemand model. Five major dimensions for impact have emerged so far, as follows:

1. Healthcare organisations see inDemand as a new corporate channel to facilitate cultural change;

2. InDemand has helped to define the 'map of innovation talent' within the healthcare organisations;

3. Following inDemand experience, healthcare professionals are more likely to use such an approach when detecting an unmet need in their daily work. The staff feels empowered to use innovation;

4. As reported from an inDemand Challenger, through the inDemand model 'the challenges are very well mapped. What came out are in fact right needs, and no invented stuff. It works as a really agile and inspiring way to dig into the needs of professionals';

5. The inDemand model is easier and faster to implement than other demand-driven instruments like PCP. All challengers agree on this.

Visualisation

Below data from the implementation of the inDemand co-creation process in Murcia Region, May 2019 to May 2020:
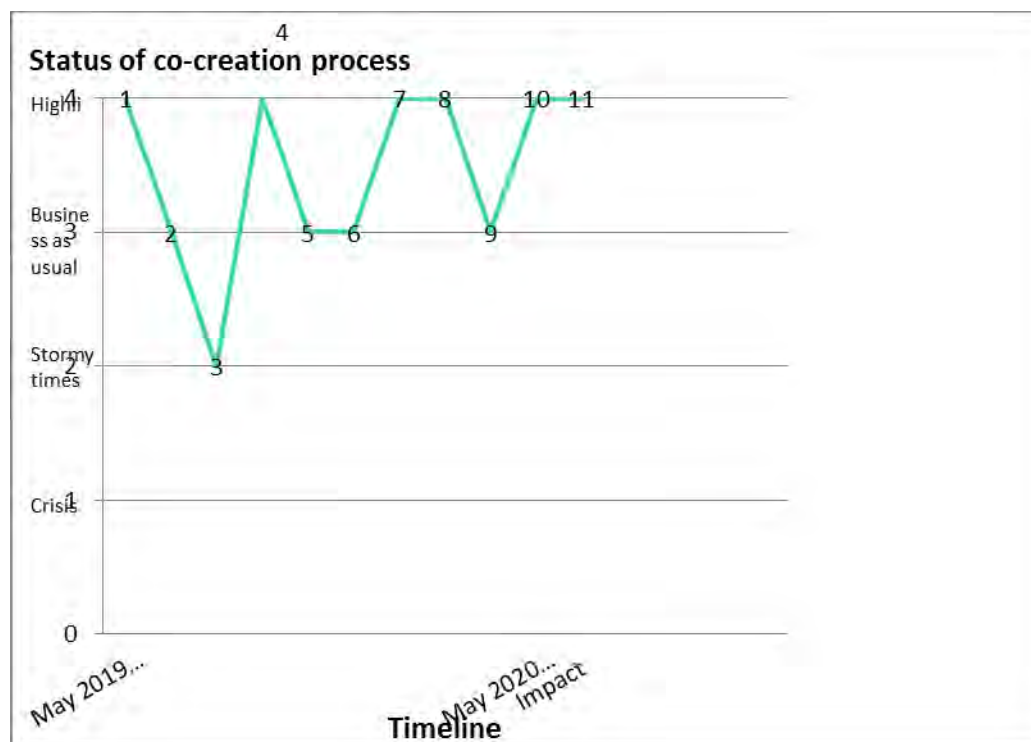
1. May 2019: The co-creation process starts with the kick-offs of the Business Modelling (Highlight)

2. May to June 2019: Four meetings take place to define the challenges (BAU)

3. To define the challenges different actors within the organisation have to take place, different cultures and visions have to be integrated in order to identify the need and transform it in a Challenge (Stormy times)

4. June to July 2019: Co-creation tables with users took place (Highlight)

5. July to August 2019: The prototype 1 was developed (BAU)

6. In September 2019 prototype 2 was developed (BAU)

7. In October 2019 the testing pilot phase started together with users training (till March 2020) (Highlight)

8. From October 2019 to January 2020: the Business advice workshops (Higlight)

9. In April 2020 Solution ready to go to market (BAU)

10. In May 2020 Event to present results (Highlight)

11. Impact phase

Which learnings emerged?

InDemand represents quite an interesting co-creation model, dealing with a peculiar sector such as eHealth. Co-creating in eHealth deals in fact with two key issues emerging in the current European social and economic landscape: the call for a more effective healthcare response on one side, the emergence of a fast-growing vertical market for tech companies and start-ups on the other. Working on the 'hinge' of the two patterns, specifically through co-creation, inDemand seems to promise quite an effective ecosystem approach to healthcare innovation, moving from the demand side and getting to the market, through final users direct engagement.

In Demand, in fact combining both open innovation as well as co-creation approaches and methods, ends to be quite a disruptive proposal for the public healthcare traditional way to approach innovation procurement. An important effect on the healthcare organisation management, as a first result, seems to be activated, through the inDemand experience. Furthermore, the key role for the regional funder, as designed in the model through a

funding mix mechanism, seems to ensure financial sustainability and local grounding to the entire initiative.

The need for capacity building for the healthcare organizations and the opportunity for business supports for the companies, as emerging from the inDemand first test (as seen in this Biography) are definitely two important takeaways for ensuring relevance and quality, both on the demand side as well as on the market. Finally, the commitment for a growing inDemand community of Regions throughout Europe suggests an additional way towards sustainability and mutual p2p learning and exchange[9].

References

Interviews

Jorge Gonzàles (CEO Ticbiomed, inDemand Coordinator)

Myriam Martin (Head of Project Management Ticbiomed, inDemand Coordinator)

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[1]"inDemand methodology for the Phase 1: challenge identification - scheme provided by the InDemand Coordinator, TicBioMed
[2] inDemand model infographic – source: www.inDemandhealth.eu
[3] Murcia regional approach – scheme provided by the inDemand coordinator TicBioMed
[4] More: www.inDemandhealth.eu/digital-health-to-support-efficient-implementation-of-rooms-in-oulu-hospital
[5] More: www.inDemandhealth.eu/transdisciplinary-co-creation
[6] More: www.inDemandhealth.eu/data-in-hospitals-avoid-unnecessary-hospitalisation
[7] More: www.inDemandhealth.eu/the-inDemand-process-generates-a-win-win-outcome
[8] More: www.inDemandhealth.eu/the-inDemand-community-members
[9] See also inDemand Case study, p. 14

Smart Kalasatama: Health & Well-being Centre | Finland

Ines Vaittinen (ENoLL) and Kaisa Spilling (Forum Virium)

Summary

Smart Kalasatama

Smart Kalasatama is a smart city district for pilot projects. It develops new digital services and urban innovations in cooperation with private companies, the City of Helsinki, other public sector organisations and Helsinki residents. The idea for a smart city district for pilot

projects - a neighbourhood purpose-built to supply proof of concept, was initiated in 2009 by Helsinki city planners.

Smart Kalasatama is an 'umbrella project' that operates on many different domains, including several projects (30+), and further, a few pilots or experimentations under several projects. The vision of the smart district is to create services in the area that will lead to saving one hour of time in the daily life of each citizen. Following this common vision, together with stakeholders, the thematic areas for experimentation were created for agile pilots that could explore the different areas of smart and sustainable everyday life.

Agile piloting programme

The programme for Agile piloting is a proven way to support and accelerate urban development and to engage a wider stakeholder network to co-create new services. The co-creation and engagement methods are inspired by design thinking. The model offers tools to innovate, co-create and experiment new services and products together with startups, the city and other stakeholders. Learning is at the heart of the process.

From 2015 until 2018 the Smart Kalasatama Agile Piloting Programme, coordinated by Forum Virium Helsinki, has facilitated 21 innovative agile pilots in real-life environments. The pilot themes have represented different areas of smart city development ranging from resource and energy efficient solutions to smart living and innovative local services and well-being.

Figure 1. The first 16 projects under the Smart Kalasatama umbrella, including no.2 Health and Well-being Centre [1]
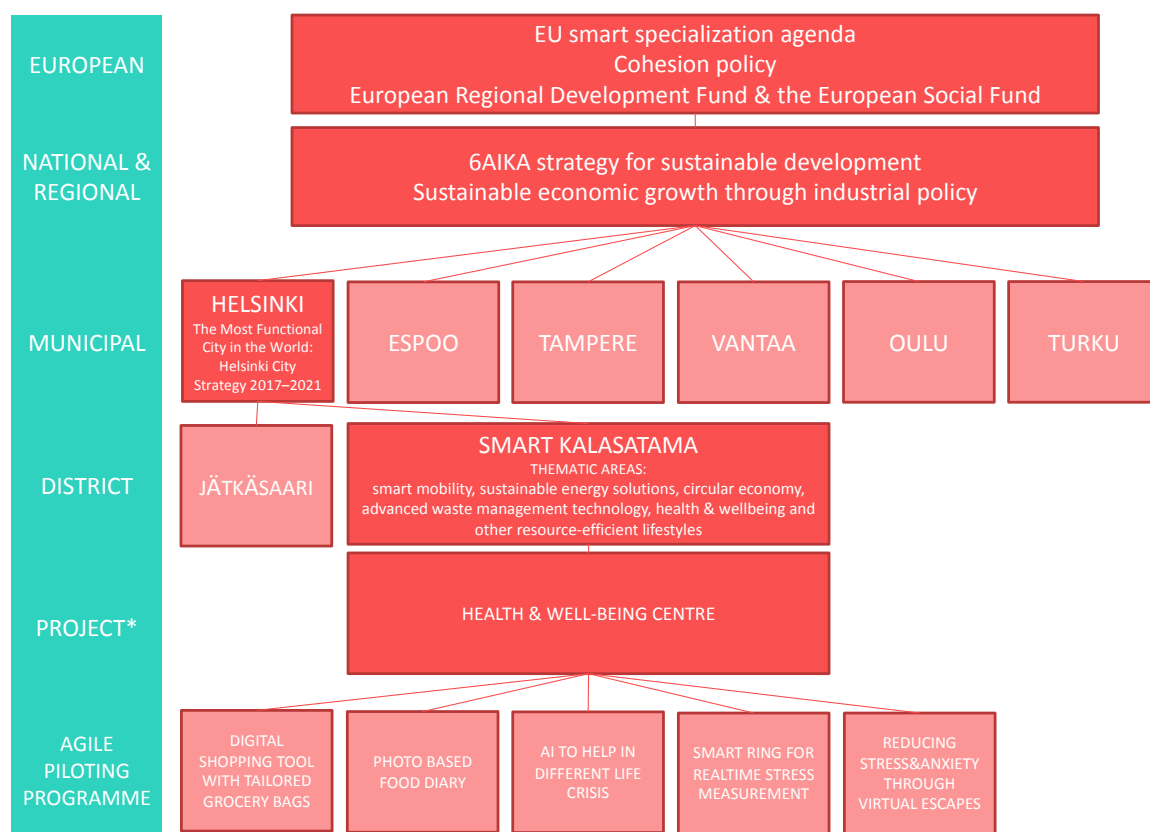
Health & Well-being Centre

The 16 larger projects first run within the district are presented in figure 1. In this case study, the focus is on one of such projects within the Smart Kalasatama programme: the Health & Well-being Centre, where the aim of the piloting is to co-develop and experiment with new solutions that improve the resident's well-being. The centre combines public health services and social services under one roof. The Health & Well-being Centre as an experimentation platform is the focus of this innovation biography; while the study refers to the district level (Smart Kalasatama district) as well as to the pilot-project level (agile pilots), the main focus on the processes of co-creation throughout this study refers to that of the project level: Health & Well-being Centre (see figure 2 – project level)

Agile pilots

In this innovation biography the focus is on Kalasatama well-being piloting programme with the first round of pilots conducted at the Health & Well-being Centre (once the physical building was constructed). This first round consisted of five agile pilots (See figure 2 – agile pilot level): 1) digital shopping tool with tailored grocery bags; 2) photo-based food diary; 3) an AI to help in different life crisis; 4) smart ring for real-time stress measurement; 5) reducing stress and anxiety through virtual escapes. These were the first five pilots conducted since the opening of the centre. A few agile pilots related to well-being were already experimented within the district in collaboration with the City Health & Well-being sector, prior to the opening of the physical location.

In the following chapters, the context, process, starting point and tools and methods, as well as learnings on the process and its scaling are outlined for each of these levels introduced.

Context of the 'co-creation process'

European, National and Local regulatory contexts. The Smart Kalasatama district has offered a physical location for experimentation for many projects, of which the health & well-being centre is one example. The first five agile pilots at the health & well-being centre represented in this figure were run in 2018.[2]

The policy background: positioning of the Smart Kalasatama Health & Well-being Centre in the European, National and Local regulatory contexts

The Smart Kalasatama district, Health and Well-being Centre and agile pilots are all embedded in European, National & Regional, Municipal and District – level strategies. Figure 2 above summarises the positioning of these in the regulatory contexts. To demonstrate, the 16 projects at the project level belong to the first 16 projects ran in the district in 2015. Similarly, the five agile pilots presented in this figure include only the five agile pilots that belonged to the first round of pilots ran at the time of the opening of the Health & Well-being Centre. The figure therefore excludes all other projects ran after 2015,

as well as all the agile pilots ran prior to the opening of the centre, and in the next piloting rounds.

The elements highlighted in the figure represent the strategies, policies, funds and agendas most central in supporting the development the Smart Kalasatama Health & Well-being Centre:

1) European level: EU smart specialization agenda, cohesion policy, European Regional Development Fund & the European social fund. At the European level, the EU smart specialization agenda and cohesion policy have provided a framework for the development of the national and regional strategies. The European Regional Development Fund and the European Social Fund are providing financial funding these frameworks.

2) National & regional level: 6AIKA strategy for sustainable development, Sustainable economic growth through industrial policy. At the National and regional level, the 6aika (six city) strategy for sustainable development has provided a framework for the development of the six largest cities in Finland with projects that aim to help companies develop new, smarter services and operating models. This is connected to the sustainable economic growth through industrial policy.

3) Municipal level: Helsinki - The most functional City in the world: Helsinki City Strategy 2017 – 2021. At the municipality level are the six cities of the six city strategy. Helsinki, where Smart Kalasatama is located, guides the development of the area with the 'Most Functional City in the World: Helsinki city strategy 2017-2021'.

4) District level: Smart Kalasatama: Health & well-being. At district level, there are two main districts in Helsinki serving as innovation platforms and running agile piloting promgrams: Smart Kalasatama and Jätkäsaari. The thematic areas guiding the scope of the projects in Smart Kalasatama are smart living, sustainable energy solutions, circular economy, advanced waste management technology, health & well-being and other resource-efficient lifestyles. In addition to these, agile pilots are also run by the city, as well as different projects.

5) Project level: Health & Well-being Centre. The Smart Kalasatama Living Lab facilitates the collaboration of the local large projects and local stakeholders on an ongoing basis, in collaboration with start-ups, corporations, public services, universities and citizens.

6) Agile piloting programme level: At the agile pilot level, five examples of such agile pilots are provided, the first five agile pilots run at the Health & Well-being Centre. The Kalasatama Health & Well-being Centre is one of the well-being innovation platforms of the city, together with the city economic department (three to five agile pilots are run on an ongoing basis, each piloting for a period lasting up to six months).

Starting point of the 'co-creation process'

<u>Starting point of the co-creation process at the Health & Well-being Centre</u>

The experimentation platform for the health & well-being domain was initiated in 2015. Already prior to the opening of the physical location, the Health & Well-being Centre itself in 2018, several co-creative and agile piloting projects were already running in Smart Kalasatama. Therefore, the culture of experimentation has already been adopted by the district and is a familiar concept to all stakeholders in the area, including citizens. From 2016 until 2018 (prior to the opening of the Health & Well-being Centre), 21 pilots have run in the district of Smart Kalasatama, covering a wide spectrum of domains.

<u>The actors in the co-creation process in the Health & Well-being Centre</u>

The main actors involved in co-creating the Health & Well-being Centre are referred to as the circle of facilitators. The different roles presented in the circle of facilitators are presented in figure 3. The governance model is based on a structure called "the circle of mediators", implemented by the city and run by a specific sector in the city. In this case, the circle of mediators is run by the Helsinki Social and Healthcare and City Executive office.
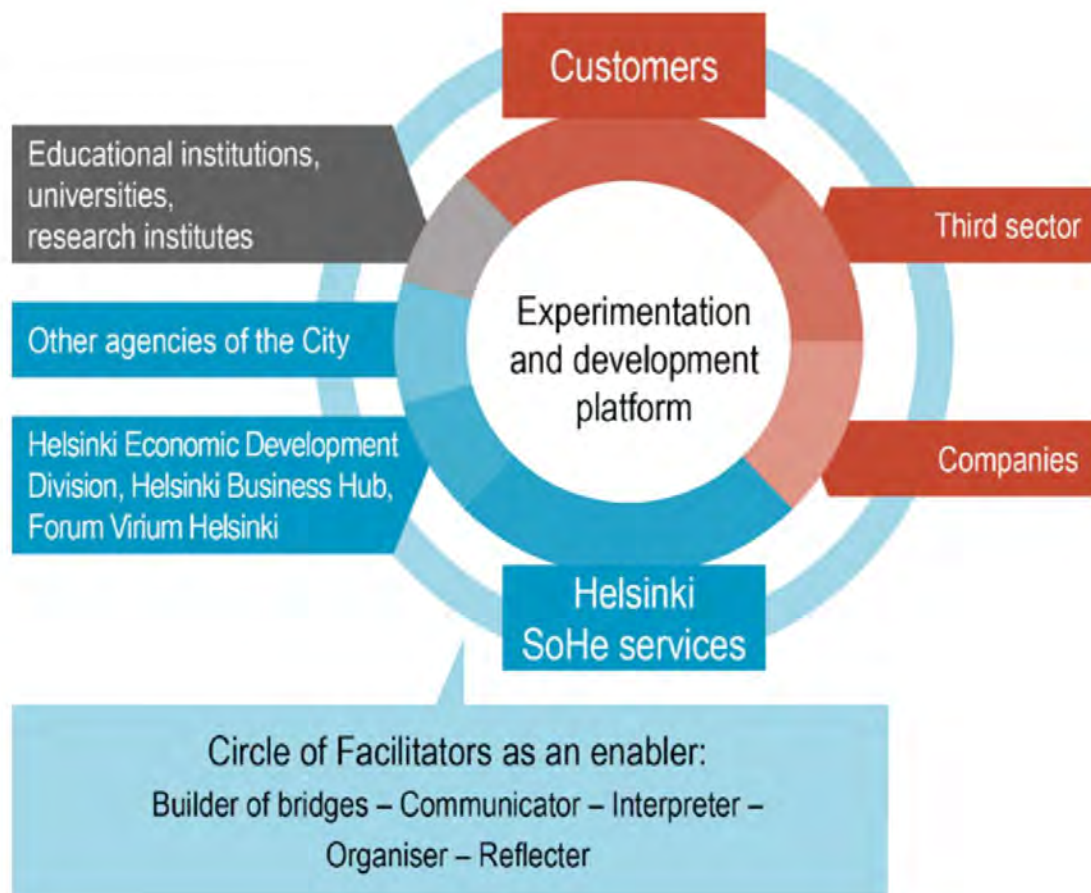
Figure 3. Circle of facilitators - Actors of the development and experimentation platform of Helsinki Department of Social Services and Health Care [3]

*the websites of all stakeholders listed below are found in chapter 11: references

In the first stage of the circle of mediators, the roles of each of the stakeholders involved are discussed and a shared vision is formed. In the second stage, the different actors in the circle of mediators support the innovation process through projects, working on the same challenge (as done, for example, in the agile piloting program). Each actor is communicating and promoting the challenge, participating in joint activities, building an identity and jointly developing through mediation. In the third stage, the circle of mediators is established and actors are acting as brokers, creating new synergies between projects and sectors. In the end, the circle of mediators can open the city as a living lab for international actors as well.

Forum Virium, the innovation unit of the city is leading the co-creation process with expertise in Living Labs, co-creation, facilitation and orchestration, citizen engagement etc.

Forum Virium itself is not running all of the agile piloting programmes but rather providing support to the actors running the pilots and accelerating the process, developing the innovation platform and initiating new innovation projects. The funding for the agile pilots (ranging from 5,000 € to 10,000 € per agile pilot) are funneled through Forum Virium and collected from the different stakeholders, directed directly to the agile pilots themselves.

The city of Helsinki, the social and health department (SoHe services) but also others (for example the city economic department) is a key stakeholder and the owner in the circle of facilitators (see figure 3), helping to understand the social and healthcare system together with the work with companies in finding new and innovative, more flexible modes of collaboration.

Below the partners in the Kalasatama well-being project that are used as an example of the co-creation process in the Health and well-being center

Laurea University has been involved from the beginning and strongly throughout, in their expertise in research and evaluation but also in a transversal role, with long-standing expertise in the field of co-creation, working with cities and public services, and in the field of healthcare. Laurea University has served an important role in the co-development of the models and beyond the Health & Well-being Centre; Laurea is an active stakeholder also across other initiatives and projects under the 6-aika national strategy. The University of Applied Sciences has actively engaged students in applied, hands-on education through the project: actively involving students in the co-creation and experimentation processes and facilitating learning in a real-life setting.

Kesko Oyj is a Finnish retail company with occupational health serving over 12,000 employees. Kesko has their Campus in the district and has been a central stakeholder in Smart Kalasatma. They are interested in collaborating with the city and the social and healthcare services, accelerating the process forward in bringing together the different stakeholders (public and private). The co-creation approach adopted by the district and the centre has been a novel approach, bringing the companies such as Kesko Oyj on board from the initial phases.

SRV is the construction company behind the REDI centre located in the area that also serves as a real-life experimentation space. None of the Health & Well-being pilots were placed in the centre (yet), however SRV has been active in exploring how well-being could be a part of the smart living concept. The collaboration with SRV continues, having brought

needs or smart living services ideas to the project and providing a potential testing ground for future agile pilots emphasizing well-being in everyday life.

CGI Suomi Oy is an IT consultancy, with several projects with the city of Helsinki Social & Healthcare services sector. CGI has been involved with the IT-solutions within the Health and well-being Centre in Kalasatama. They are also interested in startup collaboration.

The Kalasatama Health & Well-being Centre is of course the central actor in the process, providing the real-life environment for exploration, experimentation and implementation. Finally, several domains within the centre can contribute to the process, for example psychiatric health professionals have participated in the co-creation of the digital health service, and projects have extended to domains such as supporting the customer experience in dental care, as well. The project brought the culture of experimentation to the context of a health-centre, whereas previously innovation collaboration processes have been more frequent in the contexts of social healthcare and working with seniors. In this new approach, the different aspects of well-being are brought together under one, experimentative roof.

Smart Kalasatama district offers a platform for different stakeholders to perform their own agile pilots in the area: Forum Virium Helsinki has been in charge of the agile piloting programme, where the agile pilots have been run by the selected companies

Further development of the 'co-creation process'

Landscape of stakeholders

Forum Virium supports the co-creation process and possesses the knowledge and expertise in co-creation and experimentation. The open call within the agile piloting programme is run in collaboration with the city business advisor and other relevant partners. The concept is implemented by the Health & Well-being Centre, providing a physical space and domain-specific expertise for real-life experimentation and innovation. In the Kalasatama well-being piloting programme Laurea University plays an important role in the evaluation phase, but also in the (further) co-development of the internal working models, contributing with their strong academic skills and receiving real life cases for their education and research purposes. The city of Helsinki, companies, start-ups and citizens

are also benefiting from the process, in co-creating innovative solutions within their cities and business ecosystems.

Beyond the circle of facilitators, the residents of the Smart Kalasatama area and beyond (as the centre is serving residents from surrounding areas as well) are important stakeholders in the landscape of co-creation. The citizens engaged may be visitors at the center, but Health & Well-being agile pilots may also extend beyond the walls of the physical center itself: for example, potential well-being projects may be run also at the nearby service centre, or other locations in the area i.e. residential quarters.

The teams running agile pilots receive besides moderate funding (in the form of procurement) also potential partnerships, opportunities for new projects, access to real-life experimentation and end-user base (in the form of residents of the district/ customers of the center), and support on co-creation.

Phases of co-creation

Health & Well-being Centre

Prior to the opening of the centre, during the ideation phase, new structures for working in the context of the Health & Well-being Centre were explored through, for example, user needs analyses and the creation of user profiles. The collaboration continued initiating the idea for a model on how the center could be built as a platform for co-creation and development, serving as a space for experimentation for smart services supporting health and well-being.

In 2015, the model for the Health & Well-being Centre as a test and development platform was created in collaboration with Laurea University. In 2016 a 'circle of facilitators' was established involving the central stakeholders, leading the project and involved the co-creation processes – bringing the organisations involved together in collaboration and assigning the personnel to run the activities.

The model of agile piloting was first tested by Forum Virium in 2016, involving local residents in testing innovative local services. The second round of agile piloting was run in 2017, following a theme titled 'get moving'. These first agile pilots, prior to the opening of the centre, were run across several locations in the district of Smart Kalasatama.

In 2018, after two rounds of agile pilot rounds already performed on the thematics of Health & Well-being, the Health & Well-being Centre finally opened its doors providing a physical real-life setting for co-creation and experimentation. The first five agile pilots were run in the centre in spring and fall of 2018 (see figure 2 – agile pilots). The project focused on further involvement of the private sector players, aiming to bring large local players, representing the private sector, into the process. The importance of understanding the customers better is similarly a need for the large companies, as it is for the city of Helsinki. Therefore, a mutual ground was found to bring all stakeholders to collaborate around the idea of better understanding the needs of the residents in the Health & Well-being sphere: including corporate partners interested to work together with the city and start-ups, and vice versa.

In 2019, an internal working group was formed consisting of healthcare professionals in order to identify needs within the centre, actively participating in co-creation and living lab activities. Participation in the Living Lab activities and tracking of needs was established as a responsibility that is included as part of their existing jobs at the centre. In 2019 piloting activities were run related to customer experience, run by the city of Helsinki.

Impact monitoring, measurement and evaluation and iterative improvement have been built-in to the process. The model created by Laurea for the Health & Well-being Centre initiated in 2015 has been iteratively remodeled throughout time, constantly remodeling the project in accordance to the learnings, monitoring, evaluation and research.

Agile piloting

The stakeholders from the Health & Well-being Centre project are all present throughout the agile piloting processes, in various roles and through the different phases. In figure 4 the different phases of the agile piloting process and the stakeholders involved, as well as their roles in the various phases, is presented.
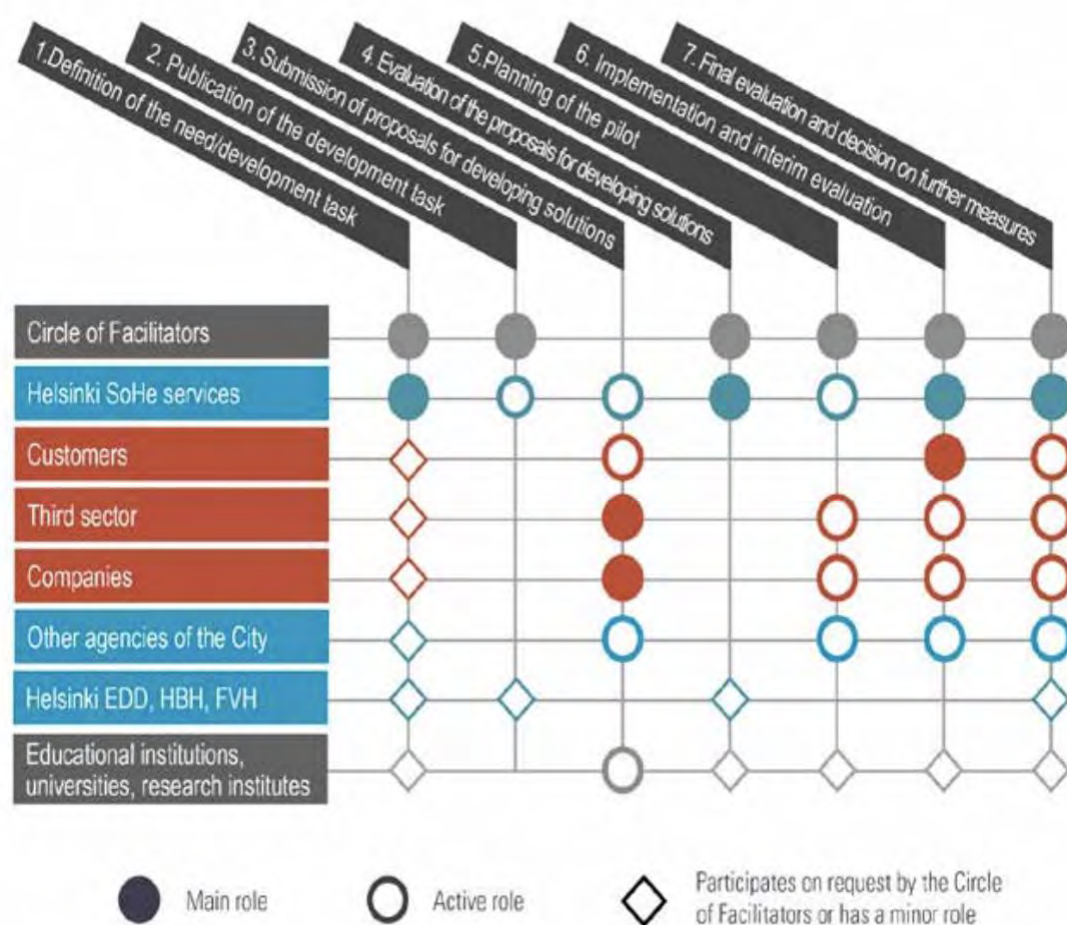
Figure 4. The actors' roles in different phases of a development and experimentation process as presented by Laurea [4]

Specification on methods, tools and communication

<u>Methods & tools in building the development and innovation platform activities in the Health & Well-being Centre</u>

The tools and methods in creating the development and innovation platform activities in the Health & Well-being Centre consisted of workshops with stakeholders and activities based on methodologies such as design thinking.

<u>Methods & tools in agile piloting: Case Kalasatama well-being</u>

Agile piloting programme, as previously described, is a co-creation process deployed at the Health & Well-being Centre (similarly to other areas of urban development). The process (figure 5) has followed an action research approach, starting from a question, problem or need as a starting point – defining the challenge for experimentation. This starting point

may emerge also from prior research or development projects. The first steps involve the identification of the current situation from the viewpoint of the different actors through tools such as mapping, document analysis, interviews, workshops and/ or participatory activities. From the very beginning, the various actors are brought together to collaborate in formulating the challenges together, involving co-creation at the very beginning of the process.

Second, an open call for pilots is organised. This phase includes also the establishment of an experimentation plan containing tasks, goals, methods and implementation and evaluation plans. These plans include consideration towards timelines and ethics, documentation and collaboration with various actors.

The pilots that have applied in the open call are invited to a co-creation jam, a physical event where the teams and programme collaborators meet and are guided through co-creation methodologies in developing their ideas further. Pitching session follows the co-creation jam and five pilots are selected for implementation.

All actors are working closely together in the implementation phase, in this case referring to the experimentation process of the agile piloting. Systematic monitoring and evaluation is a crucial aspect in this phase, leading to flexible development and improvement plans that are well documented along the process.

Reflective evaluations, improvements and corrections are carried out iteratively and in an agile manner. The pilot teams share their learnings in presentations, and discussions within network events and the evaluation partner gathers the learnings in an evaluation report.

The Living Lab supports the pilots through all phases, from the definition of the themes for the open call, selection of pilots, experimentation and evaluation.
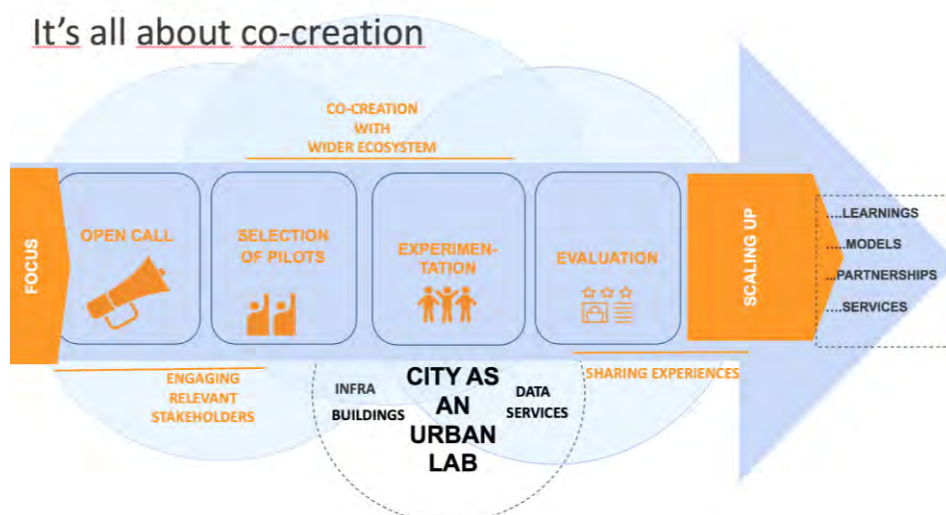
Figure 5. The co-creation process of the agile piloting programme: from open call to selection of pilots, to experimentation and evaluation[5].

Communication

A detailed reflection on communication is found in chapter "Which learnings emerged?"

Specification on cooperation and conflict

The agile piloting process: Case Kalasatama Well-being-project

Challenge definition. In the challenge definition phase, the aim is to create a definition in collaboration with the core collaborators that is wide and thus inclusive to a diversity of ideas – always focusing on the concept of supporting individuals to take better care of their health every day. Students from Laurea University provide user insights to support this initial phase by conducting surveys and interviews.

Open call for pilots. The city and corporate partners join together in offering an interesting setting for the start-ups and SMEs, as well as some more established players. Top ten projects will be selected (by the city and Kesko occupational health services as well as other corporate partners) for the next steps.

Co-creation jam. The co-creation jam events offer a collaboration platform and a kickstart for the agile pilots to initiate their co-creation and experimentation processes in relation to the proposed innovations. Smart Kalasatama living lab team facilitates the selection process and the collaboration partners select five pilots for further development and

experimentation. The Kalasatama Health and Well-being Centre and Kesko Occupational Health services will provide a lab for experimentation to the selected agile pilots.

Conflict

More detailed information on conflict can be found in chapter "Which learnings emerged?"

Specification on political influence

The specification of political influence is represented in figure 2. The different funding schemes and strategies have contributed to the thematic areas of the Smart Kalasatama district and in the implementation of the agile piloting approach. The strategy of the city of Helsinki, in which the Smart Kalasatama district is located ('The most functional city in the world') has contributed to the definition of the thematic areas of Smart Kalasatama.

The agile piloting approach was designed to help bottom-up initiatives from smaller players to create innovative solutions across the different thematic domains. The programme is connected with European and local strategies and funding programmes yet has been built in an open and inclusive model that allows for a bottom-up approach: listening to the start-ups and residents in the field and providing support in catalysing these to innovation activities by providing not only financial support, but also the living lab approach of bringing the multiple stakeholders together in co-creation. The diagram presented in figure 2 thus does not represent a unidirectional flow from top to bottom, but rather the learnings coming from the bottom are also elevated upward.

Follow-up of the 'co-creation process'

Co-creation process at the Health & Well-being Centre (Health and Well-being Centre as an experimentation and codevelopment platform)

The operational model created for the Health & Well-being Centre as a development platform is the result reached among stakeholders. The planning, implementation and evaluation of the co-creation processes at the Health & Well-being Centre are guided by the following objectives:

- Following the principles of user-centric design;

- A quadruple helix stakeholder framework involves customers, healthcare professionals, companies, sectors from the city and academic institutions;

- Challenge/ need definitions allow for both, proposals aiming for incremental but also radical innovations;

- The challenges/ needs throughout the development process are shared openly between all involved actors;

- From the very beginning, the project has been planned in a way that the operating method aims to extend to social and health care services as well as other agencies of the city. The cooperation model between companies and third sector organisations has been central in developing the replicable and scalable co-creation model.

This model for agile piloting was first created in 2015 and has been iteratively developed throughout the experiences and time. The collaboration between all stakeholders continues through the continued running of agile pilots at the Health & Well-being Centre.

<u>The uniqueness of the approach</u>

The Agile piloting process enables not only citizens but also private companies to be involved in collaboration, bringing together the instruments, expertise and infrastructures from existing corporations as well as the innovative ideas, agile culture and rapid growth from start-ups. Academic institutions provide the research infrastructures and evaluation for constant iteration and development of the process. Besides the role of each stakeholder in the process, the value created for each stakeholder, also the funding structures between the stakeholders have been innovated, involving more private funding in city development and the development of public services.

Normally, city planning projects are characterised as long-term projects. The agile piloting program has brought a new methodology and a culture of experimentation for quick, collaborative, prototyping and experimentation in a real-life setting.

Follow-up and implementation of this model is an ongoing process, as new agile pilots continue to be run in the district under the Health & Well-being Centre, other District innovation labs in Helsinki, and the numerous other projects run across the six cities in Finland.

In the Kalasatama Well-being case, the involvement of the Laurea University of Applied Sciences in the role of an evaluator in the process ensures the ongoing evaluation, iteration and redevelopment of the project.

The establishment of the clear organisational structure, a Living Lab orchestrating the collaboration between the quadruple helix stakeholders and facilitating the process of co-creation is crucial in ensuring sustainability of the concept throughout time, creating a structure for the collaboration and financing between the different stakeholders involved.

Currently, the city of Helsinki Economic development is in charge of coordinating the city's innovation platform activities with the Health & Well-being Centre as one of the social and healthcare living labs. There is a dedicated team in the centre, scouting needs and participating in the living lab activities in e.g. agile piloting. Still, development projects are identified as an important resource for living lab activities and co-creation.

Scaling

<u>The scaling of Agile piloting programme</u>

The concept has the opportunity to scale to other districts as well (as already done for example in the case of Jatkasaari) and also, through the addition of different thematic projects.

The Smart Kalasatama district is closely connected with other cities and districts, collaborating for example with other Finnish cities like Espoo, Tampere, Vantaa, Oulu & Turku (See figure 2: DISTRICT level & MUNICIPAL level). Especially through 6Pack (6-aika) cities collaboration the cities across Finland have been following a Smart Kalasatama concept, agile piloting and the learnings emerging from the experimentation. From Smart Kalasatama, the method of agile piloting is since adopted all around Helsinki city (with more than 60 pilots so far) and is also widely used by the Finnish six pack cities in Finland.

Through the Nordic Smart Cities Network the concept has also been extended to Stavanger in Norway, where the city of Stavanger has also taken the agile piloting model as a way to work with start-ups for their smart city.

Figure 6. Situation of different districts in Helsinki where real-life experimentation has been run including Smart Kalasatama and Jatkasaari agile piloting districts (2016).[6]

Systemic change

The Health & Well-being Centre in Smart Kalasatama is producing relevant impact on the short-term, through the involvement of the agile pilots and experimentation with citizens: the various projects are a concrete way to participate.

At the same time, medium/ long-term impact is achieved through the partnerships established, the established methodology and organizational structure, culture and projects that are all planned to continue to run pilots in six-month intervals. Each pilot run in the programme produces valuable learnings on the different thematic areas and proposed solutions. These learnings have the potential to scale up in the city of Helsinki and stakeholders involved and may also lead to new projects.

Several agile pilots are running on an ongoing basis and therefore creating many potential success cases in a systematic manner.

Kalasatama Well-being pilots combined private funding to support the project funding, and collaboration with corporates also provided potential for different avenues for a new model of collaboration. In the future, potential models for development and experimentation may include compensation for their piloting teams as well as projects where each actor is responsible for covering their own costs.
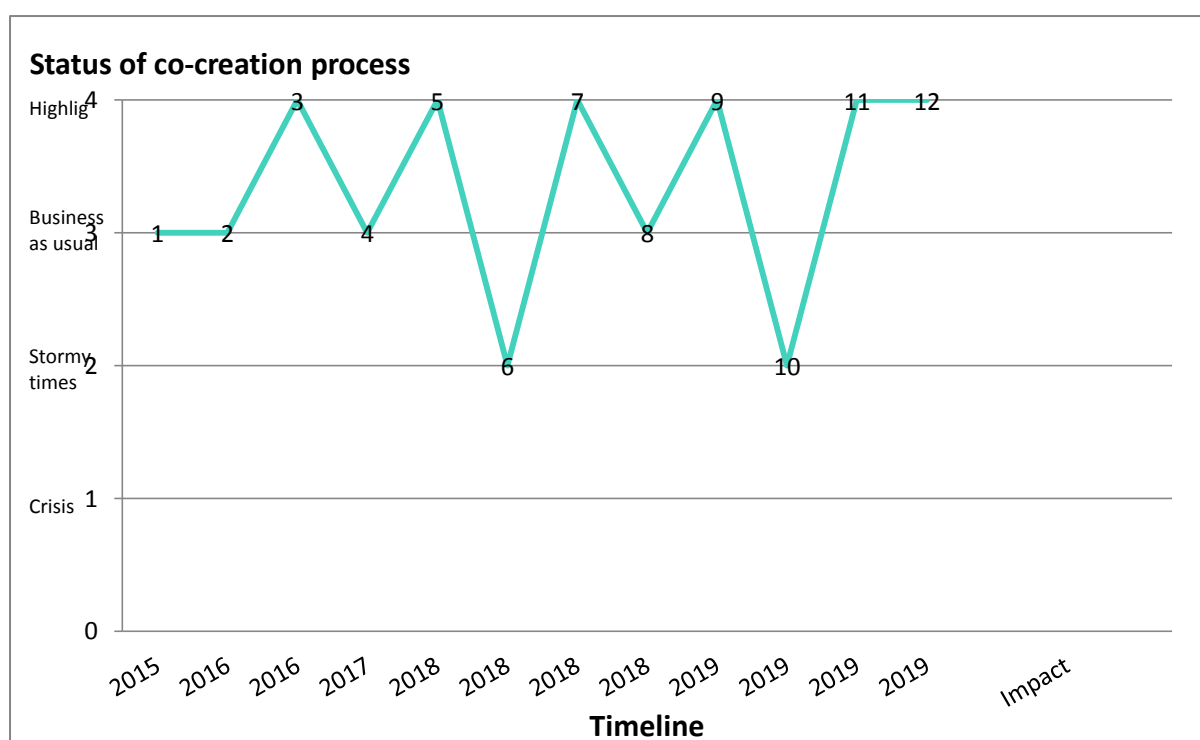
Visualisation

Figure 5. Visualisation of the co-creation process timeline and progress[7]

1. During the year of 2015, the model of agile piloting was first created and the first agile pilots in the district were initiated. The model for the Health & Well-being Centre was created in collaboration with Laurea University.

2. In 2016 a 'circle of facilitators' was created, involving the stakeholders leading the project and involved in the co-creation processes – bringing the organisations involved together in collaboration and assigning the personnel to run the activities.

3. A first round was initiated involving local residents in testing innovative local services. This was realized in collaboration with the Social and Healthcare sector run by Forum Virium in 2016.

4. The second round of agile piloting was run in 2017, following a theme titled 'get moving'. A service design consultancy was involved in supporting the gathering of user insights, these served best to support the open call.

5. In 2018, after two rounds of agile pilot rounds already performed on the thematic of Health & Well-being, the Health & Well-being Centre finally opened its doors providing a physical real-life setting for co-creation and experimentation.

6. The importance of understanding the customers better is similarly a need for the large companies, as it is for the city of Helsinki. Therefore, a mutual ground was found in 2018 to bring selected local corporate partners, among others, to collaborate around the idea of better understanding the needs of customers in the Health & Well-being sphere.

7. The project managed to get all relevant partners on board, including those needed from the private sector in 2018.

8. The first five agile pilots were run in the centre in the fall of 2018.

9. In 2019, an internal group was formed consisting of healthcare professionals in order to identify needs within the centre, actively participating in co-creation and living lab activities. Participation in needs mapping and living lab activities was established as a responsibility that is included as part of their existing jobs at the centre.

10. In 2019 pilots were run related to customer experience, coordinated by the city of Helsinki. The experiences have proven that time is a scarce limit when living lab activities are run in addition to own work.

11. From Smart Kalasatama, the method of agile piloting has since been adopted all around Helsinki city (with more than 60 pilots so far) and other six pack cities in Finland and is serving as an example for Nordic cities.

12. Agile piloting is taking its first steps in Norway, for the first time scaling outside of Finland (2019/2020).

Which learnings emerged?

<u>Communication</u>

This collaboration between the private and public sphere has already shown that often small companies do not understand the city and its needs very well – and the same is often true for large companies as well. In the case of Agile piloting programme, Forum Virium serves as an intermediary – through co-creation it also facilitates the city's understanding of the companies better. In this way the project has been successful in creating shared understanding between the different stakeholders by bringing people to work together, looking at problems together, and co-creating towards solutions together. The communication channels are various: from internal communications within the different stakeholders and between the circle of facilitators, to external communication about the co-creation process and towards the start-ups and companies involved in the agile pilots. Last but not least, the communication towards the end-users in the process is considered very important.

<u>Conflict</u>

In terms of conflict, some start-ups have expressed disappointment in the pitching organised and the results of the selection. Many good companies were able to participate in the co-creation jam but only those best implemented for experimentation from the Living Lab perspective were selected. Limited time and resources at the Health and Well-being Centre daily operations have also led to the delay of the start of experimentation and agile piloting activities, leading to some frustration from the start-ups that are enthusiastic to begin as soon as possible.

In some specific cases technical problems have occurred, and in other cases the pilot may be too early stage in terms of technical or content maturity. The students of Laurea University have played an important role in giving feedback and supporting the pilots, and the plan for involving IT professionals of the city more closely in the future has been initiated. However, although technical problems are sometimes causing frustration, the lack of resources and therefore time and/ or willingness to participate in the process is most essential in ensuring commitment from all the stakeholders in the living lab activities.

Finally, it is difficult for the facilitators to discover the problems in the experimentation phase that are experienced by the start-ups that are often not expressing their difficulties

unless the right questions are asked, as they want to give the best possible picture for the city (a potential client). From this a learning has emerged: it is important to have a neutral party to facilitate also the process of feedback and conflict resolution, that is easily approachable for the participants to provide their honest feedback. The Facilitator role is important and requires listening skills, sensitivity and social intelligence as well as conflict solving skills.

Resources

The approach also explored an interesting intersection between public and private funding, including also the intersection of free versus paid services that are the outcomes of the co-creation process.

However, learnings still emerge on the need for further resources: both time and money. It is important to consider the time and the resources needed for successfully running such collaborations and co-creation processes. The process needs to create value for all parties. The different partners in the process each have their own priorities as development work is run parallelly to other activities and often low allocation of resources, crucial for especially for the platform for experimentation.

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Interview

Kaisa Spilling (Forum Virium)

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Ilona – Robot Brings Joy in Elderly Care | Finland

Claudia Iasillo (APRE)

Summary

Ilona is a service robot introduced in elderly care services in the city of Lahti, in Southern Finland, in 2015 to 2016. The robot, whose official commercial name is Zora, is produced by Sotftbank Robotics[1] and it is one of the first commercially available humanoid robots sold as care robot. Controlled via a tablet or computer, it has sensors, a speech synthesizer, a microphone, a camera, and speakers. Moreover, Zora has human-like characteristics: it walks, moves its hands while speaking, and blinks its eyes. It is pre-programmed to perform several functions but can also be programmed using visual icons on the interface without requiring special technical programming skills. It deploys a specific software to enable application in the healthcare field and it can be used for rehabilitation and recreational assistance with exercise, playing music, performing dances, storytelling and playing interactive memory and guessing games[2].

For easier approach and help the robot's users to establish an emotional connection with the robot, it was renamed Ilona (a Finnish female name meaning 'joy') by the Lahti city officials who decided to try robots out in elderly care service. The municipality was interested in the implementation of various technologies in elderly care even before acquiring Zora and had already shown before its pioneering approach.

The first stage of the implementation of the robot lasted from December 2015 to April 2016 and Ilona was introduced in the only two public care homes with 24-hour services and in the only geriatric rehabilitation hospital in the city. The end users of Ilona are care service personnel and elderly customers. An analysis to identify the impacts and acceptance of care robot among users was conducted within Lahti Living Lab[3]. Overall, the impacts on elderly patients were positive while there were some concerns coming from some of the care givers involved. However, the positive impacts on the elderly patients, affected positively also the care givers more reluctant at the beginning. That was one of the strongest points in Ilona story, which will be further explored in the following sections.

Context of the 'co-creation process'

The case study of Ilona is an example of co-creation focused both on Responsible Research and Innovation and policy making, related to the Horizon 2020 Societal Challenge SC1-Health, demographic change and wellbeing. In particular, the Ilona implementation focused on the demographic challenge of ageing population, which is one of the concerns of Finnish society. In fact, in Finland in 2015 there were over 1.1 million people older than 65 years, which was the sixth biggest share among the EU28 countries[4]. To provide sustainable care with an ageing population and a shrinking workforce shall be considered a 'wicked problems' that cannot be solved within the boundaries of a single organisation or at specific administrative level because of its intrinsic complexity and the multi-actor and multi-sectoral challenges related[5]. In the case of societal ageing, this complexity is caused by also diverging stakeholder views. A special concern expressed in the public debate has been how to create sustainable systems to care for the ageing population in a way that achieves a balance between the economic and social requirements for sustainability without overemphasizing economic objectives. Although the 'Nordic welfare state' has its own distinct history, it faces the same debate. Ongoing initiatives and practical developments include attempts to solutions to the complex issues at hand. Technology is

expected to play an increasing role in meeting the anticipated sustainability gap in elderly care services[6].

On one side, then, the introduction of new technologies in elderly care system can help facing the challenges related to ageing population and make elderly care more sustainable. At the same time, the introduction of new technologies raises important issues and it is important to maintain a balance between technology-driven and care-driven approaches, and to take into account the role of clients and users, namely elderly patients and care professionals. By taking into account the perspective of both groups through participatory activities it is possible to increase the acceptance of new disruptive technologies such as robot assistants in elderly care. The utilisation of participatory methods and co-creation activities to bring users perspective into innovation takes advantage of the cultural background of Finnish society, which is a country with a long-proven history of citizens' involvement in the decision making and where, for the citizens, it is generally easy to approach local authorities.

In Finland, social and healthcare services traditionally have been the public sector's responsibility, mainly that of municipalities. Indeed, at the moment of Ilona implementation, the Lahti municipality was responsible of the public elderly care system, while now is assigned to autonomous regions larger than municipalities. As Finland is a very rapidly ageing country, all the municipalities had quite big challenges in providing elderly care. Lahti municipality had already shown interest in new technologies by implementing other innovations in the past, so it could be considered a pioneer and ahead of time in the field. The decision to pilot the use of Ilona robot was coming from the Lahti municipality who initiated the whole process.

Starting point of the 'co-creation process'

As described in the methods section of the paper called *Impacts of Robot Implementation on Care Personnel and Clients in Elderly-Care Institutions*[7], the first Ilona implementation period lasted from December 2015 to April 2016 and it included different steps (*Figure 20*). It started in with the planning of the activities which included meetings between the city officials who had the idea to start the initiative, the researchers of the Lahti Living Lab involved and the care workers (see turning point 1of Ilona visualisation). The municipality had a strong interest in new technologies, and they took advantage of the availability of

money specifically dedicated to that. In fact, a Lahti resident passed away and, in the will, that person left to the municipality some money to be allocated to the purchase of new technologies. Therefore, the city officials responsible of the activity decided to invest this money in new technology for elderly care and they purchased the robot from the importing company.
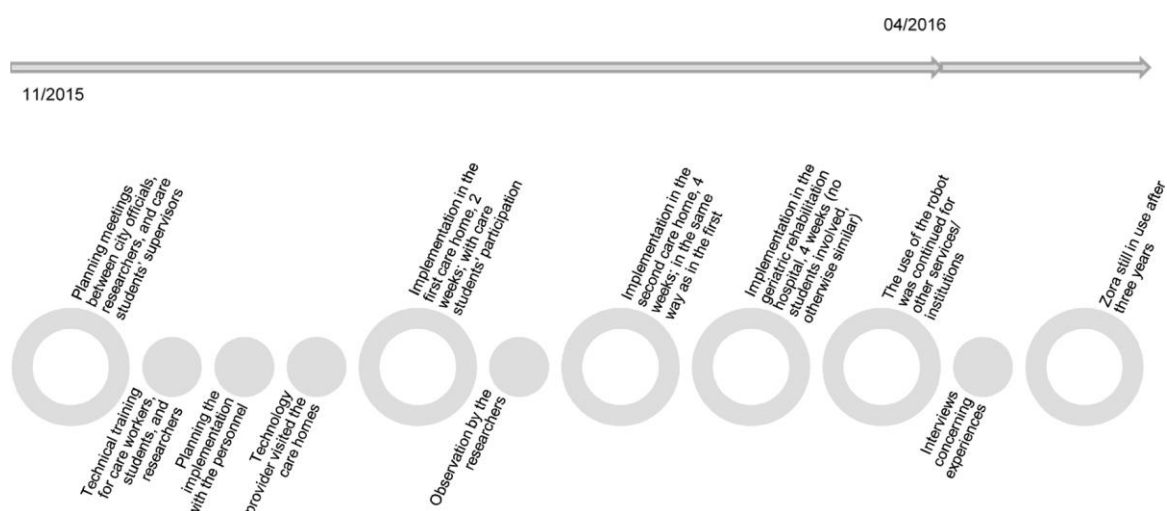

Figure 20 - The implementation process of Ilona in 2015–2016 (and subsequently) and the data collection[8]

The other actors involved at the beginning were the Lahti Living Lab as researchers in charge of the assessment of the impacts of Ilona on the final users. The Lahti Living Lab consists of different stakeholders and is coordinated by the Lappeenranta-Lahti University of Technology LUT, Lahti Campus. The involvement of the Lahti Living Lab since the early stages of the implementation of Ilona was meant to ensure a proper assessment while bringing Ilona into use and finding appropriate ways to use it and orient personnel toward its use. The fundings for the research activities of the Lahti Living Lab were not coming from the municipality, but from a project, funded by the Academy of Finland's Strategic Research Council, called Robots and the Future of Welfare Services – ROSE[9]. Within this project they had enough freedom for their research, so they could include the assessment of the impacts of Ilona implementation in their research activities.

The municipality selected the sites where the robot was going to be used - two care homes and a geriatric rehabilitation hospital – as the two care homes were (at the time) the only public service care homes with 24-hour services and the hospital was the only rehabilitation hospital in the city. The care givers were also involved in the early stages of the process, both in the planning of the activities and in some dedicated training sessions provided by

the tech company (see turning point 2 in Ilona visualisation). The first was essential as the care givers were the ones really aware of the schedule and the needs of their daily work, so they could provide essential insights for the planning of the activities in the implementation period. The technical training, instead, was essential to get familiar with the robot and benefited from the background in physiotherapy of the two trainers, that was a big advantage in their interaction with the care workers. The success of the training sessions before starting the implementation was crucial to provide the care givers the basic knowledge to feel comfortable in operating the robot with patients. In this regard, the care givers had a dual role, as on one side they were implementing the actions and, on the other, they were one of the final users of the robot, as it was meant also to facilitate their daily work. For this reason, the impacts of Ilona on their activities were also assessed by the Lahti Living Lab.

As Ilona was a top down initiative, being directly promoted by the municipality, it was easier to engage all the actors and no special incentives were required. The Lahti Living Lab already had prior fruitful collaborations in place with the city, and there was a long-lasting collaboration built on trust and spirit of cooperation. The sites selected for the implementation of the robot were also willing to participate to the activity and involved since the early stages of the planning of the activities. The municipality, moreover, paid attention to select sites taking into account i) the perceived potential of the robot in such sites; ii) the availability of competent key persons; iii) a physical environment in the facilities that enabled the robot use.

Furthermore, the municipality decided to engage also care students through the involvement of the local Lahti University of Applied Sciences. This was a precise choice of the municipality as they reckoned as very important that the future care professionals, still in their applied university studies, could have contact with the robot and see how they were actually used in real circumstances. As Ilona was the first robot used in public elderly care services in Finland, they wanted to give the opportunity to the students to follow the process and became acquainted with the possible future technologies in elderly care. The involvement of students was limited by the busy schedule of their studies and by the necessity to safeguard elderly patients and their fragile conditions, so many care givers were always present. Nevertheless, the involvement of students was a sign of long-term vision and desire of the municipality, confirming its pioneering approach.

Further development of the 'co-creation process'

Landscape of stakeholders

The implementation of Ilona robot was the result of a collective effort. The starter of the initiative was the Lahti municipality, which involved since the early stages, the Lahti Living Lab represented by LUT University for the assessment of the impacts of Ilona implementation, and the other stakeholders, namely the care homes and the rehabilitation hospital, and the care students from Lahti University of Applied Sciences.

Ismo Rautiainen, Director of the Elderly Services and Rehabilitation at the Joint Authority for Health and Wellbeing in Päijät-Häme Region[10] explained the need to look for innovative solutions: 'In my opinion, with regards to health and social services, elderly care is quite advanced in utilizing technology. I think it's a good question to ask why this is so. It clearly seems that in services where customer numbers are increasing fast, the need for services is growing fast and, at the same time, the economic constraints create their own requirements and expenses need to be cut. The situation forces us to look for new innovative solutions. The economy seems to be a good driver for development'.

After that the municipality purchased the robot, it was put directly into use (see turning point 3 in Ilona visualisation). The robot was used for two weeks in the first care home; four weeks in the second; and for a month at the hospital. In the care homes, a group of two to four physiotherapy or nursing students operated the robot, in collaboration with the staff. In the hospital, the permanent nursing staff operated the robot. The robot facilitated exercises, played music, told stories, performed dances, and played interactive memory and guessing games with elderly clients. The robot also approached the clients by walking towards them and shaking their hands while they sat in a circle. The robot could also be held in one's arms. The types of activities depended on the participants as not all types of physical exercises were considered suitable for every patient[11].

While the municipality was in charge of managing the whole process, the professional care givers and the care managers of the facilities involved were responsible of the individual implementation period in each organisation. The Lahti Living Lab was responsible for assessing the impacts of Ilona on end users (care givers and elderly patients), taking advantage of its focus in developing and studying innovativeness and productivity in the public sector and its main activity to integrate the users' perspective into the innovation processes of public sector service development. The Lahi Living Lab researchers were

attending the majority of the special sessions when the robot was used. The tech company that supplied the robot, beyond being involved in the initial training sessions, was participating also during the implementation phase, if any technical problem with the robot was coming up.

Finally, the robot's users were actively engaged in the process. Beside the care workers, whose involvement has already been detailed in the previous paragraph, elderly patients represent the other category of end-users involved in the process. Elderly patients were involved in the implementation and in the assessment phase, as they participated to sessions with the robot and to interviews with the researchers of Lahti Living Lab. This was carefully planned, taking into account the health conditions of participants and the robot was used with clients only under appropriate, competent control and supervision of at least one care worker. The clients were never left alone with the robot. Furthermore, the robot was able to perform different tasks (e. g. different games or exercise programmes), and that was also adapted to the clients' groups attending the sessions with the robot.

Overall, all stakeholders involved in Ilona implementation were showing a good collaboration built around trust and transparency and all actors were bringing in their expertise and sharing the same vision.

Phases of co-creation

The implementation of Ilona was a flow of co-creative activities, and co-creation was used at different stages of the whole process.

<u>Ideation phase</u>

During this phase, it was decided to focus on how to improve technology-assisted care for elderly people through the use of specific robots. The municipality was interacting mainly with the Lahti Living Lab, as they already had prior collaborations in place. The decision of purchasing the robot and test it as a support for elderly care, however, was a desire of the municipality.

<u>Design phase</u>

During this phase, all the actors to involve and the steps to be taken were decided. The Lahti municipality, the Lahti Living Lab and the care professionals were interacting constantly to design the implementation process in the three facilities and to plan the

activities taking into account the needs of the three different groups they represented (policy makers, researchers and care professionals), and the needs of clients. The tech company providing the robot was partially involved too, in adjusting the programmes of the robot to the clients' necessities, taking into account the insights provided by the care givers about the health conditions and necessities of their patients.

Implementation/ production phase

The robot was brought into use in the two selected care homes and in the rehabilitation hospital (see turning point 3 of Ilona visualisation). During this phase, also elderly patients were involved as they were using the robot during dedicated sessions. Researchers were observing 27 activity sessions of about one hour each during which Ilona was introduced to the clients in a special session or acted as part of regular group activities (e.g. exercise or literature groups) at the care homes or the hospital. In each session five to twenty clients and two to ten staff members were attending the sessions during the first ten-week implementation period. Overall, about 60 elderly clients and 50 care workers participated to the activities. Some clients attended multiple sessions, depending on their health condition[12] (see turning point 4 of Ilona visualisation).

Impact monitoring, measurement and assessment

The assessment of the impacts of Ilona on care services was done by the research conducted by Lahti Living Lab (LUT University). In particular, co-creation was an essential part of methodology applied during this phase. The Lahti Living Lab conducted a series of interviews both to elderly patients and to care givers taking into account work shifts, clients' health conditions, daily activities and unexpected events[13]. Thanks to the interviews to the care workers, the researchers were able to explore the attitudes and the perceptions of the users at the end of the first implementation phase, assessing the experiences and challenges faced and the expectations for the future concerning the suitability of the robot for elderly clients. The interviews with the clients focused on their feelings about the robot, the comparison between sessions with and without the robot and their willingness to participate in future sessions. The researchers used a user-oriented approach to identify various impacts on humans avoiding any predetermined framework. They worked to identify positive, negative, and neutral impacts on different groups of people. The analysis resulted in six themes for care personnel and five themes for elderly clients (*Figure 21*).

Figure 21 - Impacts of Ilona on Care Personnel and on Clients[14]

Specification on methods, tools and communication

As already mentioned, the collaboration was built on sharing the same values such as openness, transparency and trust. The communication between all actors involved in Ilona implementation was also good and in general there was no need of a professional facilitator to coordinate the process. According to Helinä Melkas, professor at Lappeenranta-Lahti University of Technology LUT, Lahti, Finland, and one of the representatives of the Lahti Living Lab team in Ilona case study: 'There was no need for mediation. We've been working together on these kinds of projects for so long that we did not need mediation. While interacting with end-users, it is important to find a common language and to not use the research concepts all the time. The dialogue needs to be based on trust and understanding of different competences and the value of the collaboration'.

Specification on cooperation and conflict

Overall, the process of the implementation of Ilona robot went rather smoothly. The research of the Lahti Living Lab suggests that the potential of new technologies and robot in the healthcare is high, but there are still some barriers to overcome. In general, the attitude towards the robot was dual and both enthusiasm and fear existed in both groups of end users. The majority of the elderly patients showed a positive attitude by wanting to engage with the robot as considered the robot entertaining, funny, and interesting, while negative reactions included irritation, reserve, and fear. In regard to care givers attitude, some people of the nursing staff at the beginning showed a negative attitude towards the Ilona implementation (see turning point 5 of Ilona visualisation). This was not due specifically to the robot utilization, but rather a negative attitude towards bringing new tools into the daily work of care givers which is already very busy, and a general reluctance due to the feeling of not having enough time to learn. The impacts on participation and perceived

opportunities to participate in the decision to purchase the robot also varied among care givers. Some wondered if the needs of the care homes were taken into account by the municipality when they decided to buy the robot. Other considered the city's strategy in elderly care services to be technologically pioneering and they showed support by agreeing to use the robot. The care givers highlighted the importance of knowing the clients and their needs well in advance when planning to use the robot and of having enough time for training and orientation. Indeed, according to Lahti Living Lab researchers, one possible explanation of the criticism expressed by some care givers, could be that the decision of putting Ilona into use quite quickly after its purchase did not give the caregivers the feeling to be well trained and informed about the use of the robot[15]. Although the care givers have been involved also in the early phases of the process, they could have benefitted of more support in the starting phase in term of training and orientation to the future activities.

On the other hand, for some of the care professionals, the robot was perceived as a useful tool, contributing to clients' well-being and activity and providing new perspectives and content on their work. Some care professionals were enthusiastic about having a new 'workmate' and were willing to act as the principal operators of the robot in their work communities, including giving up their free time to become acquainted with the robot[16].

Marja Hietanen, Instructor at Päijät-Häme Joint Authority for Health and Wellbeing[17] stated that 'Ilona really has brought people joy and happiness. The perception has been really positive. The residents were a little baffled at first, but after a while they loved her. It has been nice to see how Ilona has motivated the residents to exercise. Even those who are not always very active, they have been activated by Ilona. Ilona has also talked with the residents, which was a nice experience. Personally, I found using Ilona somewhat difficult at first. But after I learned the basic functions, it was quite easy. But it always takes a little bit of time to get her ready. I didn't have time to program her. I felt that would have required more extensive studying. But there are many programs that were available, and we were able to have nice moments with her'.

As stated in the paper *Elderly Care and Digital Services: Toward a Sustainable Sociotechnical Transition*[18]*,* that includes an analysis of Ilona implementation and some quotes of the nurse staff interviews 'the clients usually welcomed the robot with joy, and these positive responses and the interest from elderly clients affected care personnel's attitudes positively. It was noted that after having personal experiences working with the robot, staff attitudes turned in a more positive direction'. One nurse said: 'At first, I had a

few negative feelings, but when I saw the joy of the clients, it changed my attitude." According to a physiotherapist, "Robot use requires supervisors and work, but do we depart from what we give to clients? I cannot tolerate technology, but still, I have a positive attitude if I see that the customer gains something good out of it. You have to reach beyond your own attitude'.

According to professor Helinä Melkas, a representative of the Lahti Living Lab in Ilona implementation 'in April 2016, when Lahti Living Lab performed the interviews, it became clear that the care professionals, also the ones who had a negative attitude in the beginning, changed their attitude because they had the chance to really try the robot themselves and also find new ways to use it in their particular care homes and hospital, and in their own work, so that was like a point where you can see that these 10 weeks implementation period had resulted in raised awareness and new opportunities for using the robot'(see turning point 7 of Ilona visualisation).

During the implementation period there were no particular conflicts or issues among the actors involved. However, a small shortcoming was happening around February and March 2016, due to the reactions on traditional media and social media to the utilization of robots for elderly care (see turning point 5 on Ilona visualisation). Although the media coverage of the Ilona implementation was generally positive, some criticism among the general public was observed towards the implementation of Ilona in public elderly care services. In particular, one of the people in the Lahti municipality who was responsible of the Ilona implementation was criticised on social media. Some of the harsh comments were unpleasant, but as managing reactions on social media may not be that easy, they decided to not act further about it. Furthermore, the implementation was not affected by this issue which was more unpleasant on personal level for the persons involved, than for the whole process (see turning point 6 on Ilona visualisation).

Overall, the whole process went rather smoothly, and no particular crisis or major issues occurred.

Specification on political influence

The Ilona case study is the result of the strong willingness of a public administration, namely the Lahti municipality, to adopt new technologies for elderly care and provide new services to elderly patients, to better face the challenge of ageing population in Finnish society. Indeed, the Lahti municipality was the first organisation in Finland to promote the

use of a robot in the public elderly care services. The strong motivation of the municipality was surely helping the project implementation and the engagement of the stakeholders in the activities was easier as it was coming directly from the public administration.

The Ilona implementation was not related to any political programme, but the two people initiating the process had general support of the municipality and in particular from their supervisors. Therefore, it was a combination of personal motivation and trust and support from the system in the personal motivation of two people who really wanted to bring innovation into the system. Furthermore, one of the two people initiating Ilona process had a background in nursing which was an advantage, as it provided a direct knowledge of the needs and challenges in the care services at practical level.

Follow-up of the 'co-creation process'

Ilona robot is currently still in use (see turning point 8 of Ilona visualisation). The Lahti Living Lab conducted a smaller follow up study in 2019 and they plan to publish the result in the future. The robot has not been used all the time, because some of the individuals who were in charge of the activities at the beginning, are no longer working in the facilities or do not have the same role, but the three original facilities are still using it from time to time. Furthermore, a fourth facility started using Ilona.

Marja Hietanen, Instructor for Päijät-Häme Joint Authority for Health and Wellbeing[19] stated: 'We had Ilona here once early this year, and again later this year, and many of our residents, some of whom suffer from memory problems, remembered Ilona and were happy to see her. And when llona left they were sad to see her go. That's how the residents felt about Ilona. We are happy to see Ilona again every once in a while'.

According to Helinä Melkas, a representative of the Lahti Living Lab, to continue to use Ilona and to further expand it to other facilities 'was a wish in the mind of both the municipality representatives and the Lahti Living Lab, since the beginning. It was a future-oriented aim, but it was not something we had a strategy for. It happened because both care professionals and elderly clients were well engaged in the process and they could find their own way to approach this kind of a robot and use it. The implementation period was sufficiently long and then there was this strong co-creation component. All these things contributed to the success of Ilona'.

Scaling

It is worth to underline that thanks to Ilona implementation, care homes and care professionals got more information about care technologies and became interested in them. The facilities participating to Ilona implementation were looking for other technologies and they were experimenting other ones. In a way, Ilona was a starting point for understanding the phenomenon of care technologies and its opportunities for their work. To quote Ismo Rautiainen, Director of the Elderly Services and Rehabilitation at the Joint Authority for Health and Wellbeing in Päijät-Häme Region[20]: 'The lesson is that procurement is not simple. When it comes to new types of services it often happens that in the pilot phase, service providers provide us a solution and then, when we start to discuss larger volumes, we end up having to do public procurement. Maybe, in the future, we should think about how to increase the volume and, in that sense, it is important to also look to other groups than the elderly. But it is important that we have started talking more about utilizing robots'.

As he pointed out, the procurement may be an important aspect to take into account if planning to scale up innovative and high technological solutions such as robots in public care systems. Eija Kakko, Project manager at Päijät-Häme Joint Authority for Health and Wellbeing[21] spoke about procurement too: 'The procurement of robotics is quite challenging at the moment. We found the Zora robot by chance. We have had a Zora robot for a year now. Now we are looking for other kinds of robots, and it is surprisingly difficult. It is hard to find robots suppliers in Europe, not to mention Finland, with whom we could do a pilot in an easy and agile way, and not too expensive. And for the cooperation to be effective with the maintenance and everything. It is very difficult to imagine all the possibilities of robotics, if one has not seen all the things that are available. There are big differences between different robots. If we invite tenders based on our experiences with the Zora, it's not certain that the same criteria and expectations are applicable to other robots. This is clearly a problem. We don't have the know-how to do the specification. On the other hand, it is really difficult to specify our requirements and our need for robots if we do not have the user experience. The price plays a big part with regards to this. If we were able to lease a robot, it would be easier for us to do pilots and gain experience with different robots. That way we could specify our future needs and requirements for robots in care work. My hope is for more agility and versatility and variation with regards to robotics, so that it would be easy to carry out experiments all over Finland in different contexts and

we could share experiences. And hopefully one day we could carry out a national competitive tendering so that we could use the same robots in the whole Finland. I'm hoping this will be coordinated on the state level and that we would start developing robots in Finland as well. Considering the increase of robotics in the future, it's not possible to introduce vast numbers of them at once. Rather we have to take small steps, so that our staff can adjust to the idea of utilizing robots, and so that they understand that robots will not replace care workers'.

Systemic change

Beside the successful implementation of Ilona robot in elderly care system, it is worth to notice that this is one example of technology application, but its importance goes beyond the single case. The whole process is a good practice showing the pathway to follow when bringing innovation into a delicate and complex system such as elderly care. The involvement of different groups of stakeholders, the collaborative effort in planning the activities since the early stages and the thorough attention to assessing the implementation, through the utilisation of co-creative tools, to improve the activity if replicated, are all the stronger points underlining the added value of the this case study.

The short-term impacts were good in the sense that they kept using the robot and also the care professionals came up with new ideas about how to use it in the future. In the longer term, in the municipality, in the region and also more general in the country, this was an important case study because the first one in public elderly care services and the media coverage contribute to raise awareness on the subject.

Ismo Rautiainen, Director of the Elderly Services and Rehabilitation at the Joint Authority for Health and Wellbeing in Päijät-Häme Region [22] stated: 'With regards to robotics you could say that, the Zora robot, or as we call it in Lahti, Ilona robot, has provided us with new ways of working rather than directly increasing profitability. Ilona has not and will not replace our care workers. But Ilona has enabled us to bring in new ways of working, for example to support elderly activity, rehabilitation and services for other groups. Ilona has also been a good marketing tool for robotics. She has been present in different events to pave the way for robotics. There is a demand for solutions such as Ilona'.
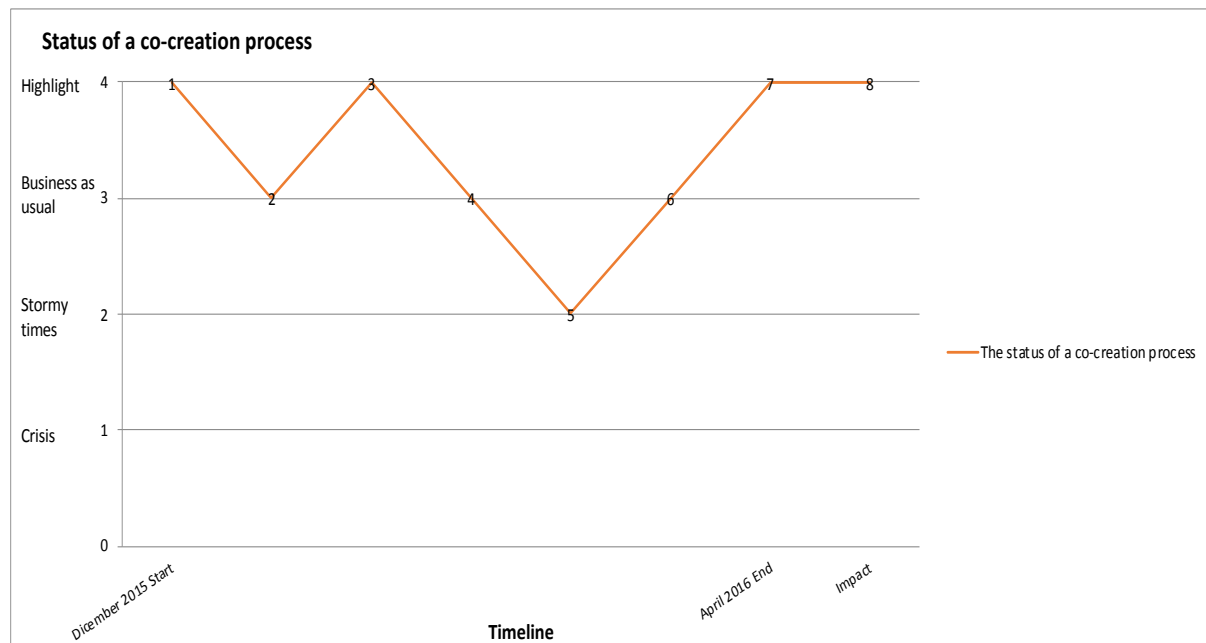
Visualisation

Figure 3: Visualisation of the Co-Creation Process of Ilona use

1. The co-creation process starts with the highlight that the Lahti municipality and the Lahti Living Lab agreed on collaborate on piloting Ilona robot for elderly care. The robot was purchased by the municipality and other actors (care givers and university) were engaged.

2. Technical trainings from the tech company that sold Ilona were provided to the care workers, to care students and researchers. The activities of the assessed implementation period were planned among the municipality, the Lahti Living Lab and the care givers.

3. The implementation period started.

4. The robot was moving from one facility to another and the researchers were observing the sessions with care givers and elderly patients.

5. Some turbulence occurred when the Lahti municipality personnel who initiated Ilona implementation were criticised in the media and more directly for the idea. Some criticism was coming also from some of the care workers, afraid of the change in their daily work.

6. The activities kept running as usual and it was decided to not pay too much attention to the public criticism.

7. The implementation period finished. The interviews with end-users underlined that elderly patients showed a positive attitude towards Ilona. Furthermore, some of the care

givers who were sceptical at the beginning had changed their mind after they saw the patients interacting with Ilona.

8. Over time, after the end of the assessed implementation period, Ilona is still in use in the three facilities and a fourth one has started to use it too.

Which learnings emerged?

The Ilona biography is the result of the strong willingness of a public administration to adopt new technologies for elderly care and provide new services to elderly patients, to better face the challenge of ageing population in Finnish society. The pioneer approach of the municipality is surely one of the highpoints of this case study. Not only the Lahti municipality was a pioneer in piloting the use of new technologies, such as robots, but also the whole process and the strong involvement of the end users and of different kind of actors, is a sign of open-minded vision and one of the factors of Ilona success.

On one hand, it is true that the engagement of the stakeholders may have benefited of the top down approach, as the process was initiated by the municipality, but on the other hand all actors actively and positively participated to the process, bringing in their expertise and trusting one another along the whole process.

I found personally remarkable how almost all the actors have been involved since the beginning. Indeed, beside the elderly patients who participated only to the implementation phase and provided insights for the assessment, all the others were engaged early. The limited involvement of patients was perfectly motivated, as it was planned by taking into consideration their health condition and all the necessary measures were taken to protect them. In my opinion, it is also worth to underline the early involvement of the Lahti Living Lab which was among the first actors the municipality was dialoguing with. By involving researchers in charge of assessing the impacts of the decision taken, the municipality showed its openness and also its strong desire to ensure the sustainability of the solution, which was not meant as an isolated experiment but rather as a desire to open the way to new technologies in elderly care services. Not by chance, indeed, the municipality required the participation of young care students in the implementation of Ilona, as they wanted the students, as future care professionals, become acquainted with the technology. Planning

ahead was definitely one of the best traits of Lahti municipality in implementing Ilona process.

A good point to reflect upon was raised by the care managers and the Lahti municipality representatives, in regard to scaling up of these solutions and procurement. Whereas the process has contributed to facilitate the introduction of new technologies in elderly care services and contributed to raise awareness and interest on the general topic of how new technologies can contribute to healthcare system, some actions still need to be taken to help the care professionals to find and adopt the best robots for their needs. The user needs are diverse, and it is important to combine field knowledge and technical know-how to find the best solution for each user. The difficulty in finding suitable robots or tech companies providing this service was underlined by the project manager of the Ilona implementation. However, this is could also be seen as a confirmation of the success of Ilona as it opened the discussion about how to introduce robots and other technologies in the system.

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Apulian ICT Living Lab | Italy

Margot Bezzi (APRE)

Summary

Apulian ICT Living Lab (http://livinglabs.regione.puglia.it) is an initiative promoted by the Regional Government of the Apulia Region in Italy, and in particular by the Economic Development, Employment and Innovation Department – Industrial Research and Innovation Service. It was implemented by InnovaPuglia, an in-house company of the Apulia Region - Technical Support Division.

Invention and identification

Through the Living Lab approach the Region aimed at facilitating the implementation of the Regional Development Strategy, and in particular the part dedicated to Research and Innovation and the regional Digital Agenda. The underlying assumption was that Regional development strategies must define new visions of sustainable future for citizens and businesses, as well as increase the quality of life and social cohesion in the territory of reference, through service-oriented communities. The Region saw in the Living Lab methodology the best way to bring simultaneous benefit to public administration, companies and enterprises from Apulia, and the entire regional civil society, calling them all to co-design and co-produce the elements of a better world.

The intuition about the value of Living Lab and co-creation methods is directly linked to the capacity of the Economic Development, Employment and Innovation Department of the Apulian Region of being involved into EU-level initiatives. Being the Region active and participant in several cooperation initiatives at the EU level allowed catching and capturing the intrinsic value of the Living Lab concept. The Living Lab methodology was eventually applied and combined with specific regional needs, with an intentional discontinuity with past socio-economic regional dynamics. The objective of this discontinuity and co-creative experimentation was primarily to trigger and support territorial-relevant innovation processes and the industrial and productive fabric, to unleash effective economic development at the regional level, especially of SMEs.

Implementation

Apulian Living Labs was officially launched in March 2012 with the aim to develop and valorise new products and services for the companies and families of the entire region. The initiative was implemented through a series of different calls over the period from 2012 and 2020. In total, 75 innovation projects were funded, affecting 15,000 citizens from 40 different municipalities, with the participation of 40 research entities and 193 local enterprises, interacting with 154 users' organisations, following the quadruple helix model.

Diffusion

The diffusion of the process was initiated through a *tour* of the Regional implementing authority throughout the region, to present the initiative. It was the public administration that moved towards specific territorial areas, meeting the enterprises directly in their activity environments, and making explicit the intention to involve the local public administrations – mainly municipalities - in a policy co-creation process.

Institutionalisation

Regarding the process of progressive incorporation of such methods in daily practice and ways of thinking, we do not have at the moment certain data, however two elements could be mentioned, which account, also if partially, for an evolutionary ongoing process:

- Network analysis to see creation of new interactions…

The region has embarked in a network analysis experimental investigation, executed in collaboration with the management engineering department of the Bari Polytechnic

University, to investigate if it is possible to identify objective parameters to evaluate participation widening dynamics, and the nature and development of the network engaged. Besides, positive hints received about the characteristics of the growing network, the research initiative shows itself an active engagement and genuine interests of the institution for the transformative phenomenon triggered by living labs.

- Evolution of a call towards social innovation

Another sign of progressive institutional practice transformation can be captured in the evolution of the call requirements. For the programming period 2014 until 2020, from the operational point of view, the Region has developed a new instrument and related calls. The new calls 'InnoLabs' represent an evolution of the first editions in that they shift their target towards the social impacts of precedent actions. Targeted solutions and related projects are therefore expected to produces effects in terms of social and societal innovation – where social innovation is intrinsically participative and based on multistakeholder dialogue.

Context of the 'co-creation process'

The Living Lab initiative was initiated by the Economic Development, Employment and Innovation Department of the Apulia Region. In order to understand the rational behind this choice, we shall analyse the pre-existing context at the level of regional economic fabric development, looking at its specific needs and problems, and at why co-creation was finally chosen as a possible solution.

In the context of the 2007 to 2013 structural funds programming phase, the policy level understood there was a need to intentionally introduce elements of discontinuity with past socio-economic regional dynamics. The objective of such discontinuity - especially under the forms of co-creative experimentations – was primarily aimed at triggering territorial-relevant innovation processes in order to effectively unleash economic development within the regional industrial and productive fabric, and support the specific competitive capacity of enterprises and in particular of SMEs, which are predominant in the regional productive context.

How and why co-creation could help in this context? The logic behind the choice of a co-creation measure was the intention to reverse the usual 'technology push' vision of

innovation, resulting in many project results stagnating in the famous 'Valley of Death'. The Living Labs logics aims at starting from authentic societal needs and to experiment in real life conditions, creating 'demand pull', sustainable innovation with a strengthened quality, utility, usability, economy, and acceptance of the proposed ICT solutions.

The Region saw in the Living Lab methodology a way to bring simultaneous benefit to public administration, companies and enterprises from Apulia, and the entire regional civil society, all called to co-design and co-produce the elements of a better world.

A triggering and underlying motivation behind the Living Lab investigative and methodological experiment was therefore the need to tackle a number of societal challenges, through the preliminary collection of multiple actors' points of view. The challenges identified were clustered into eight selected domains: 1) environment, security and territory safeguard; 2) cultural heritage and tourism; 3) digital creative economy; 4) renewable and competitive energy; 5) e-Government; 6) education and training; 7) transports and sustainable mobility; 8) health, wellbeing and socio-cultural dynamics.

An additional insight about the relation between the macro and historical context and the Living Lab initiative comes from Dr Gaetano Grasso, project manager in charge for the initiative implementation in *Innova Puglia* (the regional agency responsible for the implementation of the Living Lab Programme). 'The capacity of the Living Lab initiative to successfully generate support and enthusiasm shows in which way difficult times can trigger incredible reaction capacities and mechanisms, helping to find new and different solutions. Although the Apulia Region is still classified as belonging to the *Convergence* objective of the EU Regional policy [that is, the group of the less developed regions], and even if an intricate combination of negative contextual factors still make it difficult the achievement of more stable results, the Living Lab initiative showed that changing is possible, and that a significant margin of improvement and potential for change lay in southern Italy'.

Starting point of the 'co-creation process'

On the one hand, the choice of the Living Lab approach is to be contextualised as a new approach to tackling Puglia's economic crisis and as an innovative way to stimulate local development, through supporting local ICT businesses to develop technological solutions

meeting a range of public-sector requirements. On the other hand, the Apulia Region opted for the Living Lab methodology in order to explore and understand from municipalities and local administrations which were the most relevant issues that could be addressed through the new possibilities offered by ICT innovative solutions. The potential of the experiment was unfolded by the synergic combination of various enabling conditions: 1) the presence of urgent needs and demands; 2) an explicit governance vision and political willingness; and 3) the capacity to seize and experiment the opportunities offered by ICT. Here we explain this process more in detail.

Double helix phase: research and enterprises for innovation and competitiveness

Heading towards the policy objective of regional economic development and innovation through co-creation activities, the first measures consisted in calls targeting the constitution of public-private partnerships. The objective was to support the technology transfer phase and channel new knowledge from researcher centres towards the productive cycles of regional enterprises. The relationship between enterprises and research centres – already existing but not fully functioning and effective – was boosted and supported through a main message: research and university support shall be customized and address the specific needs and peculiarities of the regional productive fabric, effectively serving and pushing forward the maturation and competitiveness of local enterprises.

Triple helix phase: involving local public administrations to match innovation with societal needs and services

The following step was reflecting on how facilitating the transfer and match of this improved enterprise competitiveness capacity with the innovation needs of the local market demand, as well as with societal and service needs. The new objective was then to explore and facilitate the bottom up emergence of the existing demand and needs – either evident or unknown. It is at this stage that local officers in the Apulia Region decided that the living lab methodology would be the right one. The first living lab phase was shaped and dedicated to exploring local demand through collecting and mapping local needs and necessities.

The feedback received from territories was impressive, through a policy measures that combined a telematic platform (activated on the Region portal, *Sistema Puglia*) with on-site tours and meeting where regional officers met stakeholders across the Region.

Quadruple helix phase: third sector and citizens' associations

Mapping needs and necessities allowed *hooking* also the forth *helix* component: citizens. Although through intermediary organisations representing their interests, such as associations or institutions that enter citizens' daily life or schools and parishes in certain cases.

The process was initiated at the political level, by the then Regional alderman for economic development. The authority who initiated and triggered the process, including being responsible for the call management, is the *Industrial Research and Innovation Service* under the *Development, Labour and Innovation Policies Department* of the Apulia Region. The implementing and managing authority of the initiative is InnovaPuglia SpA, an in-house company of the Region. The initiative was funded by the Apulian Region through the ERDF Operational Programme 2007 to 2013. The total investment for the project 'Apulia ICT Living Lab - New Policy Approach in South Italy to Tackle the Economic Crisis and Enhance Development' is 37,718,333 €, with a maximum public co-funding ratio of 60 % of the total expenditure. The public investment was supported by Axis I, Measure 1.4, Action 1.4.2 of the ERDF Operational Programme 2007-2013. On the overall, the initiative activated a public contribution of 25 Million Euros.

Indeed, it is also important to contextualise such initiatives in a broader transformative landscape. The last decade has been for the Apulia region a moment of deep transformation from the institutional point of view, with public administrations proactively embracing activities to support a cultural change, towards the principles of simplification, transparency, involvement, participation, and sharing. For example, in 2017 the regional 'Law on Participation' was approved (LR 28/2017)[1], setting a permanent framework for the participation of citizens, local administrators, and cultural, economic, political and scientific actors, based on information, transparency, consultation, and listening, as well as on the right of citizens of verifying and monitoring the commitments taken up by the government. The drafting of the law itself was conducted as a participative exercise, involving thousand of citizens, institutional representatives and the third sector throughout the whole region. The law recognises participation as a right and duty of Apulian citizens, identifying forms and instruments of democratic participation, to ensure the quality of decisional processes on important topics and on strategic works. One of these instruments is the 'Annual Participation Programme', identifying which processes and procedures shall be opened to participation, and with which instruments and terms.

Further development of the 'co-creation process'

Landscape of stakeholders

<u>Characteristics of involved actors</u>

The Apulia Living Labs initiative and process involved all actors from the quadruple helix, in accordance to Living Labs principles. We will summarise here, as much as possible, their characteristics, their role in relation to the process, their motivations and needs to join the process, and the assets they brought to the experience. Also, we analysed the way such actors were engaged and involved.

- *Regional government (public administration)*. The Puglia Region initiated the process, engaged the actors, and through an implementing agency – Innova Puglia SpA – was responsible for the implementation. In terms of needs and motivation, through this co-creation initiative the Region addressed 1) the need to revitalise the regional entrepreneurial fabric – in particular SMEs – bringing innovation and increasing technology transfer from research entities to the entrepreneurial system; 2) addressing pressing regional societal challenges.

- *Local public administrations (municipalities)*. The first phase of the Living Lab initiative consisted in a 'Mapping of needs and necessities of local public administrators'. Although the exercise was in fact called 'map needs of final users' – implying that all stakeholders could contribute in compilinga mapping – such exercise was in fact aimed at reshaping the service landscape of a given territories, calling therefore public administrations in the front line, since they had therefore a direct interest in innovating and improving their service possibilities across the eight different identified service domains.

The presence of at least one local public administration partner was a requirement of the Living Lab call, and being beneficiaries of the funding acted as motivator as well. Local public administrations were reached out to and engaged through active and direct, informal promotion of the Regional government at the local level, through specific informative tours across the Region. Local administrations adhered to the initiative independently from their political affiliation.

- *Business and entrepreneurial system (with priority on regional SMEs).* Enterprises were asked to act on and match the needs collected through the mapping exercise

through experimentation projects based on technological solutions. The entrepreneurial system was the primary recipient and target of the Living Lab funding instrument, and as such their engagement and motivation to join the initiative was quite streamlined. Also, a motivation for enterprises was the opportunity to widen their market through testing and validating new solutions in real life environment, which would increase the possibility to produce something fully competitive and responding to actual market needs. Finally, the requirement to collaborate with the research system represented an opportunity to increase their internal know-how.

- *Regional research system (universities and research centres).* Also research entities were required beneficiaries for Living Lab call, gaining a direct benefit from the project's funding. Their role was to help SMEs innovate, possibly through transferring know-how as well as technological innovations needing to be validated. The specific role of the research system was also to support SMEs in customising and personalizing of specific technological solutions, to address actual territorial needs and demand. The Living Lab was an occasion for them to bring their discoveries into life and contribute to the overall evolution of their regional innovation landscape.

- *Local associations* (third sector organisations, no-profit associations, citizen/consumer associations), *as well as institutions such as schools and museums.* Each proposal had to include at least one association or public body. The role of associations was that of solution validators. They brought the deep knowledge in terms of service needs and features, and were motivated by the possibility to directly contribute to shaping solutions with a direct impact in their lives. Citizens did not take part to the process in an individual and direct way. Their needs were instead brought to the attention of institutions through associations.

In general, there was no need to use incentives to involve stakeholders into this scheme. On the one hand, the direct advantage and interest for all involved actors, was quite explicit; on the other hand, the times and the context were mature for all actors to enthusiastically engage in a new cooperation experience. With the words of Gaetano Grasso, project manager in Innova Puglia, 'The Living Lab experience took off within a stakeholder ecosystem that was not used to such cooperative approaches. However, all stakeholders, including politicians, showed openness to experiment, as well as readiness to challenge

previous habits, since they understood that there was a bigger challenge ad stake: addressing the difficulties connected to the economic crisis; finding a solution to community needs; strengthen innovation in the regional enterprise system and consolidate its international competitiveness. If not a pre-existing spirit of cooperation, certainly such a readiness to experiment, and to welcome a new, open approach was certainly greatly influential in creating the basis for the successful deployment of the initiative.'

Phases of co-creation

As already explained in the section 'Starting point of the co-creation process', the Apulia Living Lab, meant as a way to facilitate co-creation amongst the quadruple helix actors, was triggered by two main socio-economic regional drivers: the need stimulate local development through boosting the regional entrepreneurial system (and in particular ICT SMEs) towards innovative solutions, and the need of exploring and then addressing the actual service needs of territories, and in particular of municipalities and local administrations, through ICT solutions.

The Apulia Region Living Lab experience embraces a time span that goes from 2012 to 2017, with a stronger effort during the 2007-2013 FESR Programming Period.

- The implementation process started in March 2012 (*Phase 1*) with the constitution of a 'needs and necessities' database aimed at gathering all actual needs coming from territories, and especially service needs expressed by local public administrations.

- The *needs* exploration phase was followed by a first call for technological solutions (August 2012 – March 2013), closely followed in the same year by a second call (October 2012 – April 2013), funding respectively 11 and 23 Living Lab.

- A third call, named *Living Lab Smart Puglia 2020*, was launched in October 2013, with closing in November 2013, funding 44 new projects.

The initiative continued in the following Programming Period (2014-2020 FESR) widening the focus on exploring the social impact of ICT solutions and social innovation.

- The *InnoLabs* call was launched in March 2017, always following the Living Labs methodology.

The Living Lab initiative is a co-creation initiative where co-creation is relevant at two levels: 1) the policy priorities co-creation level; and 2) the single solution's co-creation level

– i.e. at the project level. Policy priorities were created through the series of meetings, which resulted in the identification of the eight priority areas, and in the drafting of the call specificities (see section 'Starting point of the co-creation process').

Regarding each single funded project/solution, projects selected for funding had to comply with specific requirements, as set in the call text. Requirements focused in particular on the types of actors involved, and on the types of activities conducted amongst the different actors of the quadruple helix.

Each project proposal had to be submitted by at least one local ICT SME, and only partners previously registered in the Living Labs Partnership Catalogue could join. Furthermore, each proposal had to include at least one association or public body and one research laboratory in the formal partnership.

Co-creation is meant as a feature and approach that can emerge and become embedded at various phases of the entire process, with a requirement specification in the call text for which projects will be taken into consideration only if including the activities listed:

1) Analysis and understanding of final users technological needs also through specific co-design phases (corresponds to Problem identification/ understanding phase);

2) Definition of interactional model among the different involved actors (contributes to Ideation phase);

3) Prototyping and progressive personalization of solutions (Prototyping phase, including iteration to achieve further personalisation);

4) Test and experimentation of new technologies in real applications, respondent to actual final users' needs (corresponds to verifying/ testing phase, including iteration);

In terms of experimental development, the work included acquisition, combination, structuring and use of existing scientific, technological, commercialization knowledge and capacities, to produce conceptual definition, planning, and design of products, processes or services, either new, modified or improved;

5) Demonstration and presentation in public demo-lab modality of the developed prototyped solutions, also with a view to make them available and accessible to a wider additional community of interested users (corresponds to Feedback phase);

6) Analyses for the economic valorisations of experimentation results.

It is also to be highlighted that the funding mechanism was built in order to allocate the major part of the budget to experimentations of the proposed solutions, with and by the end-users (employees, students, teachers, tourists, civil servants, patients, etc. – depending on the thematic domain selected) in real-life environments.

The Call annex dedicated to evaluation criteria[2] provides us with other interesting insights regarding the expected co-creation features of Apulia Living Labs projects. Minimum requirements are set, and specifications are required to project proposals, for example, concerning:

- *Modalities of users' engagement in experimentation activities*

The involvement of final users in each one of the following project phases, resulted in different points assigned: 1) design; 2) development; 3) validation and testing; 4) evaluation of future market perspectives; 5) monitoring and revision of project activities; 6) involvement of actors from the socio-economic system for service provision or logistical assistance. Points *2*, *3*, and *4* gave right to two points, showing a stronger focus of the initiative for the development, implementation and production phase, compared to the *ideation* and *design phase* (to which only one point was assigned).

- *Methodologies and instruments to keep motivation and interest of final users high during and after experimentations;*

Three types of instruments were suggested, with corresponding evaluation scoring systems, which took into consideration the combination between type of instrument, and number of events proposed in the project for each instrument. The three instruments proposed are the following – and this explains the relative homogeneity of projects regarding the propensity for these engagement solutions.

1) Focus groups with final users in the different phases of experimentation (design; development; validation and testing; market perspective evaluation): one point for each phase covered, for a max. of 4 points;

2) Permanent panel/ forum of citizens/ consumers activated as of the first phases of activity: 2 points for each forum, for a max. of 10 points;

3) Periodic workshops open to the participation of the wider public: 1 point for each forum, for a max. of 10 points.

- *Participation of final users to experimentation*

Depending on the number of final users involved (meant as citizens, consumers, families), and on the modalities described to reach such objective, additional points were attributed, as follows: at least 100 users: 10 points; 50-99 users: 5 points; 20-49 users: 3 points; less than 20 users: 0 points.

In terms of monitoring and evaluation, Innova Puglia – the managing and implementing authority – conducted an administrative evaluation, mostly aimed at capturing the efficacy and efficiency of beneficiaries' expenditures. Indeed, the consideration of technical implementation aspects of the projects is inherently relevant in order to assess efficacy and efficiency of economic investments.

However, in terms of evaluation of the wider and deeper impact of the measure on the socio-economic landscape, and in particular in low-tech context, activities are in pipeline. In particular, in cooperation with the management engineering department of the Bari Polytechnic University, the Region would like to strengthen network analysis experimentation to understand if this analytic method can provide us with objective evaluation parameters concerning the widening of participation dynamics; or to give us evaluation instruments able to read through participation and stakeholders dynamics, and to capture unpredictable variables. Preliminary results connected to the network analysis activity are described in session 'Follow-up of the co-creation process'.

Specification on methods, tools and communication

The initiative showed an interesting blend of communication actions, consisting in online platforms and spaces, a regional tour by the initiating authority (series of physical meetings throughout the region), and finally a strong advertisement of the public calls.

Online space. The platform was the communication tool used initially, and remained also the main reference point for the growing community. All actors were enabled and encouraged to discuss the eight domains through a web platform - called 'Living Labs Café'[3] - comprising an informative section and an interactive one, with the objective to create a Community around the Living Labs endeavor. The informative section collected all information on Living Labs activities, in Italy and beyond, and relevant EU events and

activities for the different domain areas. Also, it contained detailed information regarding each activated Living Lab, other R & I ICT projects funded by the region, as well as the needs and necessities identified and the catalogue of possible partners. The interactive and collaborative section – called 'Open community' was intended as the place where to propose projects and idea in search of partners, for a collective elaboration and to create 'a living community, which elaborates needs and innovation together, and plan, design, test, and valorise achieved results together'.

Beside this, the region set up a blog with a quite original concept. Based and inspired on *stakeholder needs*. Posts were published, where the specific *need* was presented via specific literature or music cross-references or associations, in order to gain readers' attention. Unfortunately, at the moment such a part is not accessible anymore which was reported on the basis of the verbal account of the interviewee.

Physical space, to communicate, engage and co-create. The initial phase – dedicated to administrations' and stakeholders' needs identification – was characterised by meetings in persons throughout municipalities and territories, to present the initiative and engage the stakeholders called to elaborate and submit their *needs*. Officers from the regional government travelled across the regions organising co-creation workshops to identify territorial priorities and related communities.

Some of these territorial needs were explicit, and allowed the Regional administration to immediately convey them in the programming exercise, identifying some of the eight priority domains. Other needs were instead tacit and not immediately recognisable. For such needs, the help and cooperation provided by the regional level to local administrations was essential in order to properly understand, outline and focalise their needs, even when they subtended to other, more explicit needs. This phase corresponded to dialogues with single administrators.

Meetings throughout the territory consisted first in a presentation of the objectives by the regional government, in a very informal, friendly and lean way – not a formal institutional presentation. In the afternoon, participants would divide in working groups to elaborate a specific *need.* Regional government officers from Innova Puglia, and in some cases professional facilitators, would assist in the correct formulation of the territorial *needs,* to ensure their compatibility with the telematics form predisposed to collect them. Discussion

tables were facilitated through world café methods or similar. This phase contributed in shaping the main research priorities around which the calls were built.

No explicit material has been found describing directly the experiences of stakeholders on the different co-creation tools, not on whether an evaluation was done of the specific tools and instruments used in the different projects. However, more general conclusions regarding the attitude of participants to co-creation can be inferred by the more general description of the cooperation experience, and of the successful evolution of the experience.

Specification on cooperation and conflict

Despite the Living Lab initiative represented a quite disruptive route change, with no progressive experience of this sort in the territorial cultural and historic context, the initiative was positively welcomed since the very beginning. No particular conflict or disaffection moment emerged. In the words of Gaetano Grasso, 'such experiment and change were welcomed, certainly because it responded to an implicit but mature need, that found an adequate response'.

'Certainly, such a positive reception was also the result of a good work of community and capacity building. In particular, training was provided to technical and local administrators about the use of the platform, as well as about specific concepts, in order to coherently refer to territorial needs and to communitarian priorities and language (e.g. the flagships of the Europe 2020 Strategy). Times were mature enough, and the Regional administration was aware of that'.

In terms of cooperation spirit – Dr Grasso notices – it is interesting to see how the whole process was initially born to address enterprises and SMEs competitiveness issues. Enterprises' competitiveness, as well as research institutions' interests, progressively shifted and were measured against their capacity to address territorial effective and real needs. Finally, target needs became those of public administrations and of the wider society. In brief, from the methodological point of view, we moved from *competitiveness* towards *cooperation.*

In a quadruple helix dynamic, difficulties arise easily, especially whenever cooperation mechanisms are new and not fully understood, experienced, or integrated in consolidated operational procedures (e. g. bureaucratic). Dr Grasso explained that it happened that some

local administrations – after expressing and formulating their territorial needs – when it was the time to pass to action, often under the solicitation of groups of enterprises or citizens, got stuck into public administration peculiar management issues. Such issues could span from the change of political administration, to the difficulty in placing certain activities with the right cost item from the accounting point of view, in the economic procedures and budget. Such situations generated some small failures here and there, or some resistance, which are however normal in any transitional and adaptation process.

However, in general, we can say that cooperation found new ways to emerge and be expressed, whenever associations and administrations addressed real citizens' problems. The most concrete example is represented by the health domain and by the improvement of citizens' wellbeing and quality of life, also through the introduction of applications promoting the cooperation and participation of citizens and the dialogue with public administrations – Dr Grasso notices.

Specification on political influence

The Apulia Living Lab originates from the initiative of the regional alderman to economic development, which immediately understood the policy value of the initiative, and triggered a virtuous process in collaboration with the regional department for research and innovation. In this context, politics was conducive at all levels, and no issues or barriers related to the political dimension arose. If the backing of the regional political level was important, the welcoming attitude observed at the local political level was as much relevant. Local politics showed institutional support, endorsement, acceptance and awareness about the initiative potential, always guaranteeing an institutional presence at local events, irrespectively from political colour.

An explicit governance vision and political willingness (at the regional level) on the one hand, and the openness and trust of local politicians, undoubtedly represented an important success factor for the initiative, in synergic combination with other enabling conditions. At this regard, we highlight how Living Labs took off within a stakeholder ecosystem that was not used to such cooperative approaches; nonetheless, all stakeholders, including politicians, showed openness to experiment, as well as readiness to challenge previous habits, understanding that there was a bigger challenge at stake: addressing the difficulties connected to the economic crisis; finding a solution to community urgent needs and demands; strengthen innovation in the regional ICT enterprise system and consolidate

its international competitiveness. If not a pre-existing spirit of cooperation, certainly such a readiness to experiment, and to welcome a new, open approach was certainly greatly influential in creating the basis for the successful deployment of the initiative.

Follow-up of the 'co-creation process'

By the end of the first funding period, a number of partnerships had scaled up into permanent working alliances or formal business entities, making stakeholders' cooperation steadier. Some of these Living Labs asked for the acknowledgment by ENoLL, the European Network of Living Labs, as endorsed by the Regional Government of Apulia.

In terms of evidences about the creation of different relationships combinations and of future relationships landscape amongst regional stakeholders, an interesting insight is provided by a network analysis conducted by the Apulia Region in cooperation with the management engineering department of the Bari Polytechnic University.

One of the indications that emerged from the relationship analysis of stakeholders is that a stronger support is needed to build-up horizontal dimension's relationships in sectorial value-chains. In other words, the analysis highlights that enterprises, in order to gain competitiveness, shall re-shape their relationship landscape outside their traditional and vertical value-chain, in favour of more multidisciplinary, cross-relational, and horizontal approach, entering in contact with other sectors. Using the agri-food value-chain as an example, it needs to expand their relationship network through integrating and interacting with different sectorial disciplines, such as for example informatics and data analysis (to properly manage informatics platform). Such leap appears fundamental to appropriately valorise local products in the 21st century and guaranteeing economic growth. However, putting in mutual relationship very specific and different scientific areas certainly does entail significant efforts.

A slightly different perspective to describe the same overall emerged dynamic, with the words of Dr Grasso, is the need of 'closing the circle' between technological innovation and social innovation. Indeed, while technology-based sectorial innovation certainly is essential to push the development of new productive processes, it is also essential to explore the impact of social innovation in favouring the flourishing and development of a certain sectors. Taking always the agri-food sector as an example, we know that a number of social

inequalities or issues create barriers in accessing certain products or adopting healthy behaviours: for example, low income people are more likely to buy large consumption products, since biological or high quality food may be too expensive. These social issues, however, end up hampering the growth of possible new market niches.

In light of these perspectives about needs and desired evolution pathways, and seen the success of the Living Lab initiative, the Region has ensured a continuation of the Living Lab initiative throughout the successive Programming period (2014-2020), notably by keeping publicly available on the *Sistema Puglia* Portal the link to the *needs and necessities database*, which still can be enriched with further inputs regarding needs.

In order to address a wider range of needs, the Region shaped a new and evolved funding instrument, *InnoLabs.* Compared to the first Living Labs calls, this call also introduces attention to the social impacts of the funded actions, aiming at solutions producing effects also under the social innovation dimension.

Scaling

The Living Lab experiment entailed a collective learning and adaptation process by all involved social actors. One aspect of this evolution concerns the progressive exploration of some enterprises outside their direct field of operation, with a number of enterprises already taking part to the previous calls, engaging into projects on different thematic areas. Also, with the InnoLabs calls in 2017 (which integrated social innovation objectives) it was observable how digital transformation processes and technological solutions progressively migrated from high-tech enterprises only, towards productive sectors traditionally far or reluctant to digital and technological uptake.

Dr Grasso brings again the attention on the agri-food sector, typically known for showing higher resistance to technologies, telling us a story were a different attitude was observed in agri-food enterprises. At the time of this research (January 2020) and in the framework of an Interreg project involving Italy and Greece on the topic of food waste, the Apulia Region was asked to involve relevant stakeholders through the Living Lab methodology.

Regional enterprises were involved - Dr Grasso explains – with a view to valorise typical regional crops in a sector that is based on technological support: the *functional food* sector. Considered the aggressive competition existing in the Mediterranean context, the need to

technologically transform such enterprises was evident, to ensure the capacity to open up to new market niches. In the case illustrated the effort of valorising local food products from the nutritional and health point of view acted as a means to innovate enterprises, otherwise stuck into standardized and conventional productive processes and with low attitude to product technological innovation.

Systemic change

Following the interpretation of Dr Grasso, the Living Lab process contributed not only to increase the enterprises capacity to compete outside the regional borders and at the international level (in particular in the Mediterranean context), but improved the whole regional economic context, through shaping new forms of competitiveness and entrepreneurial approaches.

Following this interpretation, a short-term impact is already being produced. Being the transformational process of the economic fabric still active and on-going (lets think about the recent cross-sectorial contamination, based on new synergies between technological and social innovation as well as between different value-chains), there are reasons to think that the following years will be decisive to measure and assess the nature and magnitude of such changes.

In order to capture that, appropriate analytical and interpretative tools will be of utmost importance, to properly interpret the actual weight and potential of new relationships as well as to measure intangible value and social capital.

Visualisation

The process showed a linear and increasing trend in terms of actors' participation, with the number of funded projects growing during the three different editions of the initiative. As a result of the Living Lab experimentation, over 200 different entities, ranging from SMEs to established businesses and individual entrepreneurs, developed solutions addressing 128 out of the 475 catalogued needs. The successive edition in 2017, *InnoLab*, under the following Programming period (2014-2017) showed an additional expansion, with additional 30 projects funded.

For the particular context and nature of the action described – a macro-level policy measure, with strong linearity features – the compilation of this type of diagram appeared difficult. Either we decided to capture the trend at the macro-level (policy action) or at the micro-level (funded projects), the added value of such visualisation appeared questionable, if not minimal. Indeed, the specific project-level criticalities were impossible to capture in the context of this study's exercise (we are speaking about +70 different projects in different areas); at the same time the option of visualising the evolution trend of the macro/policy level would also have appeared of relative interest, portraying a simple growing line with no special criticalities, crises or 'stormy times'. Therefore, and in a lack of the different types of information, the author opted to leave blank this type of graphic representation.

Which learnings emerged?

I tried to summarize in short statements what I consider as the most important learning features from the experimental journey reported in this document, as concerns the characteristics of the 'innovative environment for co-creation'.

- Political vision and support are essential. This case shows the important role of politics at different governance level – the regional and the local level. The regional political level was essential for its vision, having the intuition about the value of Living Lab and co-creation methods as a relevant methodology to address specific territorial characteristics. The local political level was important for opening the way to experimentation, showing a welcoming and experimental approach towards something new and unknown, as well as an active engagement and genuine interests for the transformative phenomenon triggered by living labs.

- Political (physical) presence and direct commitment was essential to engage. In this case, it was the public administration that moved towards specific territorial areas, meeting enterprises and local administrations directly in their activity environments and asking to express and elaborate their real needs. This made explicit the direct advantage and interest for all involved actors, and generated trust, even if speaking about an experimental process.

- Policies addressed real needs, and politics followed, without raising obstacles. At the local level, local administrations did not raise any issue linked to political views.

- Co-creation culture can emerge and thrive even where it does not constitute a consolidated mark of the territorial culture and tradition. This, however, happens under a combination of circumstances and enabling factors that must ensure the right 'maturity' of times. The potential of the experiment was unfolded by the synergic combination of various conditions: 1) the presence of urgent needs and demands; 2) an explicit governance vision and political willingness; and 3) the capacity and willingness to seize and experiment the opportunities offered by ICT.

All these, however, were part of a context that had turned mature to address the existing urgencies and for all actors to enthusiastically engage in a new cooperation experience: 'if not a pre-existing spirit of cooperation, certainly such a readiness to experiment and to welcome a new, open approach was certainly greatly influential in creating the basis for the successful deployment of the initiative' – said the person we interviewed.

To summarise about the cultural aspects of co-creation: an explicit governance vision and political willingness (at the regional level) on the one hand, and the openness and trust of local politicians, undoubtedly represented an important success factor for the initiative, in synergic combination with other enabling conditions. At this regard, we highlight how Living Labs took off within a stakeholder ecosystem that was not used to such cooperative approaches. Nonetheless, all stakeholders, including politicians, showed openness to experiment, as well as readiness to challenge previous habits, understanding that there was a bigger challenge at stake.

Concerning the specific features of the co-creation case, from the analysis of the call requirements (see section 'Phases of co-creation') we identify a clear and explicit effort to inject co-creation practice, by inserting very detailed minimum requirement regarding the inclusion of co-creation at different stages of the solution (problem definition, prototyping, testing and experimentation, demonstration), or assigning different scoring depending on modality and number of engagement activities conducted with citizens, or allocating major part of the budget to experimentation.

Independently from the shapes of expressions that these indications might have taken in a variety of different project contexts and thematic areas, and besides the fact that the call provided a fixed set of modalities for citizens engagement amongst which the proposers had to choose, the construction of such criteria appears as an effective nudging system to progressively channel new project design modalities and approaches, triggering change.

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Sience Frugale | France

Marion Real (Fab Lab Bcn)

Summary

"Science Frugale" is a forum-exhibition first presented between November 2016 and September 2017 in Paris. The exhibition wanted to explore how to do low cost experimental scientific research by hacking various available technologies, at the crossroads between experimental scientific research, maker culture, and cooperation with developing countries. It was a small (100 m2), relatively low cost (about 45,000 € for 10 months, all workshops, events and online activities included) project developed thanks to funding of research institutions (ESPCI Paris and PSL University) and the Ile-de-France Region.

Due to the originality of this cultural exhibition process, we decided in this biography to revisit it as a co-creation process who gather several stakeholders that co-designed, co-developed and exchanged knowledge and new practices about the topic of Sciences Frugales.

- The process of Science Frugale can be described in two phases: (1) the open incubation as an open exploration oscillating between context analysis, ideation, prototyping/ co-constructing workshops and reflexive moments, and (2) the exhibition as a place for debating and experimenting with the public and other stakeholders around the co-created artefacts while following prototyping new ones.
- In term of tools, the Science Frugale team has been creative, using internal 'open' tools such as Pearltree, customised co-creation workshops methods such the autopsia of a technical devices, interactive and visual artefacts created for interacting with the public (live sketching), and dissemination platforms (PSL-Explore...).
- The process of the exhibition itself can be seen as a space for the emergence of ideas and the front-end incubation of projects. In some way the exhibition has allowed new connexions between different stakeholders - researchers, social entrepreneurs, publics and has built an interactive photo of what are the 'Sciences Frugales'.

The exhibition has received the 'ECSITE - Mariano Gago International Award', category Smart And Simple. An important set of opportunities has emerged from this award and all

the dissemination activities raised by the Traces team in various networks such as the Science Engagement communities.

From now on, the exhibition can be perceived as an experience who allowed the local ecosystem to create systemic changes, *scaling deep* in the sense of mixing participative design approaches in the museology context. Both in term of content (Science Frugale) and processes (participatory approaches…), the team of Traces is pushing for radical changes and support at both internal, local and international level the appropriation of new values, techniques and tools.

Context of the 'co-creation process'

In France and in the Parisian ecosystem, initiatives and institutions are historically creating mediation dispositives to diffuse scientific knowledge. The Academy of Paris claimed that '*In a society where the place and role of science and technology are constantly growing, it is essential to inform, to explain, to educate, in a word, to make lifelong education around subjects that concern more and more all citizens*[1]. Events celebrating science and research as the 'Fête de la Science' or 'la Nuit des chercheurs' are now each year in the agenda of Parisians.

Science Frugale is an exhibition who took place in the innovative Science centre named 'Espace des Sciences Pierre Gilles De Gennes'. ESPGG is a common and shared space between ESPCI Paris and PSL, managed by the association TRACES since 2011 and created as a diffusion, scientific mediation and innovation place to foster collaboration between academics and a wider audience.

- ESPCI Paris is an internationally renowned engineering school funded in 1882 offering original courses in physics, chemistry and biology.
- Paris Sciences et Lettres (PSL) is a famous research university that is composed by more than 25 establishments around Paris with a large panel of disciplines such as sciences, arts, human and social sciences.
- TRACES is a think-do-tank about science and its communication/relation to society. They cover various services such as reflexion, counseling, training and scientific mediation on a strong diversity of axes such as creativity, responsability and public engagement.

The ESPGG is a 240 m² place situated close to the partner universities and is built upon three floors respectively hosting a historical collection, an amphitheatre and a large and open exhibition/ workshop place. It is a meeting point between parisians and sciences, that offers temporary art and science exhibitions, a permanent exhibition of scientific instruments (including original instruments by Pierre and Marie Curie), scientific events, seminars, conferences and experimental workshops and support for science education and scientific events.

The ESPGG and TRACES look for creating intersections and dialogues, introducing a disruptive thinking in classic way of working with, disseminating, doing sciences.

Starting point of the 'co-creation process'

The topic of Frugal Science was emerging at a convenient time with various trends, where a common point was to find adaptation solutions to the (un)availability of resources while promoting sharing practices.

1) Changes in university's structure: while local scientific researchers have to find new ways of practicing research in a context of reduced budget and limited resources, new technological platforms such as fab labs started to be integrated in the infrastructure of Universities. These platforms are seen as opportunities to prototype fastly, they make accessible new forms of experiments and revise the classic logic and practices of researches.

2) Reversing the balance North/ South: Counterbalancing the dominant interaction between North/ South, consisting in transferring technologies from the most developed country to the poorest or exploiting the use of territories and cultures from the South, the development of North/ South cooperation projects in ESPGG follow the emergence of a new mindset inviting the North to learn from other cultures and practices. The intent is to highlight new opportunities to balance the in depth inequalities, understanding, and promoting initiatives supporting the innovation with less and local resources, collectively.

3) In parallel with the creation of the concept of *frugal innovation* in local research group as the French Eco-Design community, various social innovation projects emerged based on the value of circularity, slow life, frugality, conviviality, experimenting with good

practices for better reducing, reusing, recycling locally. Among these initiatives, we can cite 'La Recyclerie'[1] or 'Les Grands Voisins'[2], the future ecosystems of makers Fab City Paris[3], 'Ouishare'[4] and 'La Petite Rockette'[5] who collaborates directly with the team of Traces.

ESPGG proposed to examine these trends which are spreading until the confines of ESPCI Paris through an exhibition. The Science Frugale exhibition attempts to decipher this movement and sets out to meet the men and women who practice it. Due to the originality of this cultural exhibition process, we decided in this biography to revisit it as a co-creation process who gather several stakeholders that co-designed, co-developed and exchanged knowledge and new practices about the topic of Sciences Frugales.

Further development of the 'co-creation process'

Landscape of stakeholders

The exhibition was managed and mediated by Sandrine Bron in constant interactions with the ESPGG director, Matteo Merzagora, the core exhibition team and external partners of the ecosystem.

The core exhibition team was composed by internal employees of TRACES with different backgrounds and experiences such as Maxime Le Roy, in charge of mediation, as well as an intern from a Master in Mediation in Environment and Scientific Communication, an active retired researcher of the CEA – François Piuzzi and external providers for specific activities such as the scenography realised by the studio Millimetres and graphical communication by the illustrator-graphic designer Colette Pitois and he is a graphic designer Nathan Morel.

Upstream this exhibition project, TRACES members participated in a training about living lab approaches with Didier Laval of Culture Instable who gave them an overview of new practices of design applied and to be applied in the context of cultures and museums i.e. open, participative design, design thinking.

During the project, each member was relatively autonomous in its works with a space for expressing their creativity. The communication between team members happened by different means according to the habits of each member. As an example, Maxime Leroy, facilitator of the co-construction workshop was mainly coordinating and structuring his

actions by direct interactions, in the office with Sandrine. Otherwise, they used briefs and shared documents to interact through emails. The illustrator Colette privileged online communication because of her geographic situation using various tools - from graphic to organisational tools to interact with the manager and Nathan (Evernote, Pinterest, Moodboard, visio-conferences, googledoc, pearltree…)

All along the project, key organisation partners have integrated the project and contributed to the content creation, the conferences and workshops:

- The Société Française de Physique as a supporter and provider of resources/ knowledge.
- EchOpen, an open and collaborative project and community with the aim of designing a functional low-cost (affordable) and open source echo-stethoscope.
- TReND in Africa, a higher education charity dedicated to improving university level science education and research in sub-Saharan Africa.
- The student association PSL-Lab Langevinium is the Technological Creation Space for students of Paris Sciences et Lettres, a HackLab is located at ESPCI ParisTech.
- The Woelab (a young innovative community of the first African space of Technology Democracy) and the association GotoTogo (a Togolese development NGO, to promote education, culture and health in Togo).
- Antanak(a collective for sharing about digital practices, Electrocycle (Sensib'Action and open design for electrical & electronic objects) and la Petite Rockette (an citizen initiative – ressourcerie).
- The PC Coup de pouce, an association who promote social entrepreneurship and development aid within ESPCI Paris.

Additionally, a Scientific committee was created to support the scientific contents and value of the exhibition. It was composed by:

- Roberto CASATI, Research Director CNRS, Study director EHESS, and Institut Jean Nicod (CNRS – EHESS – ENS);
- Joël CHEVRIER,Professor of Physics, Université de Grenoble and Centre de Recherche; Interdisciplinaire de Paris;
- Etienne GUYON. Professor emeritus at the Laboratoire PMMH of ESPCI Paris;
- Yohann MACHU. President of Langevinium, ESPCI Paris – PSL;
- Luisa MASSARANI.Président of REDPOP, Latino-american network of SCIDEV.NET;

- François PIUZZI. Retired researcher at CEA and responsible for the commission of 'Physique(s) sans Frontière' at Société Française de Physique.

The exhibition was funded by the platform Explore PSL and the region Ile de France and sponsored by the Societe Francaise of Physic (SFP). The whole exhibition was done with relatively few resources compared to other important cultural venues. By providing an additional report about the role of living labs in cultural spaces, TRACES has received additional funding that permitted to reinforce the financial structure of the project.

The general public was a key stakeholder in the exhibition process as the audience for the different activities of the exhibition was estimated between 8,000 and 12,000 visitors. Of course, the number and type of engagement varied according to the type of activities.

Phases of co-creation

The process of Science Frugale can be described in two phases: (1) the open incubation as an open exploration oscillating between context analysis, ideation, prototyping/ co-constructing workshops and reflexive moments, and (2) the exhibition as a place for debating and experimenting with the public and other stakeholders around the co-created artefacts while following prototyping new ones.

The open incubation has consisted in a serie of open events.

- The first event was entitled 'smartphonik: making science with our smartphone' consisted in open lab made in collaboration with *Ulysse Delabre* and *Antoine Deblais*, researchers at the University of Bordeaux, who interacted with the team member and a larger audience on how smartphones can be used to contribute to citizen science. A demonstration was proposed to show how to use smartphones as sensors for carrying out scientific experiments and gathering mechanical, optical, phonic data. A reflexive workshop was then offered to imagine, build, test and assess new uses from the smartphonique. Later on the phase, citizen science via Smartphonik was newly applied through a collaboration with the CiTicks project run by the association France Lyme and the research center INRA. They elaborates an original living lab workshop dedicated to learn about tick detection and prevent the Lyme illness.
- The second event was a Do it Yourself workshop facilitated by the Neuroscientist André Maia Chagasto who consisted in learning about how to make a microscope.

After two sessions of four hours; an open source and low-cost microscope was made by the group for the Trend in Africa association and directly shown in the exhibition place. This workshop was replicated and improved later in the process by the participation of François Piuzzi from the Physical French Society. That time, the microscope was realized from webcams and other devices who were previously dismantled by the group. Participants could better understand the proximity between the different devices, the optical process behind the microscope and could investigate the quality in term pixels. An other workshop has been realised with François Piuzzi consisting in an autopsy for DVD player – dismantling the device to learn about it and zoom in what is inside the black box.

- Then, the students of Langevinium offered a series of evening workshops to inform about different technologies. 2 sessions about how to make computer science for open Arduino's devices followed by 3D printing workshops where participants learnt about the software OpenScad and Ultimaker to design and print 3D objects.

- The open incubation phase also hosted three conferences where different international communities came to discuss good practices of open science. They introduced the activity of Woelab, a shared innovation space for making complex technologies with few resources. Then they learn about scientific mediation practices in Latin America with SciDev.net and RedPOP network, about low-cost and open-source devices for support the universal access to diagnosis in the healthcare sector with the EchOpen community.

This phase of open incubation has permitted to build the exhibition, open new opportunities and reinforce the partnerships necessary to build a relevant program for the phase of exhibition filled out by the object's co-designed during the first phase.

The exhibition was built with three spaces respectively dedicated to events, workshops and project gallery. The latter was enriched all along the exhibition with new artefacts coming from workshop creation or donations. In term of activities, the phase of maturation welcomed a lots of events. The official opening night was a gold moment where participants could see the gallery, listen to a round table about participative sciences, and experience with different activities to discover what is behind without Ink printers, oscillating fountains and other science demonstration shows. Traces of the first phases as live drawings of previous events were exhibited to talk about the participative construction and make the exhibition process more transparent. Four other events were also realised all

along the exhibition consisting of conferences about international collaborations and Science Frugale practices as well as the co-construction of devices like spectroscope or original stuff made from electronic and other types of waste coming from 'La Recyclerie' a upcycling centre.

The last hotspot of the exhibition was its desinauguration through a final event dedicated to his next lives through two moments:

(1) A professional seminar on evolutionary museography and the concept of exhibition-explorations,and a festive and fun evening.

(2) An Evening of desinauguration of Science Frugale exhibition with several activities such as:

- The launch of the Science Frugale virtual exhibition on the PSL Explore website,
- A crossed views session on the future of exhibitions exploring: Is recycling and reuse applicable to the development of exhibitions? What could we do with frugal science objects? What will it become?
- A practical workshop where people learnt to recompose/ repair objects – learning to see them as a gold mine.
- And a Science Show Frugal with demonstrations.

Specification on methods, tools and communication

In term of tools, we can distinguish internal 'open' tools, co-creation workshops methods and interactive and visual artefacts created for interacting with the public, and dissemination platforms.

Internal open tools: They are consisting in the tools used by the core team to plan and create research and tangible objects. We can cite the use of a shared PealTree, concept mapping online tools. Other tools were only used occasionally between two or three team members.

Co-creation workshop methods and tools: For the design of each workshop, Maxime was designing a set of activities with prepared supports to co-create with. Contrary to other co-creation workshops, these workshops involved not only paper canvases but other materials and tools to be manipulated. They consisted in learn by doing activities imagined by the team. More frequently, the process consisted in 1) exploring an idea with a go-nogo

decided by the team manager, 2) introducing the events in the calendar, 3) communicating and 4) preparing materials and an agenda for the days to finally 'make' the event. Original objects were co-created such the exploded view of components when realising the autopsia of a CD-Rom. The magnetic blackboard on which we hanged small plastic bags containing all the components extracted by the visitors during public autopsies of old computers, were highly appreciated.

<u>Visual identity that support learning and emotion engagement:</u> Original tools have been used such live sketching in the events realised by the illustrator Colette Pitois - @Colpizen. The visual identity of the project with a specific font and the original drawing of @Colpizen add a real value of the project – They transmitted the philosophy of Science Frugale, giving an emotional dimension to the complexity of learning how to make things with less. Inspired by industrial design techniques and comics, dense in terms of information, with hands-on aspects, letting a clear appearance of scientific instruments while letting the objects be submerged by various representations, the illustrations are opened to various interpretations. Meanwhile, keeping in mind the theme of the exhibition, Collette and Nathan both decided to use the most sober means possible. Colette was drawing with Indian ink / lines in raw white supports (no 'rich' paper") while Nathan designed the layout of the visuals of the exhibition with the inspiration of the Bauhaus movement claiming for the functional, sober but beautiful) and proposed some characters of a new font printed in 3D plastic, like game pieces available to the public, the inauguration day.

Specification on cooperation and conflict

One important dimension who is coming often when discussing with the team members is their capacity to explore the unknown with passion and creativity, without fears of losing the thread of the exhibition, accepting to "show and reacting to failures. Hearing from the facilitators and illustrators, we felt that they enjoyed the experience and diversify their knowledge.

One challenge discussed in the interviews concerns the ability to create and maintain bidirectional interactions between the scientist experts, the mediation facilitators, and the general audience. Commonly it is accepted that people are listening to the experts in a position of receiving knowledge, without having space to discuss, raise critics and influence on decisions, and be active in the decision's pathways. One one hand, this means that experts have to be opened to new suggestions from the facilitators, escaping from their

comfort zone to reach new forms of exchanging their own knowledge. From the facilitators perspectives, it means to instaure a climate of trust within a constant negotiation process that balances between traditional forms of transmission, represented by the representation of the wise man and fuzzy- innovative and sometimes improvised practices. Pushing the cursor

In the article of Spoke, the authors gave interesting thoughts about the intensity but fragility of partnerships built around such exhibitions. For them, *'Partnership is the most fundamental and the most fragile component of the approach. The very concept of exhibitions as explorations and open incubation relies on the participation of people moved by a true research question, or in need of new encounters to develop their own agenda. In the case of Science frugale, these were experimental physicists developing innovative, low cost-instruments, science teachers valuing creative DIY in their teaching, social entrepreneurs and NGOs promoting research in developing countries, militant makers, etc. The exhibition was indeed able to build a platform of exchange among them, but only for a limited time. All these wonderful people are engaged in projects that last many years or decades. Our exhibitions only lasted a few months. After Science frugale we, as a science centre, needed to move on to another subject. Our partners however kept going. And so we are actually deceiving them, and our engagement appears superficial. We would love to continue working together, but this is not possible, unless we reduce the collaboration to an issue of promotion and visibility, which is unacceptable for us.'* In that sense, Science Frugale appears as an effervescent and ephemeral ecosystem where people connect around different facets of a topic, creating future possibilities that can be incubated at different rhythms according to the maturity of the cooperation.

Specification on political influence

We can mention three good practices about the political context favorable to the success of the exhibition Science Frugale.

1) *Situate and sustain the cultural intersections*. The ESPGG can be considered as a political place itself as it concretises the common ambition of several universities of Paris to promote the scientific culture in more creative and open spaces. Without the place itself, such work won't have been done and disseminated. It is important to maintain them. Early 2020, an online petition has circulated to maintain the activities of ESPGG who were threatened by important restrictions of budgets.

2) *Open Source Platform.* A second interesting fact is the policy of the university PSL who is dedicated to new means to make science and culture accessible to their students and beyond. By systematizing the integration of their activities in a common depository for open source contents - (explore-psl.eu), PSL has ensured the creation of a second virtual life to the exhibition. The creation of the 'after' can be anticipated and fed all along the process.

3) *Access to regional funds.* The exhibition encountered difficulties from the beginning to access adequate funding. It resulted in some delays in the first steps. The support of the region Ile de France was key in this process, as they provided complementary funds to permit to go on with the exhibition and enlarge the perimeter of the exhibition asking the team to deliver a report about living labs and co-creation practices.

4) *Legitimate thanks to a Scientific Committee.* The development of a Scientific Committee was important to give legitimacy to the exhibition, creating adhesion from the political sphere and engaging some external partners in a more formal way. One of the interviewee comments on the necessity to revisit the role and functions of the committee in such processes, as it has to go beyond simple political adhesion, creating more interactions - from consultation to more empowered form of participations.

Follow-up of the 'co-creation process'

More than one solution developed by a co-creation group, the exhibition itself has integrated a serie of co-produced solutions: can be identified physical creations such as the microscope, printer, DVD player or virtual outputs as the open documentation, the visuals (Science Frugale font and diversified illustrations…) or the online contents (websites, press releases, scientific publications).

The process of the exhibition itself can be seen as a space for the emergence of ideas and the front-end incubation of projects. In some way the exhibition has allowed new connexions between different stakeholders - researchers, social entrepreneurs, publics and has built an interactive photo of what are the 'Sciences Frugales'. In some cases as the CiTicks project, it permitted to support the connexion between researchers from various fields. the diffusion of some researches to a wider public and the increase of the number of participants in citizen science projects. It also permitted new forms of empowerment: Local

scientists and engineering students as the association PSL-Lab Langevinium have benefited from a new playground in their ecosystem allowing them to experiment differently, connect with other type of publics and learn on their own capacity to transfer and exploit their knowledge.

The stakeholders agreed on having an online version of the exhibition so people can remind or discover the content of what happened. As mentioned above, we count two websites, still active, to get feedback on the exhibition: the virtual exhibition present on the PSL website (https://explore.psl.eu/fr/decouvrir/expositions-virtuelles/science-frugale) where you can find a synthesis of all the content of the exhibition, and the blog (https://www.science-frugale.fr/). Both contents is only accessible in French.

The exhibition has received the 'ECSITE - Mariano Gago International Award', category Smart And Simple. In the Ecsite website, it is mentioned that *'The Smart and Simple Award celebrates simple, innovative and creative solutions in science engagement. It recognises the power of smart ideas that prompt a "I wish I had thought of that one!" reaction from other professionals – this is why nominations for this category were put forward by peers.'*

An important set of opportunities has emerged from this award and all the dissemination activities raised by the Traces team in various networks such as the Science Engagement communities. Several invitations as keynote speakers in large conferences (France, Portugal, Poland, Colombia,…), several interventions in science centres conferences (Barcelona, Geneva,…), an article on the Spokes magazine, a training course conceived and delivered twice in France and a methodology applied to a new exhibition 'la science du choix', the SISCODE project… In the perceptions of Matteo, *"there were several thousands influential people that were made aware of our approach to cross exhibition production and participatory approaches, that in turn could influence the field. Difficult to measure, but I can provide many soft signal of its influence…"*

As a synthesis, the follow-up of the projects enhance the exhibition as a serie of co-produced solutions, open access knowledge, as an innovative output.

Scaling

Previous comments on dissemination strategies illustrated how Science Frugal project *scaled out*. Besides, it can be mentioned that the exhibition has been replicated in an ephemeral way in one other context few months after the desinauguration.

Moreover, the exhibition has permitted to scale up thanks to a change of internal practices and new local opportunities: It permitted to adopt new skills and forms of participative approaches in the local team. One team member, the facilitator Maxime, has sustained his job and diversify their practices, proposing new services for the ESPGG/ TRACES. With The 'Science Frugale' approach, meaning using the values of recycling, low cost and sharing, and some methodologies built for the exhibition, he was facilitating the project 'Les ateliers de Sciences Frugales'. Seen as 'childs of the exhibition' and founded by the city of Paris, the project "Les Ateliers Science Frugale" proposes to push exploration by exporting the workshops to some districts of Paris, and continuing to rummage on the side of re-employment, in contact with ressourceries, youth structure and other fablabs that dot the city. Thus it influences the internal policy and practices as well as extend the value of the exhibition to the district of Paris, with a strong partnership with the city council.

Systemic change

From now on, the exhibition can be perceived as an experience who allowed the local ecosystem to create systemic changes, *scaling deep* in the sense of mixing participative design approaches in the museology context. Both in term of content (Science Frugale) and processes (participatory approaches…), the team of Traces is pushing for radical changes and support at both internal, local and international level the appropriation of new values, techniques and tools. Their participation in the Siscode project, in the Ecsite network and other networks is a proof of their engagement. Looking at a wider context, both topics (Science Frugale as well as co-creation + participatory approaches) have also gained in acceptance and dissemination, as it is now a keyword, integrated in some SWAFS-EU programmes. The exhibition is part of the global changes to create new form of researches and closer proximities with the general public and all the ecosystem of stakeholders, adopting creativity, pragmatism and the value of RRI.
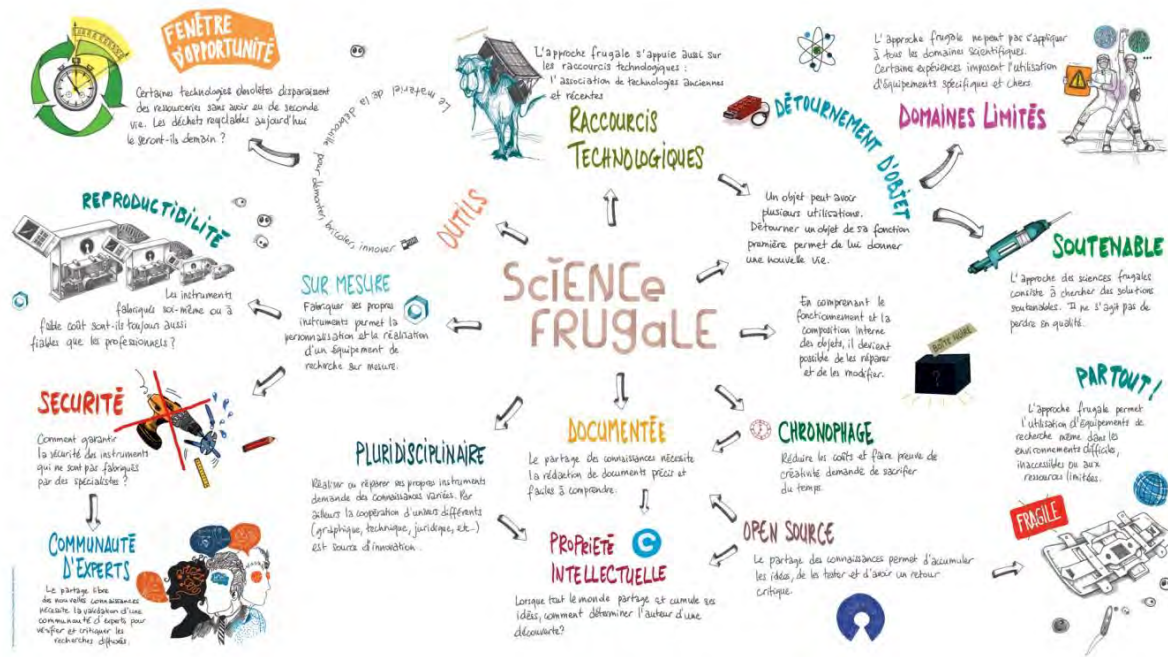
Visualisation

Which learnings emerged?

The learnings from the case are well synthesised in the article published in an Ecsites Spokes[6]. There is a clear disruptive thinking in the attitudes of the overall teams.

Here are some extracts:

'*Science centres that become research facilities, through which to explore those aspects of scientific research that can benefit from perturbations and contaminations from other aspects of culture, in order to produce more inclusive, shared research and, first of all, more research.*'

'*Exhibition as explorations', 'open incubation', 'co-construction' or 'exhibition narrators' are the keywords we now use to frame our approach to science exhibition.*'

'*Everything that can be done in public should be done in public.*'

'*We want to value and take advantage of the full range of competencies of our audiences, from the children who never saw the inside of a computer, to the skilled experimental physicists, the FabLab geek or the professional artist. There is an interesting continuum there, that should never be broken down by barriers artificially defined in terms of visitor "levels", clearly separating who is the expert and who is the public.*'

'*Partnership is the most fundamental and the most fragile component of the approach.*'

'*Combining diversities of objectives to build synergies is relatively simple, while combining diversities of schedules is a real puzzle.*'

'*If on one hand the open incubation makes good use of time resources by mutualising the time of conception and the time of actual offer to the public, on the other hand it multiplies the time needed during the exhibition's life and has an impact on the organisation of the institution*'

'*In further work, we need to make clear decisions about community engagement and documentation protocols.*'

'*It appeared that the temporary cultural space of exhibition played the role of exploration and networking. In the discussions with Matteo, it appeared that the temporary cultural space of exhibition played the role of exploration and networking. The output of exhibition can be considered as new sources of knowledge, useful for researchers.contributed to the success of what is now a full-scale citizen science research project.*'

One important dimension who is coming often when discussing with the team members is their capacity to explore the unknown with passion and creativity, without fears of losing

the thread of the exhibition, accepting to "show and reacting to failures. Hearing from the facilitators and illustrators, we felt that they enjoyed the experience and diversify their knowledge.

References

<u>Articles about the exhibition</u>

https://explore.psl.eu/fr/decouvrir/expositions-virtuelles/science-frugale

https://www.science-frugale.fr/

https://www.ecsite.eu/activities-and-services/news-and-publications/digital-spokes/issue-38-0#section=section-indepth&href=/feature/depth/science-centres-research-facilities-exhibitions-explorations

<u>Interviews with 3 members of the project</u>

Matteo Merzagora (in ESPGG – More than 3 hours of discussions)

Maxime Leroy (online – 1h30 of interview)

Colette Pitois (online – 1h of interview)

Note: the audio did not work so we just have note from the interviews.

https://www.ac-paris.fr/portail/jcms/p1_487347/culture-scientifique

http://www.ecosd.fr/en/

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[1] http://www.larecyclerie.com/
[2] https://lesgrandsvoisins.org/
[3] http://fabcity.paris/en
[4] https://www.ouishare.net/?locale=en_us
[5] http://www.lapetiterockette.org/
[6] https://www.ecsite.eu/activities-and-services/news-and-publications/digital-spokes/issue-38-0#section=section-indepth&href=/feature/depth/science-centres-research-facilities-exhibitions-explorations

Smart Citizen (Making Sense) | EU

Marion Real (Fab Lab Bcn)

Summary

"Smart Citizen" is an open source sensor kit and visualisation platform that allows citizens to gather and share urban environmental data, such as humidity, temperature, air quality, and noise.

The biography retraces the journey of SMART CITIZEN from it is emergence in 2012 in Barcelona until its recent international deployment in 2019, explaining the diverse steps that permit to reach a better appropriation of this civic technological platform combining open source technological development and community engagement methodologies, paying through different forms of funding systems such as crowdfunding, EU projects and more recently the development of customised production and consulting services. It gives a focus on the EU Making Sense project where the action-research with three city partners have permitted to gain practical knowledge on how to facilitate citizen sensing approaches. All along the years, Smart Citizen was co-created with the engagement of a strong diversity of stakeholders, leaded by interactions between makers, citizens, developers, facilitators, academic and policy makers.

Initially, Smart Citizen was developed as a research project and made available by crowdfunding. The project was launched in 2012, instigated by Tomas Diez, director at the Fab Lab Barcelona, at the Institute for Advanced Architecture of Catalonia (IAAC), and Alex Posada from Hangar Art Production Centre in Barcelona. The first version was funded via Goteo crowdfunding, and raised almost 14,000 euro from 159 backers in 2012 and led to the production of 200 units. One year later, a second campaign, via Kickstarter, raised 68,000 U.S dollars from 517 backers and helped fund a further development of 520 Smart Citizen devices [Diez & Posada, 2013]. After an ethnographical survey of the first adopters, it was highlighted a number of issues hindering their sustained participation in the project such as technological set-up, data reliability, social interactions and sense of purpose. To face these limits, the selling of the kits were stopped while a series of research projects were developed to reinforce the maturity of SMART CITIZEN devices and approaches. Thus, the EU projects iCity, Organicity, Making Sense, iScape and Grow permitted to enhance the investigation networks, solve technological issues and open new practices for empowering users and local communities. In May 2019, a new version of the Smart Citizen kit has been

opened to selling and the growing communities are now supported by a series of tools and customised services for implanting and sustaining the use of Smart Citizen kits and citizen sensing toolkits in accordance with the local context.

Context of the 'co-creation process'

This co-creation process explored the societal challenge of SMART CITIES + CITIZEN EMPOWERMENT, within the philosophy of Global design for Local cycle of production/consumption. The process was highly influenced by the first two communities of users respectively present in Barcelona and Amsterdam. Then it was extended to other European pilots thanks to EU projects. In the Making Sense project, Barcelona's pilots consisted in specific co-creation processes engaging local population, using a new version of Smart Citizen Kits as a technology customisable and useful to face specific local challenges. The platform is now counting on 2,600 Smart Citizen kits distributed in all the continents and adaptable tools to support individual monitoring as well as societal innovation and community engagement process.

The challenge: smart city x urban sensing x environment x local empowerment

Smart Citizen is born to open the doors of a new vision, more convivial and human-centred of the concept of Smart City. This vision is well described in [Balestrini,2017]: *'Smart City is a concept that emerged over a decade ago as a solution to the problems of urbanisation coupled with the promise of environmentally sustainable and economic growth [Caragliu et al., 2011]. Usually, descriptions of the smart city often focus on how technology can help to solve environmental challenges, increase efficiency, and enhance economic growth. Commentators and researchers have critiqued this technology and corporation driven approach, with a particular focus on the lack of emphasis on the role of citizens [Thomas et al., 2016]. It has been argued that new forms of citizen engagement are needed, because traditional methods for governing the complex interplay of technology, politics and city management are not sufficient [Lombardi et al., 2011; Nam & Pardo, 2011; Chourabi et al., 2012; Albino et al. 2015]. Some have argued in favour of a more participatory approach that promotes sustainable citizen-led initiatives and where the public ownership of urban and civic technologies is a viable alternative over corporate-owned solutions [Greenfield, 2013; Townsend, 2013; Saunders et al., 2015].'*

Smart Citizen emerged in the Fab Lab Bcn as a bottom-up push-up that wanted to demonstrate by doing and intervening for create ruptures and changes in the way citizens are engaged in innovations. The two major challenges of Smart Citizen are about measuring local environment and community empowerment. Balestrini, (2017) rephrased it well with the following text:

- *'Smart Citizen was designed to help communities' measure aspects of their local environment and use the data collected, and, to raise a concern for their local council. It asks what are the factors associated with meaningful engagement, sustainability and impact of a novel technology intervention? What do citizens actually do with it? How might it empower a community and what impacts can they achieve?*

- *Except from the device/platform development, the main challenges are how to enable and moreover scale participation [Stevens & D'Hondt, 2010], how to support the development of technological and data literacy among participants [DiSalvo et al., 2009], and how to enable data sense making [Bales et al., 2012] to increase the likeliness that data contributions will be harnessed and utilised by communities.'*

Starting point of the 'co-creation process'

As described below, the Smart Citizen case can be approached by different angles, composed by a series of co-creation processes in itself. In this document, we choose to define the starting point once identified the crucial necessity to pay a specific attention to the user's perspective to go further in the adoption of civic technology like the Smart Citizen sensors and platforms. The question is: *Which approaches, tools and methods can be developed so citizen sensing can be appropriated to local challenges and communities?*

The problem identification started with participative observations from the core developer teams as well as an ethnographic study realised by Mara Balestrini that analysed the first two communities of users respectively present in Barcelona and Amsterdam between 2012 and 2014. She used interviews, forms and direct quantitative data from the first users – Here the main insights for each city's players extracted from Balestrini, (2017).

Barcelona

The first version was funded via Goteo crowdfunding, and raised almost 14,000 euro from 159 backers in 2012 (117 males, 28 females and 14 anonymous or organisations) and led to the production of 200 units. Once launched and distributed to its first users, the prototypes had minimal user testing and although advertised as 'plug & play' it was considered to be at level six in the Technology Readiness Level Index. Thus, the user feedback analysis showed that providing the technology, even when affordable and open source and coming from crowdfunding was not enough to foster the emergence of self-organising and sustainable sensing communities opening spaces for discussing what kind of ownership, social interactions, skills and training, and participatory orchestration are needed to facilitate the appropriation of such a social innovation.

Amsterdam

The Amsterdam deployment ran from March 2014 to June 2014. It was organised, paid for and championed by Waag Society (a cultural institution) in collaboration with Amsterdam Smart City, Amsterdam Economic Board and Smart Citizen. The aim of the deployment was to recruit 100 citizens to explore how they might collect environmental data using affordable sensors, with a particular focus on air quality. The study around the Amsterdam community indicated that an orchestrated deployment led by local champions was able to foster much community participation. By engaging a group of users with diverse interests and skill sets; where over half were concerned about a specific problem (air quality), adapting the technology and providing skills, and facilitating social interactions and peer to peer assistance, the Amsterdam community overcame a number of challenges associated with the technology and the lack of experience with sensing. The first study shows the importance of the orchestrated championing in facilitating community engagement, helping individuals to form bonds and overcome challenges associated to the lack of technical skills and data reliability.

From these first feedbacks and in collaboration with other projects such as The Dampbusters in Bristol, Mara Balestrini developed a framework 'City Commons for participatory sensing'. The framework aims to play an integrating role; outlining the processes and mechanisms for ensuring sensing technologies are co-designed by citizens to address their concerns. The framework aims to be generally applicable to civic technology

interventions, following on from the Smart Citizen study the focus is on how citizen sensing can be appropriated at the grassroots level and for the common good.

Then, in parallel with Mara's researches and Waag good practice, The Fab Lab Bcn and Waag society gathered a network of partners, look for opportunities and develop EU proposals for improving technological parts and testing participatory sensing approaches. Few times later, the project Making Sense was accepted - Making Sense is a project funded by the European Commission within the H2020 Call ICT2015 Research and Innovation, specifically under the CAPS 'Collective Awareness Platforms for Sustainability and Social Innovation' programme (grant number 688620). The project ran between 2015 and 2018, and combined the efforts of Waag Society in Amsterdam, University of Dundee in Scotland, Fab Lab Barcelona at the Institute for Advanced Architecture in Catalonia, the Joint Research Centre of the European Commission in Brussels, Peer Educators Network in Kosovo, and University of Twente in Enschede. Based on nine pilots in three cities (Amsterdam, Barcelona and Prishtina), Making Sense have permitted to support the development of a new version of the Smart Citizen Kits as well as a toolkit for participatory sensing aimed at deepening our understanding of the processes which might enable collective awareness. The pilots led to the development of a conceptual and methodological framework for participatory environmental maker practices based on co-creation activities that has been co-constructed from an action research with the pilots. Making Sense has been a really important opportunity to validate the Smart Citizen Kit 1.5 with real users during the Barcelona Pilots prior to move to the final industrialization and commercial exploitation of the platform.

Here is a synthesis of the main funding sources:

- Barcelona 2012/ 2014: Crowdfunding

- Amsterdam 2014: Support from Waag society and city policy makers

- Mara Balestrini PhD: Intel and UCL

- H2020 Making Sense 2015 -2018: EU-funding CAPS program.

Further development of the 'co-creation process'

In this part, we will describe the Making Sense project as a set of co-creation processes that support the development of innovative citizen sensing approaches and open new practices that fed the development of Smart Citizen sensors and platforms. The Making Sense project's goal was to move towards more co-created and collaborative interventions in participatory sensing, in which citizens were considered at the core of the whole process. Here, we propose to focus on the Barcelona's pilot that involved real users in the design, development and testing of the new version of the SCK while gaining knowledge on how open source technologies like this can be appropriated by the communities. The local challenge explored by the communities was noise pollution recognized as key problems in the city of Barcelona, present and future.

Phases of co-creation

The Making Sense approach consisted of campaigns that first engage citizens and other stakeholders such as scientists, policy makers and other representatives related to environmental decision making and action. The Making Sense Framework is based on four values – empowerment, co-creation, openness and change-making - and follows several steps: scoping, community building, planning, sensing, awareness, action, reflect, legacy.

Making Sense Barcelona's co-creation process applied this framework in different loops adapting it to their context and inspiration. In this document, we are divided it in three steps: (1) setting up and community building, (2) a Beta Pilot for training the Community Champions, (3) Co-creation with the residents and visitors of Plaça Del Sol. The whole process has been captured visually through Tumblr story reachable here: https://makingsenseeu.tumblr.com/tagged/makingsenseeu/chrono

Setting up the pilot and analysing the problem (February – October 2016)

Three methods were used to analyse the problem according to [Balestrini, 2017]:

- 'Desk-based research (February - March 2016): A review of official reports, local newspapers, magazines and blogs, published in the last three years, with the objective to find articles referring to local environmental issues was conducted to inform the Making Sense team on the complexity of the environmental challenges. Insights gained demonstrated that environmental issues in Barcelona are discussed,

primarily, in terms of noise pollution, humidity and damp, air quality, and preservation of green spaces (e.g. urban parks).

- Community mapping (April - June 2016): This approach aimed at identifying the existing grassroots organisations, ranging from neighbourhood associations to citizen movements, NGOs and cooperatives, amongst others, and mapped them on the territory in order to better understand how they connect to each other and to the local issues. Resulting in a database of 274 community groups which were categorised by primary activity according to the emergent themes: environmental, social, infrastructure and services, cultural, educational, economical, health, and politics.

- Rapid ethnography (June 2016): To identify which of the environmental concerns are most urgent to citizens in Barcelona, rapid ethnography was employed to examine areas of the city that have been repeatedly associated to environmental issues. Key indicators included hanging posters and flags from resident's windows which expressed matters of concern, specifically opinions against mass tourism and noise levels, both apparently tightly related.'

A Beta Phase to train the community champions and define the intervention

This phase last from November 2016 to February 2017 with weekly activities proposed to the group to explore, ideate and prototype idea about noise pollution in Bcn. Community Champions were first invited to discover what is Citizen Sensing, they co-selected the topic they will explore, they received, learnt about and tested the new Smart Citizen Kits specifying how sound could be measured. Specific workshops have been realised to raise awareness. Then, the ideation phase consisted in elaborating the futures actions of the Making Sense Project in Bcn with the use of Future Newspapers. Among the idea proposed, the group retained: '*An intervention by which neighbours use sensors to measure noise levels in the Plaza del Sol. The sensors are connected to light displays that represent the data on the sound captured through shapes and colours.*' ([see tumblr page](#)) Then, they refined the concept and started learning to prototype a 'Noise Box' with the technologies present in the lab, cutting the plywood, drawing the electronic circuits, programming the Arduino board, making giant chalk. They deployed and tested all the installation through a Parliament section in the Superilla of Poblenou. This permitted to define things to considerate, set up and voted for a final configuration and decided on role distribution for the future steps. This phase closed with a convivial moment where community champions

were graduated, revisited all of the activities developed during the three months, evaluating their level of satisfaction and suggesting ways to improve them.

This phase brought together 25 community champions who were engaged in a high number of events including two onboarding workshops, one data ownership workshop, one data visualisation workshop, one action workshop (to design the public action in Plaza del Sol), several planning, designing and test sessions for the Noise box, and one reflection workshop to share their views. To be noted is also the organisation of one launch event with around 85 participants.

<u>An intervention at Plaza del Sol</u>

The pilot focused on addressing the issue by demonstrating that noise level in the area were above those recommended by the World Health Organization (WHO) and were incompatible with the local legislation. On March 2017, the intervention at Plaça Del Sol started with an event aimed to celebrate citizen sensing, present the work done before and build a community of citizens who want to integrate the pilot. Real-time installations, presentation about citizen participation, open source technology, geographical mapping of noise pollution hot spots in the neighbourhood and a contribution chart for mapping the efforts, skills and time that citizens are willing to contribute to the pilot. The deployment of the Noise box attracted hundreds of people who were curious to find out more and experience the installation. Many provided data and comments have been captured to inform the pilot and signed up to be involved. It was followed by another event in Fab Lab Bcn were the project was exposed and tools was reused to raise awareness and new interests. Through the use of a timeline activities that identify which noises we hear and make, different contexts to measure have been voted by participants: what is the difference of noise between weekdays and weekends, ground floor and upper floor, square and traffic streets. Then, Smart Citizen kits and booklets have been distributed to residents and sessions have set up with the community champions to learn how to install, connect the sensor on the SmartCitizen.me platform. A big picture of the noise of the Plaza has been set up and awareness has been built through collective sessions with various graphs representation of the noise levels. After that, residents reflected collectively on how to share finding, with who and for what. To ideate about the future, they first travelled in the past rediscovering the history of the place and then envisioned new concepts for the place. Participants came up with two main objectives for a final action: generate empathy and change the use of public space. The proposal suggested promoting a different use of the

square, prioritising inclusiveness, attention and silence. An event to claim the public space was imagined and developed by the residents to illustrate the problem of acoustic pollution in the square along with qualitative data on the experience and perception of the neighbours, design new experiences and reach policy makers. Designed as a co-creation assembly, the event contained interactive devices, wooden totem of experiences and five thematic tables facilitated by experts. The event was a success hosting hundreds of visitors in Plaza del Sol. It galvanised people into sharing concerns, ideas and aspirations a final event was then organised to close the pilot, gather feedback and define strategies for sustaining the initiatives.

To synthesise, this phase built on the impact of the previous work and engaged around 14 community champions through continued workshops over time, also reaching out to 35 to 40 participants in its first workshop, 11 local residents for another workshop, and around 1,000 citizens in three workshops organised at Plaza del Sol.

Landscape of stakeholders

Making Sense Project partners

The management of the project Making Sense was coordinated by the WAAG society and in collaboration with the Joint Research Centre, the Fab Lab Network, IaaC, the Peers Educators Network and the University of Dundee. It is a project in six work packages. WP2 and WP3 are run by IAAC and WAAG, that respectively instrument the citizen sensing approach with open tooling and support the pilots in the three territories. (Amsterdam, Barcelona, Prishtina).

Over the project, each pilot identified relevant stakeholders which varied across the stages of the pilots processes, and they were divided between community of practice (driven by the interest in maker practices) and community of interest (driven by the environmental issue). For all of the pilot campaigns, the communities of practice and interest were the largest groups of stakeholders. In the context of participatory sensing, the Making Sense project considered communities of interest as groups of people who jointly perceive an environmental challenge in their local environments.

Barcelona's community

The internal team of Fab Lab Bcn was composed by heterogeneous profiles i.e. designer, facilitator, core SC researchers and developers, creative director. They were in charge of

designing, planning and organising the overall process as well as creating interventions during the collective events. This core team was regularly supported by other experts that contributed to the project. (Academics, geeks, communication + art people, policy makers)

Following the three mini pilots, three types of stakeholders has been identified: the community champions and the residents/ users of the Plaça Del Sol.

The Community Champions were a combination of communities of interest and practice gathering around 30 people: A community of interest: they were composed by those with high interest and variable technology skills. In this case, those would be the citizens who were attracted to the campaign by the issue of noise pollution, but also had a desire to use and form a better understanding of sensing technology. A community of practice: there were variable interest and high technology skills. Within this community there were those with a background in sound engineering, coding, and technology enabled visualisation. These individuals sought to employ towards ideating solutions for the noise pollution issue in the city, however they had not been involved in similar projects before. The community champions first participated in a set of events occurring as a 'training for the trainees' before applying their learning to participate and support the two others pilots. The community champions had a strong engagement in the overall process.

The Plaça Del Sol pilot involved both the habitants of the place. It was a heterogeneous group of people. Two categories were identified: the residents and the regular passengers of the place, workers, consumers or visitors. Men and women were present with a diversity of ages – majority between 30 to 45 years old. Specific activities have also involved children's who gave creative ideas to revisit the place.

Specification on methods, tools and communication

As described below, the case involved a strong diversity of good practices concerning tools, methods and communication.

In term of methods and co-creation frameworks, participants have been familiarised with various approaches beyond the Making Sense Framework proposed in the toolkit. Indeed, knowledge first collected are listing for instance the *making/ telling/ enacting* model of Liz Sander as well as examples of the Participatory Prototyping Cycle (PPC) in action or the model of City Commons for participatory sensing experienced in Bristol by Mara Balestrini.

Combining the knowledge of the Making Sense partners, a set of tools were presented in the toolkit that guide readers on how to use it. Here, an overview directly picked out from the book:

- *Geographical mapping* is a visual tool, mapping out issues of concern in collaborative workshops where to discover things that might otherwise have missed.

- *Common Mapping* is a large wall canvas which openly allows people to log contributions that they are willing to make to the campaign, such as resources (e.g. sensors, meeting space, funds), time, or even specific skills. Facilitators can fill out the fields in the chart according to the specific needs of the campaign. Participants' contributions can be mapped using sticky notes on the big target where they will also find an instructions sheet and a call for participants to provide their name and contact details.

- *Collaborative pilot schedule* consists in opening up the planning process, so to design a campaign that takes into account the needs and aspirations of the community, as well as the availability of individual members.

- Onboarding kit is a set of informative resources to welcomes and guides new participant into the project and the team. It is composed of both informative resources as well as community-building tools.

- *An empathy timeline* facilitates community building by bringing people together to discuss issues and consider them in a way that they perhaps have not often done before.

- *Community level Indicators* are measures that refer to population groups rather than individuals, to collect complementary information to sensor data and better understand the sources and causes of environmental issues.

- *Sensing Strategy canvas* helps communities co-create plans for deploying their sensors and capturing data.

- *Sensing guides, data journals, operation manuals and open Hardware* support to understand, use and follow up with the sensors and make sense of the data collected.

- The use of *awareness and data discussion sheets* as well as *data dashboards* could ensure data is not only shared, but also understood within the community (and potentially, within intermediary organisations or local government).

- Building a digital presence, using prospective tools like future newspapers scenario can enhance new opportunities for inclusion or futures collaborations.

Barcelona pilot successfully managed to establish different channels of communication with participants through a number of different workshops but also through social media, thus allowing the community champions to build closer relationships between each other. In addition, setting up a private Facebook group page proved to have a positive impact for participants to report their technical difficulties quickly to the Making Sense team who then managed to give them back useful feedback. Moreover they built a Tumblr page to improve the transparency of the project all along the pilots that permit external people to follow and join the process.

Specification on cooperation and conflict

One of the successes of this case is its capacity to identify, involve and maintain the engagement of stakeholders in a quite pretty long period of time (See table below and annex 1).
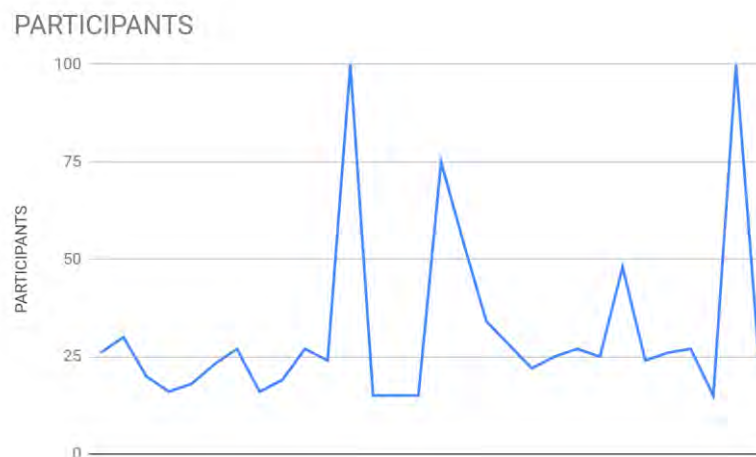
- The idea of using community champions was a success as it allowed improving the local capability for making, organising and empowering people. 14 amongst 25 community champions have followed the two stages.

- The density and variety of activities in the major events – beginning and end of pilots – have awaken the curiosity of the wide public as well as specific groups of interests.

- Cooperation was enhanced by the curiosity of participants in controlling their data acting collectively as researchers. One important aspect was to create a convivial environment for people to learn, asking questions feeling cooperation rather than competition.

- At the mid of the pilots, some difficulties have been felt to raise the confidence and effective motivations of Champions to lead the pilot in Plaça del Sol. Complementary coaching was needed so to empower them to follow on with the activities.

Specification on political influence

The City of Barcelona is leader in the area of Smart City and is supporting new visions and technologies to give core at the scenario. Fab Lab Bcn was identified as a key player. The projects directly pinpoint a change of policy about noise pollution at the local level. Within the project, political stakeholders were informed and participated occasionally in the events. The project aimed at creating evidence, and opened up opportunities to establish a dialogue with the City Council. In addition to launch an awareness campaign against noise pollution at night, the city council has initiated refurbishment works – such as the installation of large flower planters – to deter revellers from congregating in some area of the square. A close dialog is established between the council and local residents.

Follow-up of the 'co-creation process'

The co-creation process has impacted at different levels; locally about the topic of noise pollution but also at the technological level of Smart Citizen development as well as co-creation practices of citizen sensing. Here the short-term impact of the process:

(1) *Noise Pollution x Plaça Del Sol*. The community came together to address an important social and environmental issue by harnessing active participation, technology and open data. This means that a community was able to capture data, make sense of the information gathered and co-create solutions to make a positive change to their living conditions. Since the end of the pilot, the neighbourhood community have been galvanised by the issue. They continue to meet at their hub every month to continue their activity against noise pollution – working closely with the city council to fight the issue.

(2) Smart Citizen Use's feedback: According to D3.2: '*Making Sense has been a really important opportunity to validate the Smart Citizen Kit 1.5 with real users during the Barcelona Pilots prior to move to the final industrialization and commercial exploitation of the platform. Moreover it also allowed the team to explore how open source technologies like this can be appropriated by the communities as on the building of the Noise Box installation during the Barcelona Community Champions Pilot. The current results of this work have fed further work to impulse the commercial launching of the Smart Citizen Kit and on future research projects where the resources documented will be used. We aim that that modularity, standards and open source contribute to create a robust ecosystem where companies and communities can work together co-creating new strategies for sensing and citizen participation*'.

(3) Spreading the *good practice about co-creation and the Smart Citizen Revolution*: At the end of the Making Sense project, the Citizen Sensing Toolkit was re-elaborated as a collective output and effective guidebook useful for any co-creation or citizen sensing approach. Here the description of the adjusted process, better described in the CASE-STUDY.

Additionally, a movie was realised to present the results and highlight the important of the local context analysis in participatory sensing.

Scaling

The Smart Citizen platform has been designed to endeavour the distribution of the Smart Citizen Kits worldwide so to enlarge local environmental awareness and build global visualisation and communities. Following the Making Sense project, new local challenges have been identified, new types of sensors have been integrated thanks to other EU projects such Organicity - ISCAPE and GROW, that spread the world and gain adhesion, credibility and legitimacy.

- Organicity is a project that developed services for experimentation, which explores how citizens, businesses and city authorities can work together to create digital solutions to urban challenges. It permits to use the Smart Citizen as a medium to connect citizen and policy makers as well as sharing co-creation practices.

- The iSCAPE is a project aims to integrate and advance the control of air quality and carbon emissions in European cities in the context of climate change Fab Lab Barcelona is providing his expertise on open and low-cost sensors by developing a new generation of Smart Citizen Kits that will be tested by communities across Europe to learn about air quality. We are also coordinating the deployment of passive pollution control systems on seven European cities that will be monitored using this technology.

- The Grow Observatory is a European-wide project engaging thousands of growers, scientists and others passionate about the land. We will discover together, using simple tools to better manage soil and grow food, while contributing to vital scientific environmental monitoring.

Specific communities have been built according to environmental issues (air, noise, land...) and geographical situations, while a distributed platform is fed by regular improvement of technical tools.

Systemic change

The SMART CITIZEN project has already raised interests at different systemic levels – from local to international as mentioned before.

For a larger diffusion/transformation of society, a new strategy has been set up in the Fab Lab to commercialise the activity of participative sensing since 2019.

The Smart Citizen Kit 2.1 has been opened to selling online again. The kits can be ordered individually or by organisation leading new environmental sensing. The Fab Team is customising the design of the kits according to each client. Then, the electronic part of the sensors is being produced with open Hardware expert in China, the Seed Studio. The other parts and the assembly are made locally in Barcelona. Between May 2019 and December 2020, more than 800 kits have been sold.

Another service provided by the Fab Lab is about community education with online and offline workshops for 'training the trainees' and support the local development of Smart Citizens. A diversification of approaches as a follow-up of Making Sense is now being designed to keep on gaining knowledge, designing original interventions to inform citizens and accelerate the adhesion toward Smart Citizen revolution.

An important application has been enhanced through the project – Smart Citizen is not designed only for local community but can create new possibilities for researchers to develop methods fed by the crowd- The area of Citizen Science is growing, supported within the RRI tools.

The Smart Citizen project also initiated the fight for citizen to give their autonomy back starting with questioning their data. In Barcelona, other initiatives have emerged in parallel for improving the openness of public data, improve the participation of citizen in public policy design and create platform for opening innovation. Open Data Bcn, DECIDIM, I.Lab as well as the recent DECODE project invite to reflect on data sovereignty in cities.

Smart Citizen is part of a systemic vision of fab, sharing and smart cities that is gaining more and more spaces for building more inclusive, distributed and sustainable territories.

Visualisation
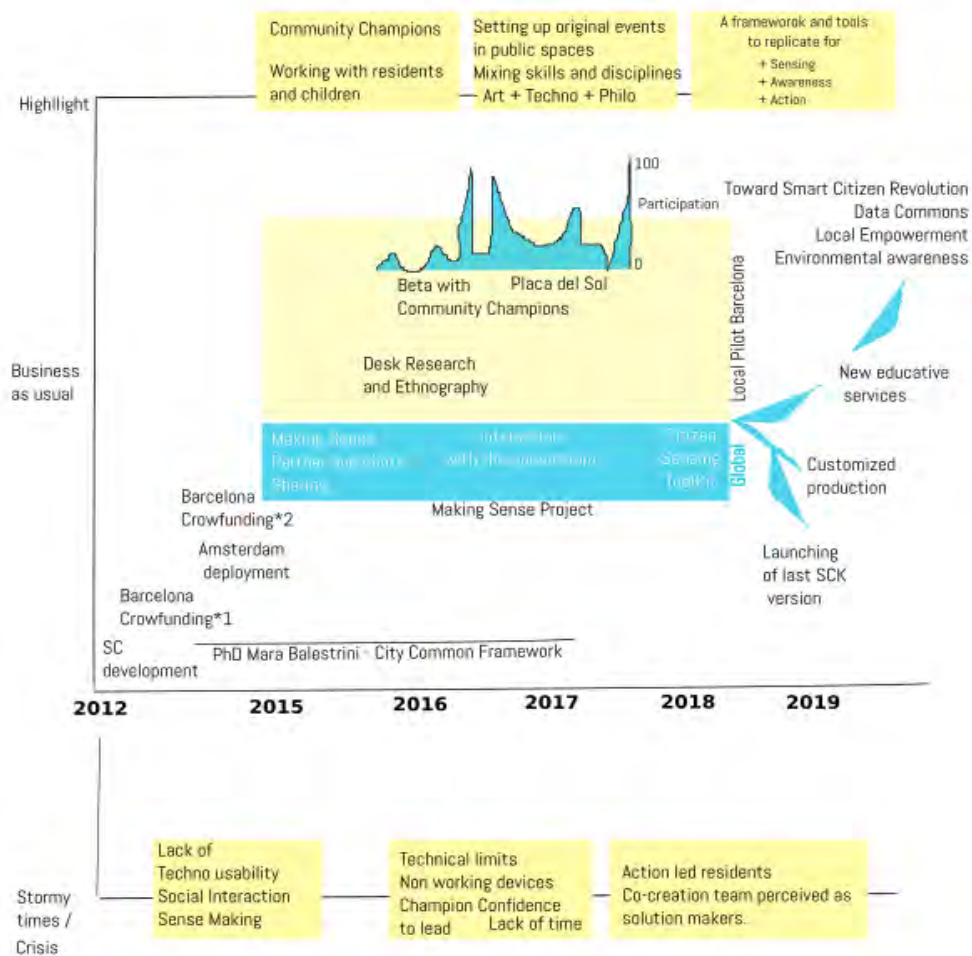
This case is an impressive source of knowledge for people who want to learn about co-creation. The philosophy of open source, data commons and citizen activism is revealed in each behaviours, writing and actions. The documentations through Tumblr, the citizen sensing toolkit, the movie helped to be immersed in the project. The major learning can be described through eight bullet points.

- Co-creation processes are multiform, applied different timing. It used to be described as short-term project with a set of workshops but it can also be applied in much more longer processes of social innovations such as Smart Citizens.

- Bottom-up initiatives can be leveraged and accelerated through co-creation and effective multi-scale project connexions.

- Starting with a challenge that come from the real need and have the potential to engage community. The choice and justification of the challenge faced locally need to make sense for the territory. The intense work done within each territory in the early stages of the pilot processes have legitimized the actions.

- Being humble and in coherence within the values of the project. The pilot leaders emphasised the importance to adopt a posture of cooperation with the community without promising the moon, being positive, empathic and realistic, and based on shared values, in this case openness, empowerment, co-creation and change-making.

- Being agile, designing and sharing tools during the pilots. One specific feedback from the pilot of Barcelona was that the co-creation activities were built during the pilot from the emerging need of the community. Indeed, the toolkit was transformed afterwards to gather the local 'innovative practices' in one book.

- Engage with Community champions. One success of the Making Sense project was to succeed in identifying, training and motivating 'community' champions to increase their level of engagement by being themselves ambassadors of the projects.

- Build upon existing communities. It is hard to start from scratch. Workings within existing communities in all territory have supported the development of the processes.

- De-complexify processes, information and sensing. One difficulty in technological projects is to make knowledge accessible and understandable for people participating in the process. In Making Sense, efforts were made to involve people all along the process whatever the level of difficulties of the activities. It also included making with transparency even when delays or problems were presents.

- The importance of documenting the process to sustain community. The last learning from Making Sense come from the design and dissemination of the toolkit remade after the ending of pilots and diffuse online. This allowed the replication of the process in other cities with a clear facility to use tools and tips present in the book.

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Interviews and interactions

Guillem Camprodon, Research Director of Fab Lab Bcn – (30mn interview)

Matias Verderau, Fab Lab Bcn production manager. (Occasional direct interactions)

Mara Balestrini – CEO of Idea for change, leading the Making Sense project facilitation locally. (Online exchanges)

Annex 1: Extract of all the detailed activities for the Making Sense - Barcelona pilots.

NAME	PILOT	PLACE	DATE	SPEAKERS	PARTICIPANTS
Launch	Beta pilot	Barcelona - Fab Lab	05/11/2016	Mara Balestrini, Gui Seiz, Guillem Camprodon	200
Noise timeline	Beta pilot	Barcelona - Fab Lab	16/11/2016	Mara Balestrini, Alexia Mellor, Saskia Coulson	26
Tech onboarding	Beta pilot	Barcelona - Fab Lab	23/11/2016	Guillem Camprodon	30
Data findings	Beta pilot	Barcelona - Fab Lab	30/11/2016	Mara Balestrini, Guillem Camprodon	20
Open Data Meetup	Beta pilot	Barcelona - CCCB Caf	07/12/2016	Mara Balestrini	16
Data visualization	Beta pilot	Barcelona - Fab Lab	14/12/2016	Gui Seiz	18
Action ideas	Beta pilot	Barcelona -	10/01/201	Mara Balestrini	23

		Kubik	7		
Action planning	Beta pilot	Barcelona - Kubik	17/01/2017	Mara Balestrini, Gui Seiz, Victor Barberán	27
Making	Beta pilot	Barcelona - Fab Lab	21/01/2017	Guillem Campodron, Gui Seiz, Victor Barberan, Matias Verderau, Alexia Mellor, Chiara dall'Olio	16
Action rehearsal	Beta pilot	Barcelona - Superilla	31/01/2017	Matias Verderau, Chiara Dall'Olio	19
Community Champions Graduation	Beta pilot	Barcelona - Kubik	14/02/2017	Mara Balestrini	27
Next pilot design	Beta pilot	Barcelona - Kubik	28/02/2017	Mara Balestrini, Matias Verderau, Chiara Dall'Olio	24
Final Action & Launch	Beta pilot	Barcelona - Kubik + Plaça del Sol	11/03/2017	Making Sense team	100
Awareness	Smart Kids pilot	Barcelona - Valldaura Green Fab Lab	23/01/2017	Mariana Quintero	15
Sensing	Smart Kids pilot	Barcelona - Fab Lab	24/01/2017	Alexia Mellor, Chiara dall'Olio	15
Action	Smart Kids pilot	Barcelona - Valldaura Green Fab Lab	25/01/2017	Matias Verderau	15

Launch	Plaça del Sol pilot	Barcelona - Kubik + Plaça del Sol	11/03/2017	Mara Balestrini, Gui Seiz, Guillem Camprodon	75
Noise timeline	Plaça del Sol pilot	Barcelona - Fab Lab	21/03/2017	Guillem Camprodon, Mara Balestrini, Chiara Dall'Olio	54
Strategy	Plaça del Sol pilot	Barcelona - Kubik	28/03/2017	Matias Verderau, Chiara Dall'Olio, Saskia Coulson	34
Tech onboarding	Plaça del Sol pilot	Barcelona - Kubik	11/04/2017	Guillem Campodron	28
Data Awareness Meetup	Plaça del Sol pilot	Barcelona - Kubik	18/04/2017	300.000 km/s	22
Data findings	Plaça del Sol pilot	Barcelona - Kubik	25/04/2016	Guillem Campodron	25
Data visualization	Plaça del Sol pilot	Barcelona - Kubik	02/05/2017	Domestic Data Streamers	27
History	Plaça del Sol pilot	Barcelona - Kubik	09/05/2017	Matias Verderau, Guillem Campodron	25
Smart Kids Action	Plaça del Sol pilot	Barcelona - Sant Josep Primary School	16/05/2017	Matias Verderau, Chiara Dall'Olio	48
Action ideas	Plaça del Sol pilot	Barcelona - Kubik	16/05/2017	Domestic Data Streamers	24
Action planning	Plaça del Sol pilot	Barcelona - Kubik	30/05/2017	Mara Balestrini, Gui Seiz, Matias Verderau,	26

				Chiara Dall'Olio	
Photo session	Plaça del Sol pilot	Barcelona - Photo Studio in Poblenou	08/06/2017	Gui Seiz	27
Making	Plaça del Sol pilot	Barcelona - Maker Faire	18/06/2017	Mara Balestrini, Matias Verderau, Chiara Dall'Olio	15
Final Action	Plaça del Sol pilot	Barcelona - Plaça del Sol	22/06/2017	Making Sense team	100
Conclusions	Plaça del Sol pilot	Barcelona - Kubik	11/07/2017	Mara Balestrini	25

Enhancing Sustainable Youth Citizneship: LoCY's Examples | Portugal

Olga Glumac (Sociedade Portuguesa de Inovação - SPI)

Summary

This biography describes a Portuguese example of micro socio-cultural transformation developed and elaborated through activities promoted by Lab of Collaborative Youth (LoCY). LoCY is a platform grounded on the youth-driven co-design research and practice with the stakeholders of the local communities.

From 2014 until 2019, four co-design programmes in three schools and two local contexts were implemented:

1) *Recreio dos Pioneiros* (2014 – 2016), in the Basic School of the Second and Third Cycle of Miragaia;

2) *Illustracionário, à minha maneira 1.0* (2015), in the Artistic and Vocational School Árvore and Basic School of the Second and Third Cycle of Miragaia;

3) *Ilustracionário, à minha maneira 2.0* (2017), in the Basic School of the Second and Third Cycle Maria Lamas; and

4) *Co-designers de Sala 52* (2018 – 2019), in the Artistic and Vocational School Árvore.

To address youth citizenship, LoCY used co-creation as an integral part of the educational co-design programmes that were developed as extracurricular and curricular initiatives for and with 91 youngsters-participants.

Context of the 'co-creation process'

There is a misconception of youngsters' capabilities to initiate, develop and conduct any type of intergenerational collaborative activity as self-initiative and through coaching. Youngsters are mostly used as an instrument for confirming pre-defined political and formal education agendas in the local context. To fill this gap, LoCY focused on sensitising the community towards youngsters' role in the co-construction of daily activities, such as the learning and participatory experiences of being and living in the city.

Since its inception in 2015, LoCY has been addressing the lack of knowledge and comprehension among youth policymakers, school community and youth associations about Porto's youngsters and the situated conditions for the youngsters' active citizenship. Hence, there has not been a coherent understanding of the necessary conditions to encourage autonomous youth participation, youngsters' self-empowerment and exercise of power on deciding about matters of concern to living, being and studying in the city.

According to LoCY's experiences in the situated contexts, most youngsters were not included in the process of decision-making or informed about the decisions made by the school community and local policy makers. For example, they haven't had an opportunity to receive or give feedback on aspects that influence the quality of daily school/classroom experiences, such as the learning materials/ contents, room setting and use of spaces, outdoor activities, organisation of informal moments/ the conviviality, among others. They thus have not been aware that they are entitled to do so.

The state of the art of youth and contemporary challenges in youth participation were stated by the local authorities in the Porto's Municipal Youth Plan, versions 1.0 (2005 – 2009), 2.0 (2009 – 2013), 3.0 (a draft co-produced with the support of the research unit from

the Faculty of Psychology and Educational Sciences (FPCEUP), federations of youth and students' associations; final draft introduced at the Municipal Youth Council in 2017, however it was never officially published).

The identified challenges for youth citizenship were usually tackled through a wide offer of public events and initiatives targeting youngsters and were organised by the youth and academic NGOs and associations, informal groups and occasionally by the policy makers. The latter initiatives were mostly targeting youth either to 'educate the citizen-in-making' or to inform and consult the target audiences. The former initiatives and events were developed by the application of the non-formal education methodology[1], and were highly participatory, educational and engaging, with an aim to encourage youngsters to take both role of a citizen and a learner in the process of lifelong learning[2]. Nevertheless, in most of the cases, the initiatives promoted the 'consumption' (i.e. use) rather than co-creation with and by youngsters.

Conversely, the topics/societal challenges were defined and redefined in each of the LoCY's co-design programme by the youngsters and other members of the school community. In most of the cases, the problems were complex and not easy to identify without a couple of iterations of the situated co-design interventions. According to the H2020 programme's list of societal challenges, this initiative addressed some of them:

- *Health, demographic change and wellbeing*: LoCY was concerned with the individual mental health and wellbeing and has addressed them by providing support to building the capacities of individual's self-discovery, self-awareness and self-efficacy;

- *Europe in a changing world - inclusive, innovative and reflective societies*: LoCY had a dualistic approach to this topic as it works on three levels of empowerment: individual, group and community, to build capacities of the resilient societies.

Starting point of the 'co-creation process'

To develop a meaningful process of co-creation, LoCY had to ensure that the youngsters and school community could understand the co-creation as both the working principle and approach to developing intergenerational learning and citizenship experiences. At the beginning of each initiative, LoCY's practitioners visited the local context and explored it through informal meetings with school representatives, teachers, socio-cultural animator

and psychologists; participant-observation in the classroom; and a cycle of warm-up workshops to learn about the people, relationships and their ecosystem. Considering the students' expectations regarding the solution, the alignment between expectations and the school's responsiveness and openness to accepting such process/solution was needed.

In the schools of basic education, this sensitisation process had lasted one to two months before determining the problem statement and a plan of interventions. For this type of co-design programme, the minimum time requirement was from a couple of months to a few semesters. Conversely, the same process in the vocational school at the secondary level had carried out somewhere between one and two sessions, as this phase was integrated into the overall action plan of the specific learning module of one to one and a half months.

The co-design and co-production (prototyping) of solutions could have taken the place once there was a shared/ common goal between the group of youngster participants. Furthermore, to ensure the students' sense of responsibility and authorship, the participants were guided to pay attention to supporting each other in developing joint solutions. The youngsters' ownership of a process and a solution has been staged thanks to the creative expression, self-discovery, self-awareness, self-management and control of time, resources, and knowledge.

To ensure the transfer of knowledge within school context and outside of the classroom, additional members of the school community were invited to participate in the process, i.e. teachers of other disciplines and socio-cultural animators as the participants and co-facilitators, and administration as the policy maker advisors. Local ecosystem governed the bottom-up initiatives, introduced and co-facilitated by LoCY. LoCY's practitioners acted as external facilitators and they were the representatives of different organisations, such as the Faculty of Fine Arts of the University of Porto, Research Centre for Design, Media and Culture (ID+), Artistic and Vocational School Árvore and Association MEDesTU.

There was no fixed and assigned budget to the programmes carried out as informal/ volunteer activities, dependent on the resources offered by the local stakeholders and its members (e.g. spaces for work, materials for work, means for printing the learning tools, among others).

Further development of the 'co-creation process'

There are several stages in development and implementation of LoCY's co-design programmes: preparation, implementation, validation and evaluation.

The preparation has always started with a context analysis and mobilisation of the youngsters eager to engage in the process of co-creation. Firstly, the students' needs and motivational desires to get involved in co-design are assessed and prioritised. Secondly, the introduction about the initiative and possibilities to address concerns through that initiative are explained (setting and matching the expectations of LoCY's capabilities and youngsters' aspirations). Finally, the action plan is built by identifying the learning milestones of each session and number of sessions is defined by the available timeframe, indicated by the school and agreed with students. The design methods and tools, corresponding to the set overall objectives and of each session, are appropriated and applied in consultation with youngsters. Each co-design programme is based on a programmatic research. This implies several iterations and more research projects integrated within single co-design programme. In a demonstrative exercise of co-design, students are usually involved in the ideation and experimental (low-fidelity) prototyping of the learning tools for themselves and their peers.

The context analysis and mobilisation of the youngsters eager to engage in the process of co-creation are the first two tasks in the preparation phase. Firstly, the students' needs and motivational drivers to get involved in co-design are assessed and prioritised. Secondly, the introduction about the initiative and possibilities to address concerns through that initiative has been explained (setting and matching the expectations of LoCY's capabilities and youngsters' aspirations). Finally, the action plan is built by identifying the learning milestones of each session and number of sessions is defined by the available timeframe, indicated by the school and agreed with students. The design methods and tools, corresponding to the set overall objectives and of each session, are appropriated and applied in consultation with youngsters. Each co-design programme is based on programmatic research. This implies several iterations and more research projects integrated within single co-design programme. In a demonstrative exercise of co-design, students are usually involved in the ideation and experimental (lo-fi) prototyping of the learning tools for themselves and their peers.

In the implementation stage, the students were invited to suggest the changes and restructure the collaborative process. Students were always encouraged to take a lead in ideation and generation of ideas, in prototyping and co-production of their solutions/tools and into a reflective exercise of understanding both the process and their roles and positions within the process. The process of grouping and regrouping (i.e. from large working unit to smaller working units and vice versa) provided each student with an opportunity to learn about themselves through building capacities in leadership, teamwork and time management. Besides, students also got a chance to see their teachers, socio-cultural animators and other school members as participants in a collaborative project co-facilitated by an external team. External facilitation usually helped the intergenerational and local group to confront the deceptive authority that younger participants may have felt about elderly participants.

Subsequently, the solutions/ tools were co-produced and youngsters were invited to analyse the use of tool/s and to reflect on their individual and collective efforts (i.e. voluntary self-assessment; compulsory self-evaluation used for self-grading). In some cases, the external/ public validation was organised to present and discuss the challenge that the co-design programme addressed and to introduce new ways of approaching to challenge resolution. At this stage, it was stressed that the accent on co-creation process was not only to create a solution/s and solve a challenge, yet, to make the challenge more visible and relevant for the public long-term discussion.

Landscape of stakeholders

The landscape of stakeholders differed from one to other co-design programme. For example, in first two co-design programmes *Recreio dos Pioneiros* (2014-2016) and *Ilustracionário, à minha maneira 1.0* (2015) besides LoCY and school members, other stakeholders joined in later stages and at the public event *Ilustracionário, à minha maneira 1.0.* LoCY was supported by the Federation of Youth Association of Porto District (FAJDP), Portuguese Institute for Sports and Youth (IPDJ), House of Youth Associations and Municipal Division for Youth of the Municipality of Porto. In the co-design programme *Ilustracionário, à minha maneira 2.0* (2017), other external co-facilitators were the local volunteers and members of the youth associations Tudo Vai Melhorar and ConnectART, thus, master students of the Faculty of Psychology and Education. In the fourth co-design programme *Co-designers de Sala 52* (2018 – 2019), the partnership was reduced to an original network represented by the LoCY's members.

The primary beneficiaries were the youngster participants and their peers between 12 and 20 years old and secondary were the partner-schools and Porto city as a whole. The network has also tried to pursue its vision to disseminating at the international level the acquired knowledge and understanding on the use of cocreation, co-design and co-production of learning and citizenship experiences through local intergenerational collaborative projects.

The co-design programmes were evaluated by the youngster participants (individual and collective reflections) and school staff, together with external moderators; in a public event all invited and relevant local stakeholders.

Subsequently, LoCY has been receiving support from a wide range of partner-stakeholders:

- *Artistic and Vocational School Árvore*: Teacher and Chief of the Graphic Design Department (female, 49 years old, graphic designer, PhD in Design Education);

- *Basic School of the Second and Third Cycle of Miragaia*: Socio-cultural animator (male, in his 40ies); 2 school psychologists (both female, in early and mid-40s); teacher (sports education and form teacher, female, in late 30s); youngsters (15 females and 10 males, 12 to 16 years old);

- *Basic School of the Second and Third Cycle Maria Lamas*: psychologist (female, late 40s), teacher of *Portuguese Language and Literature* (male, mid-50s), teacher of *Workshops/ Manual Work* (female, late 30s, background in art education), 11 youngsters (5 females and 6 males, of which 9 were 16 and 2 were 17 years old);

- *Youth Association MEDesTU*: 3 youth workers (2 females, early and mid-30s, 1 male in late 30s)

- *Youth Association Tudo Vai Melhorar:* NGO representative (male, mid-20s, background in clinical psychology and health);

- *Youth Culture Association ConnectART*: 3 NGO representatives (1 male in early 30s, 2 females of which one is in early and the other in mid-30s);

- *FAJDP:* administration (main contact was male, mid-20s, background in business administration);

- *Research Institute for Design, Media and Culture (ID+), International Doctoral Programme in Design of the Faculty of Fine Arts of the University of Porto:* PhD student in Design (female, early 30s, background in design and youth work);

- *IPDJ*: representative in charge for local volunteering and collaboration with youth associations (female, late 50s, background unknown);

- *Municipal Division for Youth*: 2 public officers (both females, in late 30s and mid-40s, the Chief had a background in law, political background unknown).

As part of the co-creation process, the needs and motivational drivers were assessed through the meetings, participant observation and warm-up workshops in each preparation stage and then confirmed through mid-term and final evaluation. The obtained answers are provided below according to the stakeholder's group (see *Table 7*):

Table 7 - Needs and motivational drivers according to each stakeholder group

Stakeholder's group	Needs and motivational drivers
Youngster participants	To learn something new; to reach further; to do something different and with their colleagues-friends; to take part in an activity that shares individual's interests and goals; To organise an open event desired by themselves and their peers;
Politicians	Co-creation was an innovative approach to addressing contemporary issues and politicians demonstrated the eagerness to learn more about it; there was an opportunity to use and promote the initiatives under a municipal youth plan; being closer to youngsters' understanding of politics and youth policymaking;
Youth NGOs	Working with their main target audiences and supporting youngsters' personal growth and wellbeing; Testing and validating non-formal education methods and tools;

Stakeholder's group	Needs and motivational drivers
Research-dedicated units	To conduct participatory action research through co-design programmes; to learn about the state of art of youth and to acquire understanding on how co-design/ co-creation could support community development, reinforcing the idea of intergenerational collaboration;
Public institutions oriented to youth matters	To learn about LoCY's examples of practices and to acquire understanding of the youngsters' views; To provide support to developing initiative further;

So-far circumstances had led LoCY to contact and collaborate with certain schools and networks either when getting to know someone who has been collaborating with them previously or meeting someone who has been their staff member. Most importantly was to reach schools that were open to collaboration on a long-term. Otherwise, the main criteria to select key stakeholders was based on geographical proximity and daily access to the neighbourhood in which school is situated. The selection of youngsters was two-fold: there were the ones who responded to an open call and expressed their wishes to act as the local volunteers-participants (i.e. extracurricular initiative), yet, there were the ones who had been selected by the school psychologist/ teacher, including the academic subject for the LoCY's intervention (i.e. curricular initiative). In case of latter, pre-selected students confirmed their motivation and availability for engagement in the co-design programme at the introduction session.

Each stakeholder partner contributed to the development of initiatives by bringing specific knowledge, resources, experiences and competences into the co-creation process:

- *LoCY*: know-how to use co-design and co-production (co-creation); created opportunity for experimentation by introducing values and framework for situated youth-led and intergenerational collaboration; coaching through positive youth development;

- *Youngsters/ participants/ co-designers/ end-users:* experts of their own experiences; local pioneers in social innovation projects; understanding of world and their roles within; mindset to learn and experience LoCY's approach;

- *Adult/ experts*: mentoring/ coaching skills in area of expertise;

- *Policy makers*: knowledge of the political situation, agenda and culture; disposition to learn about youngsters' views and ways of being and living in the city;

- *Public and private institutions/ organisations:* space, tools and resources for working, printing of the process materials, support to developing projects.

The Stakeholders' engagement was voluntary, non-hierarchical, open-ended and flexible, adapted to the provided timeframe and individual/collective availabilities.

The incentives used to involve actors were only immaterial and sometimes in longer sessions and not always, LoCY would bring snacks and juice, especially for the sessions before lunch and in the school with students of vulnerable groups. After conclusion of the project, the certificates were handed to all participants.

Phases of co-creation

LoCY employs the *Learning Framework in Active Citizenship: Active Learner is an Active Citizen* as a foundation of the platform's activities that promote and encourage experiential and experimental co-designing of the learning and citizenship processes with and by youth. This conceptual framework was developed through the iterative design processes in the LoCY's activities and by 'drawing things together' of both practice and existing frameworks for youth citizenship and youth design practice.

As seen in the *Figure 8*, the framework is visually divided to the learner's sphere and a context sphere, trying to refer to designing of any educational activity by customising it to the measures of each individual.
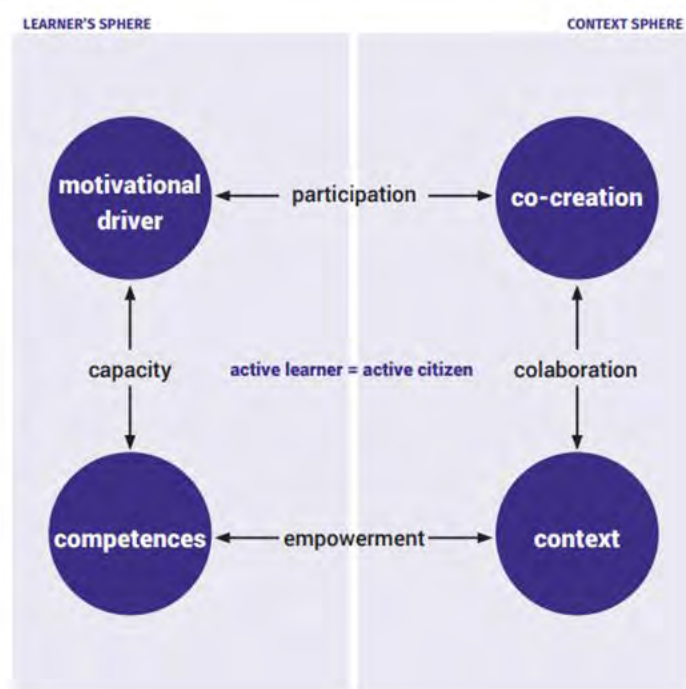
Figure 22 - Learning Framework in Active Citizenship

The framework proposes the negotiation space between an individual's motivational drivers (including learning needs) and required competences for the process of intergenerational co-creation. This is being tested and validated through youth participation and giving power to youngsters to co-create in a situated context. Through the process of collaboration, all participants are encouraged to build their capacities (they are being self-empowered) through an exchange of knowledge and expertise with other participants. Not as a prescriptive template, the framework is composed of a set of questions that guide individual/ collective to reflect and plan their participation in concrete social innovation projects[3].

Considering that the main protagonists of LoCY's activities are youngsters-learners-citizens, they are being encouraged to undergo all stages of co-design and co-production (i.e. from ideation to production of the given solution). Other key stakeholders-partners such as school staff, NGO representatives, volunteers and policymakers are invited to give their contributions as well, either as experts in a specific topic or to share their experience and views in reflective discussions with students-participants. Their role is to encourage students to self-organise and to produce a solution with quality.

Co-creation phases (ideation, design, and production) are being developed in the implementation stage of LoCY's activities. The impact monitoring, measurement and

evaluation is partially being developed with students, as the tools used for these activities are usually developed by elders. For example, students are directly contributing to the measurement and evaluation through their self- and peer assessment and collective reflection on the achieved results and impacts. For the purpose of understanding operationalisation of co-design and co-production in school/ situated context, the aforementioned co-design programmes also incorporated programmatic research. In case of the first[4] and fourth co-design programme, there were three research projects developed. For example, Recreio dos Pioneiros was developed as an extracurricular initiative outlined below (*Table 8*).

Table 8 - Programmatic research embedded into the co-design programme Recreio dos Pioneiros

Research programme (name, duration, objectives)	Research methods & tools
warmUP (April – June 2014): • Local needs • Motivational drivers • Existing sense of community • Existing levels of youth participation	Interviews, individual meetings with administration, school staff; cultural probes; co-design workshops that incorporated analysis of context through mapping, storytelling, roleplay, among other;
buildUP (October – July 2015): • Building capacities for authorship and sense of belonging • Building capacities in taking bottom-up initiatives (i.e. youth-led) • Building capacities for self-recognition • Encouraging development of the youngsters' community of practice	Learning diaries; reflection groups; storytelling cards; co-creation of two events: Christmas party and football tournament; visual dictionary (prototyping workshops);
Play (November 2015): • Embedding pluralistic approaches to	Learner's identity; co-design challenge (prototyping workshop); barometer method;

learning in the classroom • Learner as a co-designer and vice versa;	

In general, staging co-creation is time-consuming and demanding process. Some of the major breakthrough, turning points and barriers of each co-design programme are following (see *Table 9*):

Table 9 – Break through and turning points and barriers of co-design programmes

Programme: solution	Breaking points	Turning points	Barriers
Recreio dos Pioneiros: 2 youth-led events; visual dictionary; public event and the exhibition[5]; 3 lo-fi prototypes of the learning tools;	Built sense of ownership and responsibility of students as a group of Pioneers who are responsible to improve school environment for everyday experiences;	No turning points as there was no sustainability of interventions once LoCY left; Multiplication of knowledge possible through students who stayed or left the school;	LoCY and Pioneers felt powerless as there was no response from the school when developing activities; misconception of design project implemented in the school by the school administration;
Ilustracionário, à minha maneira 1.0	Built sense of ownership and responsibility among Pioneers and design students, all responsible for development of learning tools that can be used in	Raised awareness among designer-students in regard to designers' social role and responsibilities;	Time limit of learning module; incompatibility of time schedules in different schools and classes; misconception of

Programme: solution	Breaking points	Turning points	Barriers
	individual, peer and student-teacher learning activities;		public officers of relevance and recognition of pluralistic approaches to understanding concepts and terms related to youth policies and participation;
Ilustracionário, à minha maneira 2.0	Built intergenerational group of co-designers/co-learners (students, teachers, researchers, volunteers) who were responsible to develop a learning tools that can be used in individual, peer and student-teacher learning activities;	Incorporation of design methods and way of thinking in teaching; recognition of non-formal education and appropriation of methods and tools for participatory learning experiences; process of negotiation between individual aspiration and required set of competences;	
Co-designers de Sala 52	Self-organisation and self-initiative of design-students;	Built community of co-designers/co-learners who are socially responsible (co)designers;	Time limit of learning module;

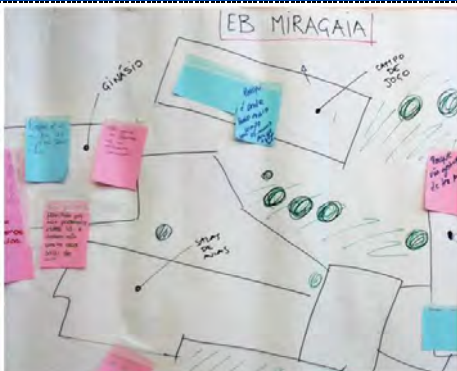**Specification on methods, tools and communication**

(Taken from SISCODE's case study Lab of Collaborative Youth (LOCY))

The communication that LoCY promotes is based on openness and transparency which means that the expectations and objectives of all included actors are addressed at the very beginning. LoCY does not have a prescriptive template for communication, it bases work on the co-creation and positive youth development principles. LoCY adapts communication channels, skills and language to each stakeholder and partner. If this refers to communication channels: email, personal meetings, workshops, focus groups, shared folders and archive for documenting the processes, among others.

LoCY thus emphases the use of non-verbal communication through writing, making, visual storytelling, theatre exercises, non-formal education methods and tools for having a say, without necessarily saying it out loud. This is due to a fact that youngsters base their 'positions' on the way they feel/ sense in certain experience and sometimes it is difficult to express this by spoken words. As they have strong sense of belonging to a group of peers, sometimes they are less comfortable to share their opinions in the group.

In all four co-design programmes, LoCY has dedicated workshops for sensitisation and training, generation of ideas, prototyping, validation and evaluation. For each co-creation phase in implementation stage of single co-design programme, specific design and learning tools were used. They aspired youngsters to move, draw, think, tell stories and discuss certain aspects of the processes, having in mind their roles as colleagues, co-designers, co-learners and citizens. In the following table (see *Table 6*) some of the examples of design methods and tools are provided.

Table 10 – Example of design methods and tools

Design methods and tools[6]	
Map of emotions The objective of this exercise was to reflect upon the favourite and the least favourite places at school by using the map of the school space (see *Figure 9*). The place that gathered the most votes was chosen to be the place in which sessions/ workshops will be held.	 Figure 23 - Map of emotions
Storytelling cards These cards (see *Figure 10*) are composed from the images of the conducted project activities. To distinguish between the elements such as the learning setting, students' tangible outcomes, methodologies, visual dictionary project, sequences and photos of the school environment, the cards were colour-coded. The student-participants used this tool at several occasions for collective reflection and dissemination of the project.	 Figure 24 - Storytelling cards

Co-design challenge

This method was developed in order for youngsters to learn that they can co-design tools pertinent for them and their peers. The proposed challenge was to co-create a learning tool which could be used in their classroom, either by teacher or by them.

An example of the result would be that one team decided to address the issue of 'injustice' in the classroom, related to the fact that teacher treats students differently. They made a prototype of a learning tool that is composed of a hammer, a book and a registration element to mark when some type of injustice has happened. Once someone placed the marker on the side of the book that says 'injustice', the class would stop with current action and make a collective discussion on how the occurred situation makes them feel and what they can do to improve intergenerational and peer relationships.
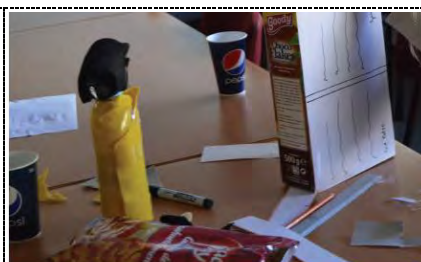

Figure 25 - Co-design challenge / learning tools

All applied design methods, tools and techniques were appropriated and adjusted to the target audiences. The most difficult aspect was to explain youngsters the difference of playing for the sake of playing/ having fun and doing serious playing which leads to some tangible and not so tangible outcomes that will eventually have impact on them and their school communities. Considering the challenge of seriousness in playing, follow-up reflections were made in round and discussions.

Specification on cooperation and conflict

Sometimes LoCY had difficult times in promoting the values and pertinence of co-creation in an intergenerational learning environment such as the school and classroom. This was due to a misconception of understanding design as an artistic expression rather than a tool for participatory experiments and systemic changes. For example, one of the schools could

not understand that co-design programme includes assessing the existing practice of youth participation and youth decision-making on educational activities/ learning modules and promotion of the same. The process was mediated through constant reporting about the project and follow-up meetings with administration to ensure that we are working for the common goal which is improving the everyday experiences of students and the school community. The project remained for almost three academic years, however, when LoCY and majority of students left the school, the initiative was terminated.

Specification on political influence

The process of including Municipal Youth Council in the development of the Municipal Youth Plan 3.0 has provided some feedback on the LoCY's ongoing actions and validated its purpose and way of conducting its activities. It also recognised LoCY as a good practice and included LoCY's action plan to develop additional co-design programmes in various schools of Porto, together with the support of MEDesTU and Municipal Division for Youth of the Municipality of Porto. Municipal/ local support was provided through dissemination, participation and infrastructural support of the LoCY's activities.

Follow-up of the 'co-creation process'

The new solutions produced in co-design programmes are the participatory processes (methodology and methods), and learning/ citizenship tools that can be a focus of, or, embedded into the participatory processes. The testimonies of the processes were elaborated through session plans and reports of each conducted workshop and in the final reports delivered to the participating organisations. Additional meetings and focus groups with school staff were held to understand how the knowledge transfer from one teacher/ staff to the school community could have been made.

It was possible to see that at least two highly motivated teachers continued promoting and recognising fruits of LoCY's activities. Through their efforts, initial levels of organisational change of methodological and value-driven approaches in the classroom emerged.

Creating solutions implied recognising the relevance to addressing the situated problem/ challenge and involving the schools that recognised the efforts and opened their doors for experimentation. Ilustracionário, à minha maneira 1.0 and 2.0 are possibly the most tangible and original solutions that have been produced in two Porto's neighbourhoods.

They opened up the dialogue between local key stakeholders responsible for the formal education and youth policies, thus, indicated the pluralistic approach to learning and understanding youth participation and citizenship practice in the school context. Both editions of the visual dictionary have been used after the co-design programme has ended, by the participants and LoCY members in further design research. Some hard copies were made available in the school libraries.

Scaling

LoCY has scaled out the initiative to two different geographical contexts (neighbourhoods) of Porto. The project was also scaled up within Artistic and Vocational School Árvore in different classes during the past five years. The ambition of the initiative was to implement new co-design projects in other neighbourhoods of the city with the support of local authorities and their school network; however, this has not been implemented due to the fact that Municipal Youth Plan 3.0 hasn't been published.

Systemic change

As previously mentioned in section 5 of this biography, follow-up actions were made by two highly motivated teachers. Both of them incorporated co-creation values in development of the educational activities and teaching in their classrooms, while one of them still continues to actively promote co-design practice and research in design education.

Consequently, a group of design students recognised co-design as a tool in their graphic design education in the fourth co-design programme *Co-designers de Sala 52*. After concluding a learning module on visual identity, students (15 to 17 years old) applied the same approach in following learning modules and school projects. This implied they took initiative and self-organised co-design practice by reclaiming their right to ownership of the process as the co-designers/co-authors.

There is still work to be done in regard to sensitising the adult-stakeholders to the process of co-creation. Youngsters are keen on working together and with adults, and easily comprehend the collaborative goals and shared interests. Usually, they don't have issue to being direct in expressing their gratitude or dissatisfaction in relation to the ongoing

activities. They are easily overwhelmed with too technical and too abstract communication and processes. They enjoy more tangible and hands-on activities to think and work in a productive manner. The adults remain with some prejudices of what youngsters are capable of projecting, ideating, prototyping and solving.

The use of concept such as co-creation in the official description of Municipal Division for Youth, available on the website of the Municipality of Porto[7], does give some light to the overall situation, however, it is everyone's responsibility not to turn the co-creation into a buzzword and space for 'tokenism' and 'decoration'.

On a long-term, LoCY wishes to further contribute to macro socio-cultural transformation by reaching to wider network of schools and youth associations, with the support of Municipal Division for Youth/Municipal Youth Council.
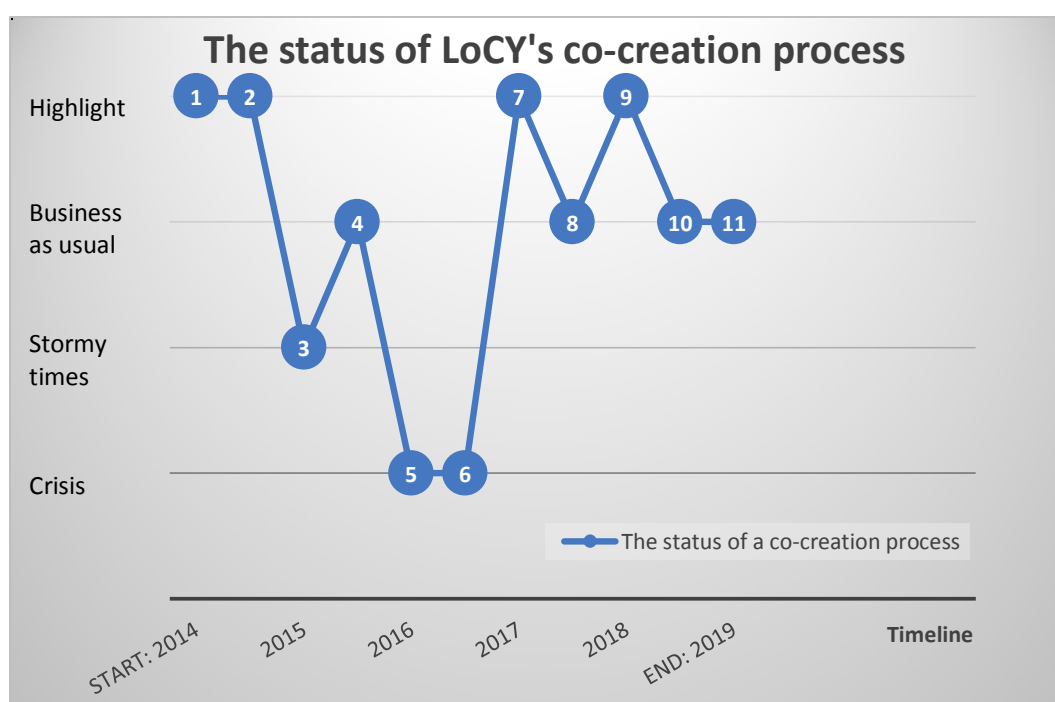
Visualisation

Figure 26 - LoCY's co-creation process

The respective status of LoCY's co-creation process at a certain point in time is visualised in graphic above (see *Figure 26*). The key milestones presented in graphic can be described as:

1) Preliminary context analysis and first-hand experience of co-design initiatives that were recognised as pertinent and innovative; informal group of practitioners managed to work and negotiate collaboration with two local schools;

2) First co-design programme Recreio dos Pioneiros captured attention of three classes and twelve students-volunteers (*warmUP*);

3) With the second research project *buildUP* in the first co-design programme the group of students was regrouped (some students concluded last grades and left) and has represented volunteers of the same class; as this was the last year in basic education, students were more keen to developing events and doing something outdoors, rather than working on abstract issues (i.e. the issue of language elaborated through visual dictionary);

4) Two schools located in the neighbourhood Miragaia were invited to work together. For one group it was the *buildUP* project and for the others was the second co-design programme Ilustracionário, à minha maneira 1.0. This was a breaking point to demonstrate to both sides that they can collaborate in different settings, working groups and manage project and time together; this milestone in process actually contributed to forming LoCY as a collaborative platform.

5) Discontinuation of the LoCY's initiative due to lack of human resources (volunteers);

6) Discontinuation of the LoCY's initiative due to lack of human resources (volunteers);

7) New school has established partnership with LoCY and many other key stakeholders have joined for third co-design programme Ilustracionário, à minha maneira 2.0;

8) Ongoing co-design programme Ilustracionário, à minha maneira 2.0;

9) Implementation of the fourth co-design programme Co-designers de Sala 52;

10) Self-organisation of students and use of co-design practice with the support of a teacher in Co-designers de Sala 52;

11) Self-organisation of students and use of co-design practice with the support of a teacher in Co-designers de Sala 52;

Which learnings emerged?

Co-design programmes elaborated by LoCY and in collaboration with the local communities demonstrated flexible and open approach to developing learning and citizenship activities with and by youngsters-students. There are few learning underpinnings in regard to this when undertaking a co-design process similar to the one of LoCY's co-design programmes that start with self-assessment of:

- *teacher's role*: willingness and ability to coach each student on how to raise self-awareness and increase the sense of responsibility and authorship of one's life; recognise and promote co-creation phases when developing learning modules;

- *youngster-students' role*: willingness and ability to acquire co-design experience in order to increase self-awareness, self-discovery and self-efficacy as a 'author of one's life';

- *policymakers' role:* to support and investment in research projects on the state of art of youngsters/youth in close collaboration with youngsters as co-researchers/ co-authors; youth policy making and urban development through co-creation;

- *practitioner-facilitators' role*: openness and empathy with the local community and its members for which the research and design project is being developed; development of the strategy for effective knowledge-transfer.

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Interview

Raquel Morais (Artistic and Vocational School Árvore, Professor of Graphic Design and Chief of Design Department; Lab of Collaborative Youth, Co-founder)

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LTsER Montado | Portugal

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Summary

Cork oak trees are an important aspect of the cultural landscape of Portugal. These autochthonous forest species are distributed in the Mediterranean region where the Atlantic influence is felt. The geographical location provides adequate climatic conditions such as high thermal amplitudes and the summer dryness characteristics. These characteristics also occur in some regions of Portugal (although not part of the Mediterranean) ecologically more favourable for the cork oak, except at high altitudes and areas with very low temperatures in winter. In Portugal, the cork trees forests are known by the name 'montado'.

Given the cultural and also the economic significance of cork oak trees to Portugal, preservation of these species is of equal relevance and importance. The community surrounding the areas where these are found is aware of the challenges and the socio-economic implications. The need to preserve these species has been stressed leading to the introduction of multidisciplinary community practices. One of such practices/ platforms is LTsER Montado.

LTsER (Long Term socio-Ecological Research) Montado (http://www.ltsermontado.pt/) is a platform that combines the practical, productive, ecological as well as cultural aspects of socio-ecological systems to promote improved management of montado. The prime objective of LTsER is to facilitate the successful development of montado in the long term.

LTsER platform is a part of the LTER network that works towards the conservation of cultural landscape of Portugal around two levels: the LTsER platforms and the LTER sites. The cultural landscape is subject to threats such as rural abandonment, increasing tree mortality, reduced natural regeneration, unsuitable management practices, pests and diseases, depreciation of cork market value, overgrazing, air pollution and climate change.

The Centre for Ecology, Evolution and Environmental Changes (CE3C) develops research to contribute to promote an improved management that reconciles the use of biological resources with conservation goals. Projects such as LTsER Montado and OPERA are some good examples.

LTsER works with owners and managers of these systems to develop scenarios and design ecosystems service maps. This is done through workshops with stakeholders (companies, policy makers, non-governmental organisations) with the objective to understand their perceptions on montado and support the development of a roadmap with their vision for the future. LTER is determinant to study long-term ecological processes (climate change impacts) and the impact of rare or episodic events (pollution), impossible to detect in short term. The three main objectives of the LTER are as follows:

- Storage and monitoring of relevant data in ecology;

- Establishment of links between institutions and researchers;

- Promotion of knowledge exchange and know-how development.

Context of the 'co-creation process'

Cork started to be used as a seal in the 18th century, soon becoming economically significant in Portugal. It marked the birth of agro-silvo-pastoral systems (the so-called montados) in Portugal, which can be considered as an example of sustainable forest management at the global level. Although subject to several challenges and threats, montado is legally protected, cutting trees is prohibited and its sustainable exploration is encouraged.

The montado extends over more than 5,800,000 ha in Spain and more than 1,070,000 ha in Portugal[1]. Currently, cork oak range is of approximately 2.3 million hectares, half of which are located in the western Mediterranean. Distribution is quite fragmented including areas in North Africa (Morocco, Algeria, Tunisia), south of France, west coast of Italy, a few islands in the Mediterranean (Corsica, Sardinia and Sicily), and the southwest of the Iberian Peninsula (Portugal and Spain). According to the World Heritage Convention (UNESCO)[2], the montado system currently occupies, in the South of Portugal, a significant part of the Alentejo region, large areas of the Tagus Valley and of Beira Baixa interior, as well as and the mountain ranges of the Algarve (Serra Algarvia).

Alentejo, where the majority of montado is located, is the largest Portuguese region with a territorial area equivalent to about 31,500 km² (Eurostat 2019)[3], which is approximately one third of the national territory. In 2019, the region had 705,478 inhabitants (Eurostat, 2019) and an average population density of 22.8 people per km² (Eurostat 2018). The population density is lowest among the regions in Portugal. Over the past decades, the region has undergone an average negative population growth rate, which is largely due to rural exodus (as there are less infrastructures, jobs and opportunities) and ageing population. The political culture of the region can be understood as progressive, but slightly more conservative than the largest cities in coastal areas. For the five mainland regions there are members of the central government with responsibility for regional development through regional administrations. These administrations manage several financing instruments intended to promote regional development. On grounds of innovation, the Regional Innovation Scoreboard 2019 (RIS 2019)[4], classified Alentejo as a 'Moderate Innovator' region with an increase of the regional innovation performance over time.

The LTER network working towards the conservation of cultural landscape of Portugal and especially the montado system of Alentejo operates at two levels: the LTsER platforms and the LTER Sites. In total there are 41 LTER national networks of scientists which develop long term research and are included in the international LTER network (ILTER). The LTER Sites are facilities of limited size (about 1 to 10 km²), mainly of one habitat type and form of land use, and can be part of LTsER platforms. The research activities are concentrated at small scale ecosystem processes and structures. The LTsER platforms represent entire regions in cultural, land-use, historical, natural, administrative and economic units, comprising all relevant agents. It is an infrastructure with monitoring networks and *in-situ* research sites, technical supporting structures, laboratories, collections, museums, visitor centres, databases etc. It is an assumption of the LTsER platforms that there is an involvement of the research community, regional population, key stakeholders, decision makers and all potential beneficiaries of the knowledge produced.

LTsER Montado network has five main research and monitoring stations (R&M) covering the range of climate and soil types of montado ecosystem. These conceptualise a socio-economic platform by representing different land-use regimes and desertification scenarios, therefore, involving different pressures. It focuses on improving understanding on the long-term consequences of land use practices and management options, and how their interactions with other socio-economic and environmental drivers operating at scales

from local (e.g., agriculture intensification, cattle pressure) to global (e.g. climate change, desertification).

The stakeholders (including landowners and managers; rural workers; environmental nongovernmental organizations (NGOs); policy makers (e.g., municipalities, Institute of Nature Conservation and Forests); producer associations (e.g., for beekeepers, hunters, foresters, cattle breeders); academia (researchers studying montado-related topics); business (e.g., manufacturers of cork-related products); and representatives of other entities linked to the landscape (e.g., firemen) operate at various levels in the montado system. A series of participatory workshops at local and regional levels to assess the ecosystem services most valued by these stakeholders, discussing their views on the threats and future scenarios, were organized by CE3C.

Starting point of the 'co-creation process'

LTER Portugal network (http://www.lterportugal.net) was formalised in 2011, in a process led by the Sociedade Portuguesa de Ecologia (SPECO). Funded by the Fundação Ciência e Tecnologia (FCT) and the Fundação Luso-Americana (FLAD), LTER Portugal currently includes two platforms and two sites in different types of key ecosystems: a Mediterranean forest system for multifunctional use (Platform LTsER Montado), estuaries (Platform LTsER Estuários), freshwater (Site LTER Sabor), and transition waters (Site LTER Ria de Aveiro). The criteria leading to the choice of these sites are:

- Ecological significance;
- Social relevance;
- Range of data available;
- Cooperation between the public and private sectors;
- Ability to generate complementary funds[56].

LTsER Montado is a project led by the Center for Ecology, Evolution and Environmental Changes (CE3C) that includes the following institutions:

- Higher Institute of Agronomy, University of Lisbon (CEF)
- Faculty of Science and Technology, University of New Lisbon (CENSE)

- Natural Resources and Environment Centre (CERENA)

- Centre for Exploitation of Mineral Resources (CVRM)

- Institute for the Conservation of Nature and Forests (ICNF)

- Companhia das Lezírias S.A

- Regional Coordination and Development Alentejo (CCDR-Alentejo)

- Regional Development Agency of Alentejo, S.A

- Development and Infrastructures of Alqueva (EDIA)

- Amorim

- Municipality of Moura

- Municipality of Grândola

- Municipality of Benavente

- Municipality of Coruche

LTsER Montado site was officially created in 2011 after being selected and received funding under the framework of a competitive call opened by FCT Portugal and having an international evaluation panel.

The basis of creation of the project in itself is a community of several institutions including the science consortium and the consortium stakeholders. Nevertheless, the co-creation activities were more focused on studies to identify the most valued services provided by montado, their current and future trends, and the most probable future for this landscape.

The co-creation started at the implementation phase with the development of participatory workshops for the stakeholders. It began with an initial unstructured preparatory workshop with open-format questions to enhance the discussion; the following two workshops involved a structured methodology with close format questions where participants were asked to rank different options. Both workshops were led by two facilitators specialized in participatory processes. Researchers were also present during the workshops to explain the objectives and to provide support, if needed. They did not participate actively in the discussions.

The initial involvement of the stakeholders was initiated through personalised invitations (by email or phone calls); the stakeholders were divided into three groups: preparatory, regional or local stakeholders.

Further development of the 'co-creation process'

The implementation of the co-creation process included the following activities:

- Brainstorming;

- Focus groups;

- Trends analysis, SWOT analysis, and future scenario vignettes;

- Services' assessments.

For the preparatory workshop, CE3C invited 72 stakeholders from which 23 attended. The workshop was held on the 8th of April 2014 in Coruche, Portugal. All categories of stakeholders (except rural workers which were not invited) were represented at this workshop, with academics and policy makers being the majority (31 % and 22 %, respectively). The aim of the activity was to start the engagement, assess the knowledge on the topics discussed namely the ones with an impact on the system. The participants were paired to do a brainstorming on the main concepts; on the next phase, they were grouped in 4 to work on a SWOT analysis of the montado system[7].

The second workshop focused on the regional level; 81 stakeholders were invited from which 13 attended. It was held on the 2nd of December 2015, also in Coruche. All of the main stakeholder categories were represented, apart from farm workers (which were not invited). Producer associations, NGOs, and landowners/ managers were the dominant groups in attendance, (46 %, 15 %, and 15 %, respectively). The participants were again grouped in 4 to rank the most important services of LTsER montado based on their perceptions and the drivers of change identified initially. This was then discussed and all voted on the most important services[8].

The third workshop was done at the local level. CE3C selected five farms within the LTsER montado area and held three different sessions using the same methodology of the regional workshop. The sessions took place on the 29th of April at Companhia das Lezírias and Machoqueira do Grou, on the 19th of May 2016 at HRA and 6th of June 2016 at Coitadinha and Contenda. The participants were suggested by the farm managers; 31 stakeholders attended the local workshop sessions: eight from Companhia das Lezírias, six from Machoqueira do Grou, ten from HRA, four from Coitadinha, and three from Contenda. Farmers were invited for these sessions with the distribution of participation as follows: 22 % of policymakers, 16 % of producer association representatives, 13 % of landowners/ managers, 10 % of

academics, 3 % of business, and 23 % of other entities (e.g., firemen). The facilitators used a Toolkit for Ecosystem Services Assessment (TESSA) Preliminary Scoping Appraisal protocols to assess the services and trends at the local level[9].

There was no indication of follow-up activities with the participants. The study was published in a renowned academic publication. In general, LTsER Montado's work since 2011 has been acknowledged by the ILTER network and regarded internationally with an award for its results, the multidisciplinarity of its researchers and the involvement of the region's population and policy makers.

Landscape of stakeholders

Below is a list of the main stakeholders involved in the LTsER montado workshops:

Academia

- FCUL - Faculdade de Ciências da Universidade de Lisboa
- INIAV - Instituto Nacional de Investigação Agrária e Veterinária
- ISA - Instituto Superior de Agronomia
- ICAAM - Universidade Évora

Associations

- AAG - Associação dos Agricultores de Grândola
- ACPA - Associação de Criadores de Porco Alentejano
- ADL - Associação de Desenvolvimento do Litoral Alentejano
- ADPM - Associação para o desenvolvimento do património de Mértola
- ANCORME – Associação Nacional de Criadores de Ovinos
- ANPC - Associação Nacional de Proprietários e Produtores de Caça
- ANSUB- Associação de Produtores Florestais do Vale do Sado
- Associação de Caçadores e Pescadores de Samora Correia
- Associação Perdigueiro Português
- Associação Barrenquenha de Criadores de Porco Preto
- Associação da Cabra Serpentina

- Associação de Criadores de Bovinos Mertolengos

- ACOS - Associação de Criadores de Ovinos do Sul

- Associação de Criadores do Porco Alentejano

- Associação dos Produtores Florestais de Coruche

- Associação Iberlinx

- Associação Nacional de Criadores do Porco Alentejano

- Carne Alentejana

- Clube Português de Monteiros

- Cooperativa Agrícola de Moura e Barrancos

- Equipagem de Santo Humberto

- Escola Nacional de Caça, Pesca e Biodiversidade

- Federação Nacional de Apicultores

- FN – Apicultores

- GRANDOLACOOP

- Melbionisa

- MONTE - Desenvolvimento Alentejo Central (platforma of 5 associations)

- Terras Dentro Associação para o Desenvolvimento Integrado

- UNAC - União da Floresta Mediterrânica

- COMOIPREL – Cooperativa Mourense

Enterprises

- Amorim Florestal

- Consagri

- Corticeira Amorim

- Fundação João Lopes Fernandes (Herdade dos Leitões)

- Gesfloresta

- Indústria Corticeira do Concelho

- Santos Brinca - Produtos Apícolas, Lda

- Sociedade Agropecuária Herdade Las Medinas, Lda

- Sociedade Filarmónica União Samorense

- Terraprima

Environmental NGO's

- Liga para a Proteção da Natureza

- Quercus

Other entities

- Bombeiros de Samora Correia

- Bombeiros Voluntários de Barrancos

- Campo de Tiro de Alcochete

- Centro Ciência Viva do Lousal

- Depósito Geral de Material Exército

- GNR-SEPNA

- Observatório Sobreiro Cortiça

- Protecção Civil

- Turismo do Alentejo

Owners/ managers

- Companhia das Lezírias

- Herdade da Coitadinha

- Herdade da Contenda

- Herdade da Machoqueira do Grou

- Pancas

Policy makers

- Ayuntamiento de Oliva de la Frontera

- Ayuntamiento de Valencia del Mombuey

- Câmara Municipal de Barrancos

- Câmara Municipal de Benavente

- Câmara Municipal de Coruche

- Câmara Municipal de Grândola

- Câmara Municipal de Moura

- Câmara Municipal de Sines

- CCDR Alentejo

- CCDR Centro

- ICNF

- ICNF - Parque Natural da Serra de São Mamede

- ICNF - Parque Natural do Guadiana

- ICNF - Parque Natural do Tejo Internacional

- Município de Grândola - Ambiente

- Município de Grândola - Cultura

- Município de Grândola - Desenvolvimento económico

- Município de Grândola - Desporto de Natureza

- Município de Grândola - Gabinete Florestal Municipal

- Município de Grândola – PDM

- Município de Grândola - Turismo de Natureza

- União de Freguesias

Phases of co-creation

The research team from CE3C, leader of LTsER montado established a strong relationship with other colleagues and institutions. This involves practices of cooperation at the regional and national level. As acknowledged by the ILTER Network, LTsER Montado integrates expertise from several scientific disciplines - such as biologists, ecologists, social scientists

and geologists, and involves the regional citizen groups and policy makers. However, this is a dynamic partnership meaning that there is constant flow.

The stakeholders were invited to participate in the workshops to obtain their understanding on their challenges, and the market needs. By involving them in the process, it was possible to gather information about management activities, and their outcomes which are crucial to understand the montado.

However, this process was isolated as LTsER is not a permanent structure; it is dependent on the projects as there is no legal representation and permanent basic funding.

Being so, it is not possible to talk about the phases of co-creation for the whole structure rather specific co-creation activities for isolated projects or initiatives. There is an involvement of the stakeholders, whenever there is a question, but all done more personally.

Specification on methods, tools and communication

LTsER montado seems to rely mostly on personal contacts and communication to reach out to its stakeholders. With some of them the connection is strong due to other works, not necessarily because of the co-creation activities.

The website is quite scarce on information about results, methods and tools and not user-friendly. Nevertheless, it has a bibliographic database with over 4,000 titles that is subject to regular updates, and includes articles in national and international peer-reviewed journals, book chapters, dissertations, technical documents, manuals, etc.

The information received was sent by the interviewee, in the form of scientific articles which might not be the most adequate means to communicate with stakeholders and general public.

The team has researched on different participatory methodologies by practice to implement on the workshops. They learned what and how other projects and initiatives were doing. The facilitators were from the University of Lisbon – INOVA, collaborating for these specific activities.

Specification on cooperation and conflict

During the interview it was mentioned that the collaboration is needed to construct a Community of Practice that will work together on societal and environmental issues. However, since it is not a legal entity, it is more difficult to establish a permanent community; it is more of a dynamic cooperation in a project to project basis. Since it is not an established initiative with ongoing projects and also ongoing partners, there is no detailed information on specific conflicts or cooperation, apart from the lack of financial and human resources.

Specification on political influence

The stakeholders involved in the workshops included policy makers from several municipalities of the LTsER montado area; however, there is no specific political influence in the initiative.

Follow-up of the 'co-creation process'

As mentioned above, it is not possible to talk about a co-creation process rather co-creation activities developed for a specific study or project. There was no follow-up with the stakeholders involved (at least, that we were aware/informed). The results were used to publish some scientific articles.

Although the LTsER montado was selected as a case study in different projects for different topics (instruments, management of the site, how we use participatory methodologies, ecological data), the lack of formal structure, resources, and continuity of the processes hinders its development and follow-up as a co-creation initiative.

Scaling

Since this is not a co-creation initiative per se, rather used some co-creation approaches in some of the workshops, the scaling is not really applicable. The montado region is, of course, transversal to other regions, namely in Spain, but talking specifically about scaling in co-creation is not possible.

There are some possibilities that include the use of the community of practice around LTsER to other projects/ initiatives rather than just used as a case study for projects, the scaling of the methodologies and assessment tools by the stakeholders or to the LTER international network, and the knowledge transfer from this case study to other projects or similar montado areas.

Systemic change

The results from the workshops developed with the stakeholders were crucial for the researchers at CE3C to write, submit and publish scientific articles in academic journals[1011]. However, there is no evidence that these approaches (the assessment tools, the methodologies, future scenarios) were used by the stakeholders or even at the CE3C in some other forms. It is also not clear if there was a systemic change in any of the organizations involved.

Visualisation

There is no specific data for co-creation activities to make a graphic on the modes of co-creation.

Which learnings emerged?

Despite the highly sustainable management of cork that takes place in montado, the system is under threat from several factors highlighted above. As part of the interview, Margarida Santos-Reis shared that it is challenging as it takes time and support to create a community of practice. It is important to reach the stage where the sustainability of the ecosystem in economic, social, and financial terms can be guaranteed.

Attaining consistent results and progress can be extremely challenging if there is no support. In fact, the platform currently lacks human resources. Individuals supporting the platform are constantly changing and it is not possible for the project to offer short term contracts. According to Margarida Santos-Reis, it would be better to have full time staff managing a consistent workflow of the platform.

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Interview

Margarida Santos-Reis (CE3C, Director)

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Developing a Table for PIKSL Laboratories | Germany

Jennifer Eckhardt (TU Dortmund University), Tanja Klimek (TU Dortmund University)

Summary

This biography is based on SISCODE's case study PIKSL - Person-centered interaction and communication for more self-determination in life. The organisation PIKSL aims to close the digital gap in digital participation opportunities in the context of people with learning disabilities. The PIKSL labs are public educational places where people can access digital media, acquire digital skills and gain Internet experience in open settings as well as in courses. The special thing is that these places are the result of co-creation processes: In response to the desire for digital participation of the clients of the umbrella organisation

IGL, a kick-off workshop was organised in February 2010 with representatives from science and research, management, clients and employees of IGL, where the PIKSL idea was born.

This biography describes the first co-creation process after the initiation of the organisation PIKSL: People with learning disabilities should contribute their expertise in breaking down barriers within the co-creation process to the conception and development process of an inclusive, multifunctional and barrier-free meeting place for the implementation of digital participation. The conception and development process also includes the realisation of the corresponding interior, especially the implementation of a height-adjustable work table on castors for mobile use in the PIKSL lab.

After the PIKSL lab in Düsseldorf had established itself and won a number of awards, a scaling process was initiated to spread the PIKSL idea and reach more people. The result of the co-creation process, the designed tables, can still be found nine years later in the other five PIKSL labs and have become an important trademark. They contribute to a de-stigmatisation of the place by not associating it with facilities for the disabled, but rather acting like a modern co-working space. They are also a good example of universal design. This solution differs from traditional or previous practices as the involvement of people with learning difficulties in their role as experts can be seen as innovative.

In summary, the co-creation process can be seen as a response to various societal challenges, such as the digital exclusion of specific groups, the still prevailing protective and deficit-oriented perspective on people with disabilities and the accompanying stigmatisation of places in disability care.

In the following, the selected co-creation process will be examined in detail, highlighting the context and starting point that led to the initiation of the process. Furthermore, the further development of the process is shown by describing the stakeholders involved, the individual phases of the co-creation process and the tools and methods used. The biography concludes with a consideration of the further development and expansion of the approach, the description of the impact that the co-creation process has already gained and how co-creation is reflected in the field under investigation.

Context of the 'co-creation process'

The promotion of an inclusive society has been a declared goal in Germany, not only since the ratification of the "The United Nations Convention on the Rights of Persons with Disabilities (CRPD)" in 2009. Inclusion means that it is no longer the disabled person who has to adapt in order to be able to participate, but the focus is on the impeded environment. The unrestricted and self-evident right to participate also means ensuring equal access to information and communication, including information and communication technologies and systems[1]. Digital participation is thus an important condition for social participation.

Despite the ongoing digitisation process and the explicit statutory provision in Germany that all people should have free and open digital access, as also demanded by the CRPD, several million people are not part of the digital society. This particularly concerns people with learning difficulties[2].

The organisation "Person-centred interaction and communication for more self-determination in life" (PIKSL) addresses this social challenge by working to close the digital gap in digital participation opportunities in the context of people with learning disabilities. Due to inadequate access, non-barrier-free offerings and a lack of inclusive teaching and learning materials, they are unable to make full use of the opportunities offered by information and communication technology[3]. Due to increased ambulantisation in the welfare sector, the need for clients to maintain social contacts is also increasing. Clients of IGL expressed a desire to use digital media and to learn how to deal with them. So, the demand stems directly from the affected population.

As a starting point for the focused co-creation process, the idea of involving future users and their needs can be identified: People with learning disabilities should contribute their expertise in breaking down barriers within the co-creation process to the conception and development process of an inclusive, multifunctional and barrier-free meeting place for the implementation of digital participation. The focus should not be on compensating for limitations, but rather on people's potentials and a resource-oriented perspective. The conception and development process also includes the realisation of the corresponding interior, especially the implementation of a height-adjustable work table on castors for mobile use in the PIKSL lab. Stigmatisation and discrimination of people with disabilities still exist; therefore the place including the equipment should have a modern aesthetic in order to avoid a stigmatising effect.

In summary, the co-creation process can be seen as a response to various societal challenges, such as the digital exclusion of specific groups, the still prevailing protective and deficit-oriented perspective on people with disabilities and the accompanying stigmatisation of places in disability care.

Starting point of the 'co-creation process'

The co-creation process started as a result of a joint workshop in February 2010 to develop the PIKSL lab in Düsseldorf. The process was initiated by the management of the umbrella organisation "In der Gemeinde leben gGmbH (Living in the community gGmbH) – IGL" as a reaction to the demand of IGL's clients to support them in dealing with new digital media. IGL advises and accompanies people with disabilities and their relatives in search for suitable support services[4]. The clients expressed a desire for digital participation and reported about missing digital opportunities. In their respective living environment digital devices were neither available nor was the level of digital competences sufficient to use computers, tablets or mobile devices.

The project manager of PIKSL has implemented the process by initiating the kick-off workshop in February 2010 and inviting representatives from science and research, the management, clients and employees of IGL to this workshop. Thus, all relevant stakeholders were directly involved from the beginning. It was particularly important to involve the future users of the PIKSL lab, so that their needs and wishes are not discussed in their name, but can be expressed directly by them.

One of the residents, who among other things had given the impulse for the idea, gave a talk during the workshop in which he explained the urgency and his wishes regarding digital participation. According to the external persons it was a new situation for them to work directly together with the target group. But they were open and motivated to try it. The workshop focused on the questions of how digital participation can be realised and how the target group can participate in the project. In a creative phase the idea of the PIKSL lab emerged. Furthermore the name "PIKSL" was determined. Important influences and inspirations included modern methods and principles such as design thinking, participation and forms of work like co-working spaces where many different disciplines work together. According to the project manager, the workshop can be seen as the initial spark for the PIKSL project, in which many points were set. The workshop was followed by

the further development of initial ideas like the conception of the PIKSL lab and the submitting of funding applications and project proposals. The project management contacted industrial designers regarding the development of the lab interior. The co-creation process, the realisation of the interior, especially the implementation of a height-adjustable work table on castors for mobile use in the PIKSL lab, then started with the participation of IGL clients. The two industrial designers observed the first weeks and met with the future users, explored their living environments and analysed their wishes and requirements. They developed prototypes of the room concept and furniture design, which were examined and discussed in the plenum. Thus the furniture represents a special feature because it contains the expertise of the potential users. The furniture was finally produced in workshops for people with disabilities[5].

Which methods and tools were used for co-creation will be described in more detail in the next chapter. In terms of the governance dimension, the process was thus organised from bottom-up, at an internal company level. The implementation of the project of an inclusive meeting place in the neighbourhood took place at the municipal level. For the co-creation process a budget of about 30.000 Euros was provided by the umbrella organisation IGL.

Further development of the 'co-creation process'

In the following, the co-creation process from problem framing to solution building is described with special consideration of the participatory phases.

Landscape of stakeholders

Within the co-creation process different main actors were involved; these are now described in more detail:

The management of the IGL (male, 55 years, religious educator) and the PIKSL project management (male, 30 years, communication designer) have implemented and supported the process. The management was regularly informed by the PIKSL project manager about the status of the process development. As motivation for the management the positioning of IGL as an innovative company can be identified, which has a high interest in a participatory corporate culture and wants to promote the removal of digital barriers in the environment of people with disabilities. The project manager explained that his underlying motivation was to put design knowledge for the integration of people with disabilities into

product development processes into practice, thus making the consumer a prosumer. Furthermore, to use design methods as a key factor for the development of social innovations. The project manager was able to contribute his knowledge and experience in the exploration and visualisation of customer life worlds, in the application of creative tools and in the general implementation of projects to the process.

Of the IGL client representation, three residents, a 40-years-old man and two women, 30 and 42 years old, were particularly involved in the process and contributed their expertise in identifying and breaking down barriers and their knowledge of the target group requirements. This enabled them to position themselves as experts, contrary to the often deficit-oriented prevailing perspective on people with disabilities. The implementation of an open workplace, where solutions for digital participation are developed and where access to new communication and information resources is enabled, as well as the creation of new employment opportunities apart from the "classical" workshop for people with disabilities, can be identified as underlying needs and driving values of the target group.

The project manager was able to convince the design office "Lehmann und Schmedding GbR" to take on the task of co-designing the PIKSL lab[6]. The industrial designers (a woman and a man, both 34 years old) planned, implemented and evaluated the process. The conception and development of the overall project was coordinated with the PIKSL project manager. They have contributed to the process with their practical experience and skills in product design, aesthetics and in the implementation of customer projects. Feedback could be directly taken into account in product development because they actively involved the target group in the development process. The industrial designers also benefited from the co-creation process, because they gained new insights in dealing with people with disabilities, had a high degree of design freedom and at the same time were able to implement concepts that were close to the needs of the target group. Another motivation can be the implementation of a project with such a social impact.

The decisive reason for the selection process of the stakeholders involved was the proximity to the target group and the understanding of their needs. In addition, the focus was on active involvement with the target group, as it was not intended to become a process in which representatives of the target group participate, but to involve people with learning difficulties directly in the product development process.

Phases of co-creation

In this process co-creation took place in the ideation and design phase. As already described, the PIKSL idea was developed together in a kick-off workshop in February 2010. This was followed by a briefing with the industrial designers. It was very important for them to get to know the lifeworld of the future PIKSL users. Because of this, they have conducted hospitations in the IGL.

Then the design phase began together with the residents of the client representation. Prototypes were made, which were presented by the designers and then discussed with the residents of the client representation. Their suggestions and points of criticism were documented by the designers and integrated into the next design phase. This iterative process took place over several months.

As a critical turning point in this process, the remark of a wheelchair user who was unable to drive under the table during prototype testing can be identified. Then a height adjustment was installed, which enables flexible use.

Specification on methods, tools and communication

Important methods for the co-creation were visualisations of the designs in form of illustrations, computer drawings and mood boards. Brainstorming, keynote speeches, hospitations, interviews and the exchange of experiences were specially used for the idea generation phase. During the design phase prototyping, scribbling, illustrations and mood boards were used.

In the joint working process, attention was paid to simple language, simplicity and accessibility, as classical teaching methods do not meet the needs and opportunities of many people with disabilities. The dialogue between the actors was not structured according to a specific methodology or led by professional facilitators. Otherwise, regular meetings were held to discuss design drafts.

According to the project manager, the co-creation tools were perceived by the stakeholders as low-threshold and intuitive to use. This enabled people with learning difficulties in particular to participate in the design phase. Especially the visualisations helped to break down the level of complexity.

Specification on cooperation and conflict

The cooperation with the industrial designers within the considered co-creation process can be seen as a foundation for further cooperation. A business relationship with the umbrella organisation IGL has also developed from this cooperation. The case study has already highlighted the general importance of cooperation for the functioning of the organisation: In its work, PIKSL receives support from more than ten partner organisations from science, teaching, education, communication and the private sector. This exchange and cooperation represent an important pillar of the PIKSL idea because it supports PIKSL in its goal of creating digital participation. There was no dissatisfaction or conflict within the considered co-creation process.

Specification on political influence

PIKSL is not explicitly connected to a direct political programme. However, references to the implementation of the United Nations Convention on the Rights of Persons with Disabilities can be formed because the process was about unrestricted access to digital media. Otherwise, there was no positive or negative political power that had an influence on the process.

Follow-up of the 'co-creation process'

No follow-up was agreed among the stakeholders, but the implementation of the first PIKSL lab in Düsseldorf in October 2011 can be considered as a "joint solution" between the stakeholders. This solution differs from traditional or previous practices as the involvement of people with learning difficulties in their role as experts can be seen as innovative. As already described, the perspective on people with disabilities is often more protective and focused on compensating for limitations than empowering and resource-oriented. In the beginning, PIKSL was seen as a competitor to other providers of the welfare system[7]. For the IGL as an organisation, the bottom-up approach was a previously untried way of implementing projects. The involvement of own clients in the design of projects and services was also a new approach. The co-creation process has created a business relationship between the industrial designers and IGL.

Scaling

After the PIKSL lab in Düsseldorf had established itself and won a number of awards, the project funding ended in 2014. Therefore, the focus was on refinancing the PIKSL lab. The umbrella organisation IGL was not able to fully finance the PIKSL lab, so refinancing became a problem. Nevertheless, the second PIKSL lab was already opened in Bielefeld in 2015. This was beared by the "v. Bodelschwinghsche Stiftungen Bethel" and financed by a project sponsored by the Federal Ministry of Education and Research (BMBF). In order to develop a long-term financially viable concept and to carry out a feasibility study for scaling up the PIKSL idea, a business economist was hired in 2016. The aim of the feasibility study was to be able to submit an application for funding for the German SKala Initiative, which promotes charitable organisations[8]. SKala is an initiative of the entrepreneur Susanne Klatten in partnership with the non-profit analysis and consulting company PHINEO. PIKSL is now in the second funding phase, in which the focus is on the dissemination of the PIKSL idea[9]. In order to reach as many people as possible, PIKSL labs are to be established throughout Germany. For this purpose, PIKSL cooperates with various social sector organisations that set up their own PIKSL lab within the framework of a social franchising model. For this purpose, a separate department has been set up, the PIKSL Management Team, which is responsible for the dissemination process, administration as well as for all managing procedures. The PIKSL Management Team is part of the IGL and currently consists of seven employees[10].

Systemic change

The result of the co-creation process, the designed tables, can still be found nine years later in the other five PIKSL labs and have become an important trademark. They contribute to a de-stigmatisation of the place by not associating it with facilities for the disabled, but rather acting like a modern co-working space. They are also a good example of universal design. This is a design concept in the sense of the CRPD: products, services, programs, devices, environments and systems should be designed in such a way that they can be used flexibly by as many people as possible[11].

Overall, there are tendencies that point to a systemic change in society through PIKSL. PIKSL has already been able to reach out to a number of providers of assistance for the disabled with the main objective of promoting digital participation by founding their own

PIKSL lab or participating in workshops. Thus, PIKSL contributes to raising awareness of the need for digital participation for all. In addition, PIKSL works with its concept to reduce existing prejudices against people with learning disabilities and to change the often prevailing preservative and deficit-oriented perspective on people with disabilities into a resource-oriented and empowering attitude. A contribution is not only made to digital but also to social participation, as the labs are open meeting places for an inclusive exchange. Other important values associated with the PIKSL concept are participation and transdisciplinary cooperation in the sense of co-creation. The focus is always on the user perspective. PIKSL has also led to structural changes within the umbrella organisation IGL. Furthermore, IGL is currently focusing on becoming a digital company[12].

Visualisation
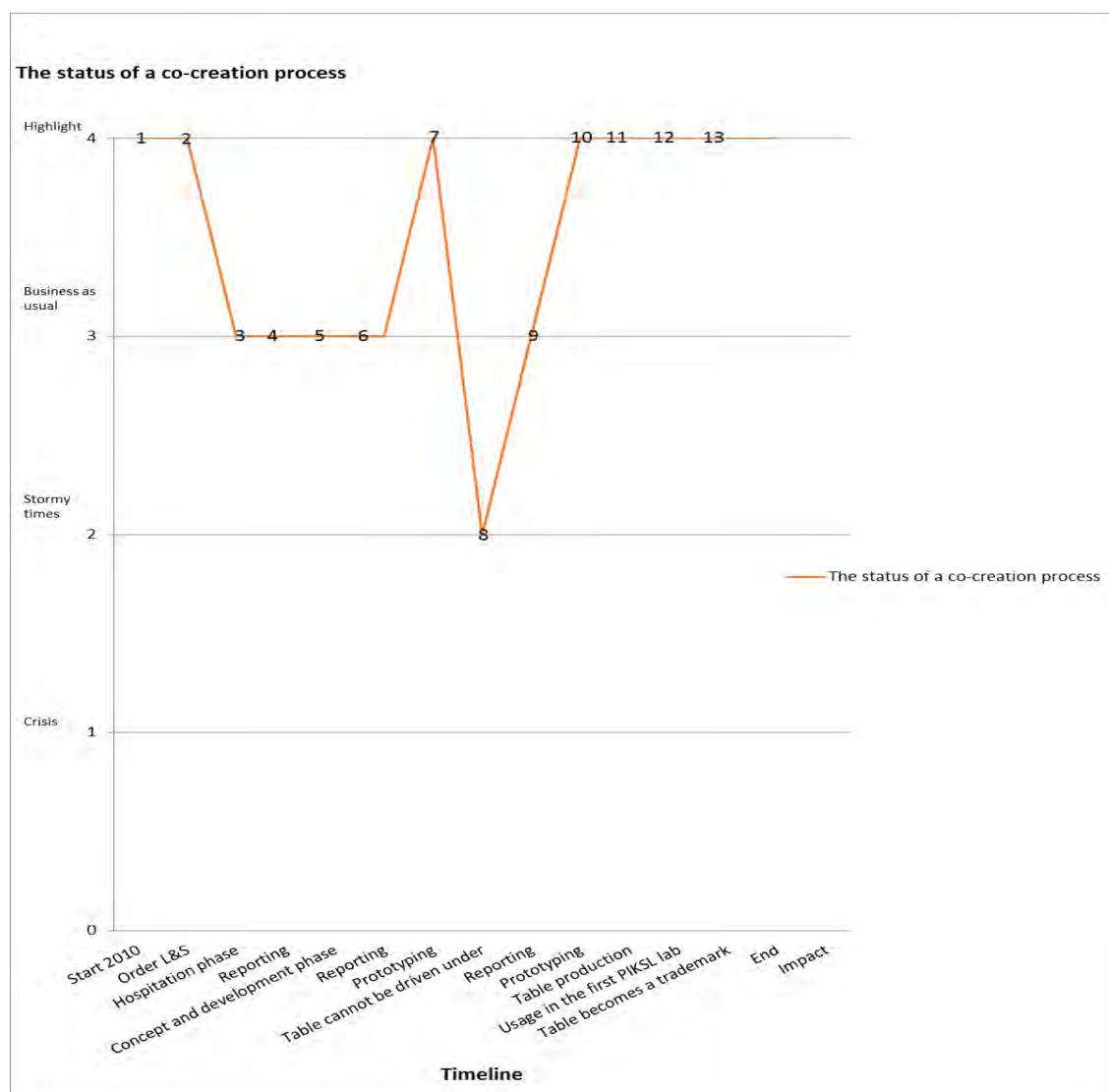
1. Start February 2010: Kick-off workshop PIKSL

2. Commission to design studio Lehmann and Schmedding

3. Lehmann and Schmedding observe and get to know the living world of the clients

4. Reporting between PIKSL project management and designers

5. Iterative concept and development phase with clients

6. Reporting

7. Prototyping

8. Prototype fails with wheelchair user, because the table cannot be driven under. The height adjustment is then built into the table.

9. Reporting

10. Prototyping

11. The table is produced.

12. The table is used in the newly opened PIKSL lab in Düsseldorf.

13. The table becomes a trademark of PIKSL and is used in the other labs.

Which learnings emerged?

Based on the collected data, final consideration is given how co-creation is reflected in this biography. In this case, co-creation is the result of active participation and an empowering perspective. The special thing about this case is that it takes place in a context in which decisions are often made about people with disabilities rather than involving them directly. The responsible persons perceived the wishes and needs of the clients regarding digital participation and involved the clients equally as experts of their own lives in the process. Against the background of disability assistance in Germany, this perspective can thus be described as innovative, as there is often still a deficit orientation and compensation instead of creating opportunities to bring in skills and resources. In retrospect, the hiring of the communication designer as head of the project certainly played an important role in the emergence and further process of PIKSL. With him, principles of design were incorporated into the process, that problems can be solved better if interdisciplinary teams work together in a creative environment and the user perspective is actively involved from the very beginning. This also includes the culture of trying, improving and learning. In

addition, design enables barrier-free involvement of all stakeholders through visualisations and flexible design thinking methods. Co-creation and design principles seem to be connected.

Above all, the innovative environment for co-creation in this case is characterised by participation, equality, resource orientation, empowerment, open, committed and interdisciplinary employees, the use of design (methods) as well as the (financial) support of the partners and networks. In summary, co-creation can not only be seen as a method but as an initiation moment for the organisation and as a fundamental part of the concept. Thus the selected co-creation process represents a good example of the general co-creation culture in this organisation.

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<u>Interview</u>

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Sharing City Umeå - Framtidens Mobilitet (Mobility of the Future) | Sweden

Eva Wascher (TU Dortmund University)

Summary

The Innovation Biography 'Sharing City Umeå – Mobility of the future' refers to the Case Study 'Sharing City Umeå'. It is a project coordinated by Umeå Municipality in northern Sweden. For Umeå's inhabitants it should be easy to live sustainably. The city's population is growing and this development is managed by the municipality with regard to social, ecological, cultural and economic sustainability. 'Sustainable living' is a political program by the municipality which is implemented through several projects. In these projects, the municipality engages with different actors to find creative and new solutions for citizens in order to contribute as a city to the achievement of the Global Sustainability Goals (SDGs). In 2018, the municipality of Umeå carried out a consumption habits survey with citizens to investigate mobility patterns and other consumption related aspects with climate impact. Furthermore, the city conducted travel habits surveys the years before. Based on this knowledge, ways of traveling have a significant climate impact and the city must therefore test new solutions for sustainable mobility in new and existing urban areas. As a goal, a sustainable lifestyle including sustainable modes of transport should always be a feasible and easy solution for people living in Umeå. In order to reach that goal the municipality develops and supports different initiatives around sustainable mobility. Based on this ambition, the ideas of creating mobility service hubs in Umeå were raised. Mobility service hubs are places that bring together different types of services that reduce peoples' travel needs and allow for alternative mobility solutions. This way, the need for transport can be reduced. For example, a mobility service hub offers solutions to pick up ordered goods, to borrow a bicycle or car, to service your bike and meet others who live in the area. Altogether, opportunities for reuse should be promoted and recycling should be made possible. It should be easier and more attractive to choose sustainable means of transport rather than owning a car and overall needs for transport should be reduced. From a holistic

perspective which includes urban planning, public transport solutions and service design the city decided to conduct a 'mobility of the future' user-centred design study. This focus group study identified three target groups that are especially relevant for the 'Service Hub' project because of their possible climate impacts if sharing services would be used more frequently. Furthermore, the study identified the main frustrations each target group has today linked to mobility in day-to-day activities. The focus group study also demonstrated the strongest needs that drive target groups' choices linked to mobility and created an outlook on the target groups' needs for the future mobility. Eventually, recommendations could be derived for further initiatives around sharing services in Umeå also linked to user-centred approaches. According to participants, the 'Mobility Paradise of the Future' (Framtidens mobilitetsparadis) is a city that is not designed solely on the basis of efficient mobility, but which gives greater importance to enjoyable, flexible and comfortable travel (easy travelling for people and goods, without the need to advanced planning, guided by simple services). This helped designing prototypes for service hubs concepts that will now be tested at the parking garage Nanna (parkeringshus Nanna) and the Cycle Center (Cykelstället). By testing in an existing urban environment, the municipality gains experience which can be transferred to other fields, e.g. new and existing housing areas.[1]

Context of the 'co-creation process'

The mobility service hub is a sub-project of project 'Sharing City Umeå'. Sharing City Umeå contributes to Umeå's development by testing new solutions and collaborations. With the theme of 'Sharing', the municipality works for sustainability in all dimensions. Umeå municipality's vision is to become 200,000 inhabitants by 2050 and be a pioneer in the sharing and circular economy. For that reason, Umeå is an active participant in the OECD project 'The Economics and Governance of Circular Economy in Cities'[2]. The municipal council adopted a 'Comprehensive Plan for Umeå Municipality' in 2018 which includes five sustainable growth strategies[3]:

1. Promoting city growth in a five-kilometre radius from the city centre: Umeå aims to grow in an organic way in order to make sustainable mobility easy and effective. This will stimulate citizens to use public transport, aiming to accomplish a shift from car dependency towards sustainable transport modes (e.g. bicycle).

2. Developing high-density new city districts: high density will make it possible to support new areas with public transport, sustainable services and sharing solutions.

3. Planning population growth along public transport corridors.

4. Investing in public parks to provide citizens with a healthy environment, through fostering access to recreation and promoting a sustainable lifestyle.

5. Offering citizens an open, transparent and democratic process encouraging participation in the planning process, through co-creation and citizen engagement processes.

The strategies are accompanied by different supportive mechanisms such as increasing 'the knowledge city of Umeå' with education and lifelong learning systems, e.g. in the university district. Additionally, based on being European Capital of Culture 2014, Umeå wants to further strengthen its position as an international centre of culture and promote culture as an investment and inspiration for a sustainable society and growth. Social issues are high on the city's political agenda as well. In cooperation with the region, Umeå aims to provide the best public healthcare system in Sweden and halve child poverty. Different measures have been implemented to foster gender equality in the city, from improving gender representation in cultural events to enhancing safety in the streets. In 2014, the Observatory of the European Charter defined Umeå as a 'model town for gender equality'[4]. Furthermore, Umeå municipality has initiated the Call for a European Capital of Social Progress Award[5] to encourage other cities to stand up for a more socially progressive Europe[6] 'Gendered innovation' was one of Umeå's main features for applying as European Capital of Innovation (iCapital) Award in 2018.[7] For example, the gendered landscape tour of Umeå is a way of making statistics come alive and to demonstrate concrete effects of striving for gender equality. Work that has been led both by the municipality, but also by other organizations and persons in Umeå. The purpose is to underline the importance of highlighting gendered power structures in society and to show results of long-year endeavours with gender issues in Umeå municipality.[8] In 2017, the method 'The gendered landscape' was awarded 'Good Practice for sustainable urban development' by URBACT. It is the only example in Europe with a focus on gender equality[9]. One example of the gendered landscape connected to user-centred mobility hubs was the project 'Nanna - a parking garage for everyone' which was conducted by the municipal parking company Upab. The aim was to investigate how power and gender become visible in a parking garage and how gender mainstreaming can help to create an environment that is safe and accessible to everyone.[10] Already in 1998, the municipal council in Umeå decided that all municipal companies would take power on gender mainstreaming in their operations. Therefore, Umeå's municipal parking company Upab launched a project to make the

parking garage Nanna in central Umeå an equal parking garage. The aim of the project was that women and men should be able to park on equal terms, and that the environment should be perceived as safe for everyone. Users of the garage were studied according to the reasons for parking there, what time it needs, which resources were required and how they experience the parking garage. Among other things, the parking garage itself was perceived as insecure and dark. Based on this knowledge, Upab has tried to change the parking garage into a more attractive and accessible environment. The car park was repainted, scrubbed, got new and better lighting and more easily opened doors as well as glazed walls for the stairwells for better visibility. The equality work in Nanna has not been completed, but is ongoing. It is also ongoing in the Sharing City Umeå project which has a special focus on gender equality and integration as well.

The city is tackling many complex issues and thereby has to challenge existing structures. The opportunities and risks of the sharing economy must be tested and evaluated before they can be implemented on large scale in urban planning processes and beyond. Therefore, projects like Sharing City Umeå develop and test new solutions for sharing services. There is great hope, that sharing services developed in the project can be best-practice examples for contributing to a reduced energy and climate impact of consumption and help to promote socially sustainable development in the city. Umeå is today one of four innovative cities within the national program Sharing Cities Sweden. The other cities are Gothenburg, Malmö and Stockholm. The purpose of the program is to share resources within a city more efficiently and to share knowledge between participating cities. Sharing Cities is also based on the principles behind open source and open data.[11] Sharing Cities Sweden is part of the strategic innovation program Viable Cities, which is financed by Vinnova, the Swedish Energy Agency and Formas (see Case Study Sharing City Umeå).

Starting point of the 'co-creation process'

Starting point of the co-creation process for designing 'the mobility of the future' including mobility service hubs were several ongoing projects that Umeå municipality was already involved with. A couple of years ago the municipality decided to increase possibilities for cycling in the city as a smart and sustainable way of traveling. Therefore, Umeå municipality is participating in Sveriges Kommuner och Regioner (SKR)'s reference group for increased safe cycling (a government assignment). The purpose of the reference group

is to make it both easier and much more effective for municipalities who want to invest in increased and safe cycling in the municipality and make it safer for cyclists, all according to the national cycling strategy.[12] Among other things, the reference group develops criteria for good behaviour-influencing efforts for increased cycling. Because Umeå municipality wants to offer alternatives to the car for travelling within the city centre and the campus area, the idea of providing an electric cargo-bike pool for citizens was introduced. Usually, bike-pooling services are provided by for-profit businesses. But for the city of Umeå, no company could be found that wanted to offer the service. Therefore, the municipality decided to initiate a bike-pooling service. Work started, among other things, at the streets and parks department of the municipality that is concerned with overall mobility management for the city. According to the sustainability goals of the city it is the task of this department to engage in strategies that make it easier for inhabitants to travel by foot, by bike or by bus and to lower the use of cars especially in the city centre. Staff of the department has for example been employed in the project The Low Carbon Place ('Den koldioxidsnåla platsen') that already started a couple of sustainable mobility activities (see Case Study and Innovation Biography ('Den koldioxidsnåla platsen'). As Umeå is using the city as a testing ground for behavioural change towards reducing the city's emissions the project covered several activities that engaged citizens in different ways. One of the sub-projects developed a Living Lab that challenged ten families to go car-free for three months (Tre bilfria månader) which included using the U-bike cargo bike pool for free[13]. Another activity was a large information campaign called #Brytupp (break-up) which should encourage citizens to break-up with unsustainable modes of travelling. The campaign focused the motivation of freedom feeling when using the bike rather than pointing out needs and environmental effects of unsustainable mobility. The campaign included billboard posters, a magazine/small newspaper, a short campaign advertisement film which aired in cinemas and social media channels for #Brytupp. The campaign was also used to show and inform about different sustainable mobility services that the municipality is offering, e.g. the venue for cyclists at Cykelstället, the sharing service U-Bike (cargo-bike pool) as well as Cykelöverfart (Bike-over-passings). These bike overpasses or crossings in streets are built in a way that cars have to stop and pedestrians as well as cyclists have right of way. 21 Cykelöverfart have been built by the municipality in recent years making it easy and fast to go by bike through the city[14] . The municipality-owned and managed cargo bike pool U-bike was partly further developed within the project 'Den koldioxidsnåla platsen, e.g. including marketing, developing the service and arranging the opening day ceremony

at Cykelstället. Now with the project Sharing City Umeå some more resources can be put into the service to further raise awareness among citizens and to further improve the sharing functions and facilities. One of the pre-defined sub-projects of the Sharing Cities Sweden programme was to establish service and mobility hubs for sharing services and products. The sub-projects that would be developed within the Sharing City project were selected during the pre-study phase in which topics and project partners were considered. The Service Hub sub-project emerged from the idea that Umea is growing quite rapidly with approximate 2.000 inhabitants per year. In effect, the city will double its population in less than fifty years to approximate 2000.000 inhabitants by year 2050. This results in new districts and building and construction sites like 'Tomtebo Strand' with about 10.000 new inhabitants in the next years. For new districts like Tomtebo Strand the municipality developed a sustainability program with partners[15]. For mobility and sharing, this involves creating mobility and service hubs and offering digitalised sharing services as well as proving good access to public transport, safe lanes with high accessibility for pedestrians and cycling, bicycle friendly buildings and an overall planning for low car use. In a way, actors involved in the planning and construction for the new district, like Umeå Energi, the local energy company, Vakin - the local waste company and Upab- the local parking management company all had different perspectives on their contribution to developing the new district and making it as resource efficient as possible. The question was to investigate how a mobility hub can serve as a kind of a waste management, how can more efficient ways of taking care of waste and reducing transport need be developed, how can charging stations for e-mobility be implemented in the service and mobility hub and what are the possibilities of shared battery storage for solar-based energy systems etc. There was an overall agreement to investigate the possibilities of hub-services and because many of the services would not solely refer to mobility and transport issues, project partners decided to use the term 'Service hub' with the project. In the beginning, the Sharing City Umeå team focussed on researching mobility hub solutions. A consultancy, Trivector, was commissioned with conducting a study about six best-practice examples of service and mobility hubs in Europe (Flustret, Vallastaden Linköping; Rosendahl och Ulleråker, Uppsala; Mobilitetsgarage Slottsbacken, Stockholm; MobilStation in the districtMülheim, Köln; Einfach Mobil, Offenburg; Domagpark, München). The study analysed each background of hubs (purpose, location, business model, development process, digital infrastructure (app, platform for booking, ordering etc.), provision of services (mobility, supplies, information, waste management etc), lessons learnt). Besides, the city of Umeå

was already testing some sharing services including the cargo bike service U-bike and a safe bike storage at Cykelställat. One of the intentions with testing is to examine whether citizens are actually willing to pay for this kind of services, e.g. putting their bikes in a safe and warm environment. Results from the studies can then be communicated to other stakeholders, such as private property owners, in order for them to develop similar concepts. The service hub idea was developed in 2019 in a service-design process with citizens and will be tested from 2020 on. The location is one of the biggest parking houses in central Umeå called Nanna. It is an area with around 24.000 people per day moving around mostly by bus or bicycle, making the car parking garage a place with high potential for becoming a hub for sustainable mobility. For the property owner Upab, this is also a test field for evaluating the feasibility and implementation of mobility and service hubs for other places in the city. The Nanna parking lot already provides a carpool sharing service which is not used frequently, e.g. because of lack of visibility. Previous ideas included to improve the car-sharing service at Nanna, to introduce a bike-sharing service and to include a Delivery Cabinet, e.g. for parcels and other goods that were ordered online. In Sweden, parcels are usually delivered to kiosks in one's neighbourhood for free and to one's home only for an extra charge. Meaning that people get informed about a parcel by a small postcard when they are at home and have to make an extra travel to pick-up the parcel. Using a serice hub in the city centre could enable people to pick-up their parcels before they go on the bus and reduced the need for additional travelling.

Further development of the 'co-creation process'

The goal of the sub-project 'Service Hub' is to develop knowledge about service hubs through external monitoring and to actually test services in existing urban space. [16] Mobility and freight transport is a priority issue when a district is to be designed so that sustainable modes of transport (bus, bicycle, walking) become the first choice. The services that have been tested must be evaluated on the basis of providers, users and what actual benefits the services can have socially, ecologically and financially. Milestones in the project included:

- Compilation of service and mobility hubs conducted by Trivector

- Stakeholder workshops with the municipality, municipal companies, construction companies and Trivector

- Roundtable talks with car pool operators

- Service design - user perspective on service hubs with Hello Future

    1. Mobility of the future - sustainable travel in ten years - report Hello Future

    2. Development of the parking garage Nanna mobility hub started

- Extension of the Ubike pool at Cyckelstället, including bicycle Service Station and Solar cells installed in September 2019

- Workshops on Upab with Hello Future

- Study visits at the Bicycle Center in Region Jämtland - Härjedalen project SMICE, Region Örebro tänkanken.nu, Uppsala parking AB

User involvement and citizen engagement are important for the overall process of the 'Service hub' project. As Sharing Cities is an innovation project it creates new knowledge for the actors involved. This requires that the municipality as coordinator is open to new insights and acknowledges the role of not being the sole knowledge provider but to use co-creative approaches together with other stakeholders to come up with feasible solutions that will be shared by many actors, including citizens. Even though, after the research phase the municipality gathered a good overview about best-practice examples of service hubs the decided it would be necessary to further develop their initial ideas for solutions and to broaden the development process by involving citizens with a diversity of perspectives and backgrounds as users of the services. It is important that newly designed services involve different user perspectives in order to be related to different groups of inhabitants. Especially with regard to sharing services it is very much up to the individual if the service is used or not. If citizens do not trust the service it will not be shared. With a focus on user-cantered methods in this specific effort, the municipality strengthens the user perspective and creates a good understanding of the citizens' long-term mobility needs. From an internal perspective, the municipality creates legitimacy for their sustainable mobility initiatives and a basis for urban planning. Therefore, it was decided to conduct focus group studies to further develop the service hub concept.

Landscape of stakeholders

Sharing City Umeå is coordinated by the City of Umeå (municipality). Partners include Akademiska hus, Coompanion, Umeå Energi, UPAB, VAKIN, Region Västerbotten, and Umeå university. Akademiska hus is a state-owned property company and takes special responsibility for being a leader in sustainability. It is one of Sweden's largest property companies and a specialist for building, developing and managing environments for

education, research and innovation in collaboration with universities and colleges. Vakin is a water and waste company, jointly owned by Umeå and Vindeln's municipalities. Coompanion is a consultancy for cooperative business models. Umeå Energi is a municipality-owned energy company. UPAB is the municipality-owned parking space provider. Other partners are Region Västerbotten and Umeå University. The budget of the project 'Sharing City Umeå' is about 24 million SEK of which 12 million SEK are a grant through Viable Cities program and 12 million SEK are co-financed by all involved project partners.

The co-creation process of the 'Service hub' focussed on the parking garage Nanna. Owner of the Parkeringhus Nanna is Umeå Parking AB (Upab), one of the project partners. Upab is responsible for the operation of all street parking in Umeå municipality. In addition to this, they operate the five parking houses Nanna, the Parquet, Dragonen, Navet and the Railway Hall. In addition, they have assignments from a number of property owners providing everything from planning, operation and maintenance to parking monitoring. Upab's mission is to offer well-located and attractive parking facilities drive parking and parking monitoring. The goal is that all parking spaces should be clear, accessible and easy to use.

The focus group study was conducted by Hello Future. Hello Future is a consultancy and agency specialised in digital transformation. The organisation offers the provision and facilitation of service design, software development, innovation sprints and digital strategy to create long-term change and innovation with their customers.[17] Hello Future is part of the international Service Design Network (SDN) which is the leading non-profit institution for expertise in service design and innovation processes.[18] Hello Future was commissioned by Umeå municipality to conduct service design processes for other projects and departments and within this cooperation they designed the 'mobility of the future' process.

Phases of co-creation

For developing the service hub concept the municipality and its partners decided to do case study research as a first step including a results discussion workshop with stakeholders. Following that, two focus group studies, facilitated by Hello Future, took place. The first study was about the general question of mobilities of the future and the second study was about concrete sharing service and mobility solutions for the parking garage Nanna.

1) Engagement of actors: Relevant organisations

For dissemination of results about the case studies conducted by Trivector the municipality decided to conduct a broad stakeholder workshop as well as roundtable talks with car pool operators. For the stakeholder workshops, different actors from diverse departments within the municipality of Umeå were invited as well as people from other municipalities, municipal companies and construction companies. For the sub-project 'Service Hub' it was a major kick-off because people than realised what the service ad mobility hub idea was about and what other cities and countries are doing in that direction. The workshop had 40 participants of all relevant organisations in Umeå, including the Sharing City Umeå project partners. Since that, some private builders and construction companies are pushing similar hub concepts in their projects. This is of high importance to the municipality because property owners need to provide shared services for their own facilities, close to where people lie, and not every service can be arranged by the municipality. The documentation of the workshop was broadly shared by participants. This way, Sharing City Umeå with the 'Service Hub' sub-project acts like a facilitator of a knowledge network and is an important contact for creating service and mobility hubs in the region.

2)   Starting-off citizen engagement: the focus group 'mobility of the future'

The cooperation with Hello Future started with an expert group workshop for a stakeholder mapping for selecting the focus groups. The expert group consisted of employees from different departments within the municipality as well as people from Upab, Umeå Energi and the local public transport operator. The workshop took place for half a day and was facilitated by this Hello Future. The aim of the workshop was to work out what focus groups they wanted to investigate, what target groups they had and what kind of questions and experiences they wanted to learn about. The group collected target groups like 'people driving by bus', 'people parking by car', 'cyclists', 'people who work in the inner city', 'people who work in the inner-city circle', 'people with kids', 'couples without kids' etc. Furthermore, the group had to evaluate and rank possible target groups on their possible effects of using sharing services. From this information Hello Future designed a focus group study and developed a questionnaire. This was then commented and finalized in cooperation with the municipality.

The first focus group study called 'Initial survey of long-term resident needs in Umeå municipality part 1 - Mobility of the future' was conducted in May 2019 and facilitated by Hello Future. The three selected target groups were: youngsters, Families with children, older couple without children living at home (so-called Dinks, Double Income No Kids)[19].

According to Umea residents, the Mobility Paradise of the Future is a city that is not constructed solely on the basis of efficient movement, but which gives greater importance to enjoyable, flexible and comfortable travel. The total cost of the trip is the important one, where costs in time, convenience and climate impact weigh heavy. The discussion also highlighted the most important mobility frustrations are of participants. Seven ideas were tested on the participants in the design study which they evaluated, including their most relevant recommendations. The focus group's seven most popular ideas:

- Strong interest for bicycle service tools as well as warm and pleasant waiting rooms.

- Poor interest for ordering in the city and picking up goods on the way home as well as borrowing an electric bicycle, or parking one's bike safely and securely

- Weak interest for borrowing an electric scooter and renting an electric car.

The second focus group study called 'Invånarstudie: Nanna-P - nav för hållbart resande (Residential study: Nanna-P - hub for sustainable travel)'[20] at the end of August 2019 and facilitated by Hello Future. In a start workshop for the second focus group study Umeå Municipality and Upab discussed issues such as mobility needs, possible features of sharing services, and possible target groups for user tests. Through discussions and a stakeholder mapping it was decided to further examine travel habits of 'people who nowadays frequently move in and out of the central Umeå by car, bus or bicycle'. The group also identified other important stakeholders such as service providers, but concluded that their perspective is needed only at a later stage in the process when user needs are better mapped. After the start meeting, a registration form and a campaign in social media was created to attract participants. Recruitment of participants to the first date proposals for workshops gave, however too few applicants, so the project team had to invest in more personal recruitment to a new set of dates, which was more successful. Unfortunately, it was therefore not possible to get an equally mixed group of travel habits that were first conceived; the data about the participants shows that these are predominantly people already using bicycles and public transport to the city. On day 1 five people participated (Women 2, Men 3, Ages: 47, 51, 32, 31, 1 person approximately 20 years estimated). On day 2 five people participated (Women 3, Men 2, Ages: 22, 61, 49, 36, 81). All participants had to fill in a self-assessment form before the workshop providing personal data and travel habit data.

Each focus group started with the group being given an introduction to why they were there and to the arrangement for the workshop, while they had lunch which was included. Then

they got an overview of all the 7 ideas that would be discussed during the workshop plus an invitation to also come up with their own new ideas if they had any. Then they got to discuss one idea at a time, focusing on lifting what they like positive and negative with the idea, and to tell what would be required for them to be interested in it. For some ideas, some needed more explanation and exemplification of the workshop leader. A person from Hello Future recorded and took notes for each idea. When the group got to think about all the ideas, they got 5 votes to spread between their favourite ideas (they could vote multiple times on the same). Here they could vote on either of the 7 basic ideas or on new ideas that came in during the workshop. In the last element, the participants would then think about how they would like to pay for these services and how the contact points would preferably be designed. They got to see a sketch of a hypothetical "Sustainability Pass" as a triggering concept to start thinking about different service designs. Through the discussions on the proposed solutions, how the participants' voices fell out and above all their underlying needs expressed in new ideas Hello Future identified the reasoning around existing needs which are most relevant to Umeå municipality to currently focus on and explore further. Based on the outcome of the focus groups Hello Future derived a collection of recommendations which are linked to further including user-centric, design driven approaches in the work of the municipality. For example, measures should apply a service design methodology to build a user-centred public transport solution to find ways to create a better user experience for bus rides, emphasising that many illuminated frustrations with public transport are related to problems that can be solved without enormous funding for bus traffic or great technical progress (what kind of busses do people want to use? What features do they actually want to see in their travel app? How does their dream bus look like?). Additionally, users can also help to identify how walking routes in the city can be improved and where bike lanes need to be safer.

Specification on methods, tools and communication

The start of the study and target group selection began with a workshop at the end of May 2019 in which Hello Future, the municipality of Umeå and Umeå Parking AB together decided which questions were important to answer in upcoming focus groups and which target groups would participate in the focus groups. Through the stakeholder mapping method all possible target groups were first explored, after which they were ranked on the basis of criteria such as the group is rated as important for the project. The three selected target groups were: Young people, Families with children, older couples without children at

home (so-called Dinks, Double Income No Kids). In order to contrast the results of the groups, it was decided to run a purely focused group per each target group.[21] The recruitment was a self-selection process on the facebook campaign site where people could register for being a participant in the focus groups. This way, people participated which already had an intrinsic motivation and interest in mobility issues and future mobility. Each focus group started with an introduction to why they were there while the group had dinner (which was included). The group was told that there was no expectation to propose ready-made solutions, but the aim was to explore theirs needs and that all opinions and ideas, crazy as well as well-founded, were welcome. The first part of each focus group revolved around the question: What frustrates you when you are traveling in everyday life? Based on the question participants would write down frustrations, which were then reported anonymously for the whole group to start with a discussion. This arrangement was chosen because the participants should have to think for themselves, and then get ability to respond to each other frustrations and give birth to new thoughts together. The moment ended with that the participants had to vote on which of the three worst frustrations were. When the frustrations were elaborated the focus groups went on to another element. Here the participants should look into the future and dream about the ultimate everyday life mobility where all the frustrations would be resolved. First, the participants should dream as broad as possible about mobility futures. In a second step, they were challenged to come up with more concrete examples and imagine how they moved in this ultimate, future everyday life. The initially broad perspective was necessary to meet all types of needs that could be expressed and because needs of mobility are linked to a wider context. Each focus group was facilitated by one or two workshop leaders who steered discussions while an observer recorded and gathered insights about underlying needs which were expressed in the discussions. All written notes were photographed and processed in gradually so that nothing was wasted for the analysis phase of the work.

The chosen method had an impact on the result because the selection method for the target groups families and young people were self-selecting; they had to sign up via face-book. This reasonably turns the sample to people who are already in some way interested in mobility and environmental issues (or alternatively who want to get free food). At the same time the purpose of the work was not to extract insights on how participants behave today, without identifying underlying needs. These are reasonably quite similar among them who today uses buses as with those who do not do it, for example. The youth group needed a lot more management both in serving irritations and to dream of a better future. Several of the

group participants did not have Swedish as a native language and because of this some linguistic obstacles occurred. The fact that they needed more management the interpretation of their feelings about the theme of mobility is not as strong as with the other target groups.

To best understand the participants future mobility needs, we must first create an understanding of how they experience present travelling. With a clear picture of the current situation, we can easier contrast this with a future and with that contrast we can gain insights to needs. That is why the second focus group rounds started with the same questions as the first round. First common frustrations of the three target groups are investigated and then differences that emerged are being highlighted. Altogether, there are more similarities than differences. In other words, there are great opportunities to develop customized solutions and to satisfy many groups of citizens in Umeå. The insights into the mobility needs are extracted from the frustrations and the participants' reasoning around them, from the dream pictures of the future they painted up and out of contrast between the current position and the future that arises when reviewing their stories. In these focus groups, as in all focus groups where the participant is allowed to fantasize about the future, it is never the concrete ideas of the future that is relevant for meanings of transport and new urban planning that are the most interesting. The interesting parts are the underlying needs that are emphasized in participants's shared stories.
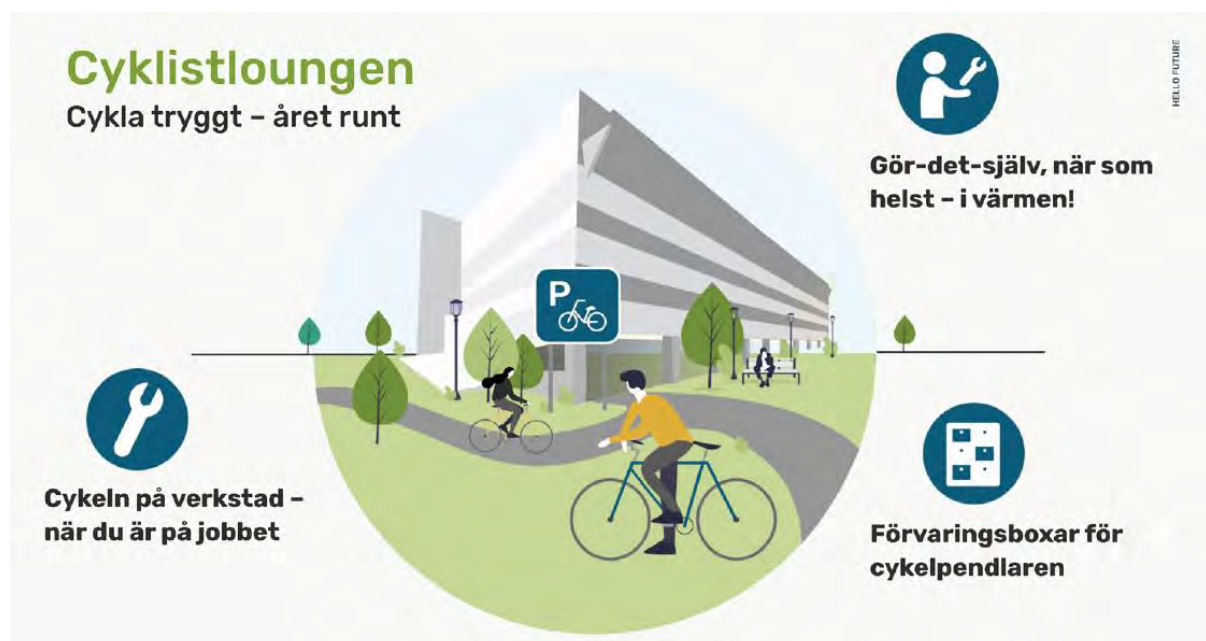
Figure 27 Ideas of workshop participants for mobility development around the parking garage Nanna (Source: Hello Future/ (cyclist lounge, bicycle workshop - when you are at work, heated do-it-yourself workshops, storage boxes)

Specification on cooperation and conflict

None of the members of the 'Service hub' project was actively involved in the focus groups in order not to influence participant's contribution to the study. Some participants might have felt intimidated if mobility and sharing services experts from the municipality and Upab had been sitting at the table with them. As an expectation for the workshop it was clear for participants that their ideas would be taken back to the 'Service hub' project team for further consideration and that their ideas would not be implemented directly. For example, the department now has to examine closely all ideas and has to plan for feasibility studies, including necessary resources and maybe legal as well as political constraints and certain regulations that would apply if the solutions would be implemented. Within the focus group studies no conflict came up.

One of the highlights for cooperation is the way that the departments within the municipality can now work with Umeå Parking AB (Upab) around the topic of sharing and mobility services. Through the project, people from the organisation advanced their understanding for sharing services and became more open to consider it important for the organisation's business model as a company that is owned by the municipality. Both, the municipality and Upab realise their potential for being an innovator in service provision. Though, it has not been easy in the beginning to convince Upab of the necessity to look into possibilities of sharing services. On the other hand, activities related to building infrastructure most often yield to stormy times. Politics, media and citizens complained about the cost budget and the physical appearance as well as questioning the overall need of having Cykelstället. Though, the place has been award-winning several times. Furthermore, the project is constantly explaining that the cost involved in building cycling infrastructure is much lower than building car infrastructure and Umeå's politicians answered up to that really good with explaining motivations and clearly describing why this kind of place as been build and why the focus is on cyclists. The feedback for the U-bike service so far has been really satisfying for the municipality. Another physical appearance of the project is a 'sharing pavillon' at the university campus which also received bad press. It is supposed to be a place for sharing, to have events and to exchange sports equipment and other ways of engagement. Often, people are irritated by the small building. But at least

there is discussion about the topic of sharing as soon as something visible like this is put into place. The possibility of using urban living labs as a method and testing solutions directly helps the municipality to examine reactions and to see who is engaging and who is not for what reasons. For example, when Umeå Energi changed their distribution of solar panels from only selling to also proving renting solutions they could reach a much more diverse field of customers. Before, mostly men were purchasing solar panels and now with the renting mode more women and young people in general became customers. Furthermore, Umeå Energi is now not only talking about technical solutions with solar panels but also emphasising environmental aspects for climate protection and social aspects like shared electric power solutions.

Specification on political influence

Sharing City Umeå is a part of a large state-funded project called Viable Cities which required all project partners to work cross-sectoral and to engage many different actors in their projects. For the city of Umeå, different politically desired initiatives could be combined in the projects in order to find synergies and to generate more attention. One aim of Sharing City Umeå is to further develop the previously developed services around cycling that the municipality envisions. The sustainability strategy of the city is an important background to the projects. Furthermore, disagreement to the project, e.g. concerning Cyckelstället, mainly came from the political opposition. On the other hand, the municipality has been quite successful with all projects. Other cities do study visits to Cykelstället and want to learn about the U-bike system. It has been inspiring for many other Swedish cities to put effort in the projects. Local politicians are really proud of the project results and mention it in other project applications.

Follow-up of the 'co-creation process'

The prototypes that have been developed around the focus group for Nanna need closer consideration for their implementation, including a feasibility study. For the municipality, it is important that the products and services that might be implemented have been developed in a co-creative process with citizens and have not solely come from an expert perspective. For the 'Service Hub' team it is now clearer what expectations of citizens are and what kind of infrastructure would be need, e.g. for Nanna. Additionally, when implementing parts of the prototypes the municipality has to accompany this with a

communications campaign explain what kind of sharing services are offered and why. This way, usability and access can be increased. The municipality is thinking about different ways to engage people in using the services. For example, starting to address people that have a high interest for sharing services because of environmental motivations can be one way. Furthermore, the fee scheme could be adjusted to a test-bed setting, including to make the services available for free for a certain time frame or at least to reduce the pricing in the beginning. It is very important for the municipality to raise awareness for their activities and to include as many people as possible in the test-setting. Because naturally, this raises awareness with other actors, such as the media. The municipality is also anaylsing why existing sharing services such as the carpool at Nanna are not frequently used. Here, first ideas are that the carpool operator is hardly advertising the service in the city as well as around the parking garage itself. Therefore, possible customers might not even know that the service is available there. The biggest challenge for implementing the services is to find other investors than Upab for operating the services. Here, the municipality started collaborating with other companies, but additional funding needs to be acquired first. It is hardly possible to implement solutions at Nanna within the timeframe of the Sharing City project.

Scaling

In order for scaling the ideas and initiatives around the 'Service Hub' sub-project several conclusions for mobility hubs service and functions can be drawn. For the municipality it is important to establish cooperation with mobility stakeholders who are interested. It is difficult to judge which services hold in the long term. The city and parking companies should act as facilitators rather than service developers. There should be willingness to be flexible with different solutions and functions and to not get locked with focusing on specific services, but prefer to mix different services for passenger and freight transport. Spaces should be flexible so that they can be used by different types of mobility services over time. Furthermore, hubs should be located where travel creation occurs, either near the local center, housing or public transport node. A variety of mobility services should be customised based on travel needs. Regarding parking garages and other possible hub locations which include a large number of parking spaces, the location needs to take into account the traffic congestion that the hub is expected to generate. Longer walking distances can then be considered. For digital infrastructure, the functioning and handling

of apps needs to be tested before implementation, e.g. with housing residents which should use the app later on. Communicating and informing users about the new services needs to be combined and started early. If the services cannot be offered through a joint application, the actors involved can collaborate on shared information and marketing of the services. If the hub is established together with private parking, the parking company becomes a key player and parking purchases a tool for financing solution. Still, possibilities for external funding should be investigated, for example through EU projects or other research funding. This can facilitate funding of the municipality's costs initially. Resources for follow-up and evaluation need to be included accordingly. An evaluation is important to follow up on the business model and the effects of the project on travel habits. There may also be a need to develop a mix of mobility services based on how they are used and what is requested by users.[22]

Systemic change

Based on the outcome of the focus groups Hello Future derived a collection of recommendations which are linked to further including user-centric, design driven approaches in the work of the municipality. For example, measures should apply a service design methodology to build a user-centred public transport solution to find ways to create a better user experience for bus rides, emphasising that many illuminated frustrations with public transport are related to problems that can be solved without enormous funding for bus traffic or great technical progress (what kind of busses do people want to use? What features do they actually want to see in their travel app? How does their dream bus look like?). Additionally, users can also help to identify how walking routes in the city can be improved and where bike lanes need to be safer. Encouraging efforts might include to investigate movement patterns and needs to see where new or improved walking paths or bike lanes should go and what they should look like. Users can be asked for their perspective on what safe and good routes mean to them and what motivates them to use the bike or to walk.[23] The municipality can also enhance to make it easier to understand and follow traffic rules. When many different modes of transport and different levels of knowledge are mixed in traffic, it is probably inevitable that many people get frustrated with the road users. Unfortunately, there is reason to believe this problem is only going to get bigger as the city gets more residents; more and more modes of travel are introduced and fewer and fewer are taking a driving license (and thus never learn the traffic rules in an

in-depth way). Sooner or later, autonomous vehicles will also be mixed into the picture. In that landscape, how is it possible to create a city whose rules are easy to follow and can be understood intuitively? What makes it difficult today and how can they solve future problems with the design of key points in traffic, signage, education, knowledge campaigns etc? This is a question that should undoubtedly be explored from the 'outside' with a user perspective and not just from inside administrative bodies and legal institutions.

Visualisation
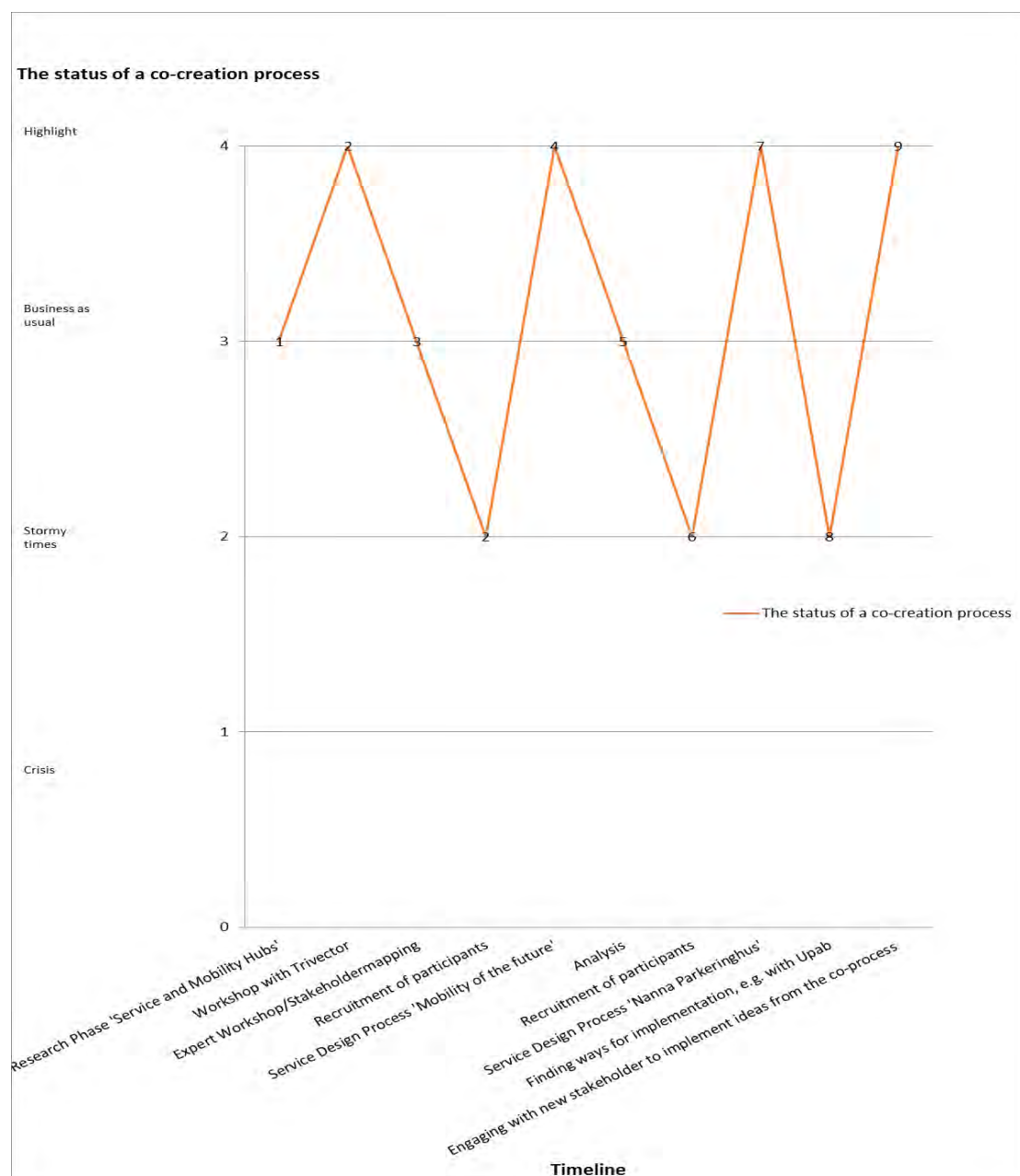
Which learnings emerged?

All projects within the Sharing City Umeå project are co-created with project partners but do not include citizens in all co-creation processes. Though, citizen engagement plays an important role at some stage in the processes. When the project started, the project manager went to have open talks at public libraries, because they are already a hub for sharing. This way, the project reached a group of environmentally interested people that participated in other events of the project as well. Though, it was harder for the project to raise awareness among neighbours in the respective districts that the project was working in. People either did not want to invest time to get informed and engage with the project or the project used the wrong way of communication. On way of solving that problem is that the municipality is now including organised civil society, meaning networks or people that are already there (e.g. Naturskyddsföreningen or some other environment-protection organisations or Studentförbund, the local student association). These organisations have most often regular meetings that can be joined. Another way is to investigate citizens opinions, e.g. for urban planning, asking the question 'What do you think of the neighbourhood?'. Employees from the planning department go to supermarkets for interviewing people that come by and informing about the municipality's projects. This is a very effective way for reaching citizens but very time-consuming at the same time. Therefore, the municipality uses different social media channels like Facebook and Instagram for communicating with citizens. Furthermore, the project is starting a new experiment where a pop-up show for sharing is installed. It is within the central shopping mall MVG in the city centre together with Uminova Expression where a shop-free zone about creative consumption is being created. The project emphasises the importance of having the opportunity to develop several test-beds and settings for experimentation in the city. The sports and outdoor equipment sharing platform Fritidsbanken has also been a great success of the project. So far, it has been the most successful tool library for leisure and sports equipment in Sweden. The project staff engaged citizens in many different ways, e.g. including schools, public swimming halls as well as newly migrated persons. They invested in Para-sport equipment for them to share for wheelchair equipment etc. And the leisure and sports department of the municipality worked in close cooperation with the project because they have a political mission to have sport opportunities available for all citizens. With all the sub-projects Sharing City Umeå tested various ideas around sharing services, including diverse groups of citizens.

For the 'Service Hub' team several lessons emerged as well. Using a consultancy for the focus group study provided a 'neutral facilitator'. Furthermore, the agency made a well-documented report of all steps in the different focus group studies and these reports are valuable products of the project itself. The municipality learned a lot about user-centred design processes and might conduct other kind of these processes on smaller scale on their own without consulting an agency for help.

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Den Koldioxidsnåla Platsen - The Sustainable Restaurant Network | Sweden

Eva Wascher (TU Dortmund University)

Summary

The Sustainable Restaurants Network (Restauranger för hållbar utveckling) in Umeå has been initiated as part of the project 'The Low Carbon Place' ('Den koldioxidsnåla platsen'). The Low Carbon Place has been a project about climate-smart choices for sustainable lifestyles running from 2016–2019 in the city of Umeå in northern Sweden. The project is part of Umeå's climate work and has been implemented in a collaboration between Umeå municipality and Umeå University together with other partners. By testing and evaluating different ways to promote climate-friendly choices in everyday life, the project developed new tools for the municipality's climate actions.[1] One of the sub-projects 'Restauranger för hållbar utveckling' was intended to enhance climate-smart solutions in restaurants and catering facilities. By supporting Umeå's restaurants in their sustainability work, the municipality can make it easier for residents to choose food that is climate friendly, environmentally friendly and fairly produced. This is the basic principle that was the inspiration for Umeå's restaurant network. By 2018, the municipality tested the concept. A number of restaurants and school kitchens were invited to become members. When the test was evaluated, the municipality decided to continue the network and to expand with more restaurants. By 2019 a dozen pioneers had joined the network. The network was successfully established and is now continuing its work after the end of the project The Low Carbon Place. The network offers education for restaurants in various aspects of sustainability, while participants inspire one another and build up shared knowledge about a sustainable restaurant industry. The network includes several restaurants as well as municipality-owned canteens (e.g. for schools) in Umeå. The network members discussed topics such as sustainable food, economy and energy, environment and climate, moral and social conditions as well as communication for sustainability. Through education, advice

and networking, the restaurants gain practical tools for developing their own sustainability strategies and ways of implementation. The restaurants also receive tips and support in how they can inform their guests about their sustainability efforts. Education has been an integral part of the process with an emphasis on networking and the sharing of experience. In addition, the restaurants receive individualised current-status analyses and advice to enable them to implement relevant activities that take their sustainability efforts forwards (sustainability assessments). Feedback from the participating restaurants has been very positive. Altogether, network members are eager to share their learnings and despite of coming from both smaller gourmet restaurants as well as municipal catering service providers, members always found something to learn from one another. The concept of developing local sustainability networks is based on the work of the national sustainable restaurant network platform 'Nätverket Hållbara Restauranger'.[2]

Context of the 'co-creation process'

'Den koldioxidsnala platsen'[3] is a collaborative project. It is part of Umeå's climate work and a collaboration between Umeå municipality and Umeå University. As a city that aims at sustainable growth the municipality pursues several actions with regard to lowering climate-sensitive emissions (see Case Study 'Sharing City Umeå). For many years, Umeå municipality has worked to inspire its residents to switch to sustainable travel and transport. The project The Low Carbon place took an even more holistic perspective and looked at how individual lifestyles impact the global climate in terms of food and energy consumption as well as mobility. The overall question for the project was how to engage citizens in more climate-friendly behaviours. To this end, the project acknowledged that municipalities are generally important facilitators in enabling more sustainable lifestyles of their citizens. They provide for many services as well as infrastructure either with means that are rather more sustainable or less. Furthermore, the municipality can lead by example with regard to sustainable consumption and production (e.g. snow clearance, public transport, library services, school meals, waste collection etc.). During the three years of the project, the team worked to inspire others to make choices and lead lifestyles that are climate-smart. The purpose has been to test new approaches and pave the way for a municipality that addresses the consumption aspect of its climate impact. Instead of focusing on one area or cause of climate impact, the project took a holistic approach about individual lifestyles and consumption habits. This way, the project examined how different

elements of life and municipal operations can facilitate more sustainable habits. The overall objectives of the project have been to 1) make new data available on the climate impact of the area, 2) develop methods and tools to visualise statistics, 3) develop a public-sector toolbox and 4) collaborate and share knowledge.

The project was carried out with financial support from the European Regional Development Fund, Umeå Municipality, Umeå University, Region Västerbotten, Umeå Energy and Upab[4]. The project application had to be submitted to Tillväxtverket[5] (Swedish Agency for Economic and Regional Growth). It is a government agency under the Ministry of Enterprise and Innovation responsible for coordinating different EU funds. The ERD-Fund for the project was 12 Mio SEK with another 12 Mio SEK coming from local partners. The project budget overall was 24 Mio SEK which is about 2,3 Mio Euro. Furthermore, the project had collaborative agreements with

- Energikontor Norr (North Sweden Energy Agency is a non-profit independent expertise resource and a regional cooperation institution)

- Trafikverket (Swedish Transport Administration)

- Naturvårdsverket (Environmental Protection Agency)

- Visit Umeå (Umeå Tourist Office)

- Kompetensspridning i Umeå AB (municipal-owned company within the Umeå municipality group with a focus on international business development and one of the driving forces behind the platform North Sweden Cleantech)

- Bostaden (municipal-owned public housing company).

The project covered a variety of topics and methods to achieve the project goals and pursued around 20 different sub-projects. A selection of sub-projects is presented in the final report[6]. Almost all of the sub-projects involved engaging citizens in different ways. Through the funding agency certain themes were pre-defined as well as different aims with these themes that had to be conducted within the sub-projects. Additionally, the project team discussed the current state of climate actions in the city with specific emphasis on processes that had already been started and that could be further developed (e.g. with other departments of the municipality) or processes that were of specific relevance to the overall project goals. A preliminary list of ideas for sub-projects was discussed and agreed upon with the project's steering committee.

Starting point of the 'co-creation process'

Because sustainable mobility is already a major field of climate action that the city works on, it was decided to use some of the 'Den koldioxidsnåla platsen' sub-projects to also examine other fields of sustainable consumption, especially with regard to food consumption. Though, the municipality was well aware that it is difficult to work on the topic of sustainable food consumption which is directed towards citizens. As a food supplier, e.g. in publicly-owned schools and elderly care homes the municipality is already involved in improving sustainable consumption. But the overall question for the sub-project was how to make citizens generally aware of sustainable food consumption practices and how could this be done in a good and efficient way. One of the project team members got in contact with the national sustainable food consumption platform 'Nätverket Hållbara Restauranger'. It was decided to use the project as a test-bed for developing a local sustainability restaurant network in Umeå. The idea behind the sub-project is that if the municipality helps restaurants with their sustainability management, customers will get into contact with different aspects of sustainable food consumption. In many European countries like in Sweden there is a trend towards eating outside your home, e.g. in restaurants or take-away food. Therefore, focusing on restaurants could be one important path in facilitating practices around sustainable food consumption – for restaurant businesses as well as for their customers.

'Nätverket Hållbara Restauranger' is a network of restaurants aiming to create a more sustainable restaurant business and to contribute to a more sustainable food industry in Sweden. The network currently consists of 65 restaurants in Göteborg, Stockholm, Malmö and Umeå. Cooperating partners are WWF, Visita, KRAV, Mässrestauranger, Umeå municipality and the suppliers Saltå Kvarn and Diskteknik[7]. Sustainable food supply is a prerequisite for a well-functioning restaurant industry and the network is a way of supporting and creating the conditions for a change in the local restaurant industry and the hospitality industry. Restaurants are also trendsetters and can, through their sustainability work, move norms around food and thereby contribute to a more sustainable food consumption in general. Companies that become a member of the network receive a variety of support measures to improve their sustainability management. This includes building knowledge and exchange of experiences in workshops and network meetings as well as offering a sustainability coach and a sustainability assessment. Eventually, the database Worldfavor provides a restaurant guide for the network where every restaurant

transparently reports their work with sustainability.[1] The network was initiated and is managed by U&We, a Swedish consultancy for sustainability-driven business development[8]. In their pilot study U&We found that there is a gap between what restaurants do and what customers want. Therefore, communicating about sustainability is as important as learning and implementing sustainability management in the overall process of becoming a member institution of the network.

Further development of the 'co-creation process'

Landscape of stakeholders

When the team had decided to work on the topic of sustainable food consumption and to involve restaurants for that purpose they considered different ways of contacting stakeholders. As a first step the local restaurants networks which is run by the business development department of the municipality was approached. This network usually deals with questions of how restaurants contribute to increasing tourism in the city or how restaurants as employers can attract new employees. Sustainability has not been an issue with the restaurants network before. One of the team members contacted the network and gave a presentation about the project idea of sustainable food consumption. Following the presentation, the team member identified some restaurants that seemed to be interested in the idea of creating a sustainable restaurants network in Umeå and invited them to join the first group of restaurants to start with the process back in January 2018. In the first year the group consisted of three private business restaurants and one municipality-owned school canteen. In autumn 2018, the former project leader for the sustainable restaurants network moved on to another position within the municipality and Märta Streijffert became project coordinator for the Sustainable Restaurants Network. She started her work within the project with a stakeholder mapping of all restaurants in Umeå to get an overview of the landscape of restaurants and their already existing sustainability work and efforts. In order to get in contact with the restaurants the project coordinator called each restaurant to personally invite organisations to join the network. Directly connecting via a telephone call opens up the possibility for creating a personal relationship between the municipality and the restaurants. This way, the project coordinator could explain what she had found in the stakeholder mapping and could personally invite restaurants to share their strategies and

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[2] http://hållbararestauranger.se/en/restaurant-guide/, 20.01.2020

experiences with other organisations. For the municipality it was important, that the restaurants did not get the impression that the sustainable restaurants network was just about teaching others the 'right thing to do' but to engage in a meaningful platform which allows for secured space to share information with others but also learn from other's experiences. During 2019 twelve restaurants had joined the network. Ten private business restaurants of different sizes (some very small, some larger) and two municipality-owned school canteens participate in the network. Since mid of 2019 the network is self-expanding without further direct recruitment by the municipality. Restaurants now join because they got aware of the network through other restaurants that already partner in the network. Furthermore, the project also made some public relations work in different local newspapers, events, websites and videos[9] etc. which also raised attention by restaurants in Umeå.

Phases of co-creation

The Sustainable Restaurants Network is not a new certification or an award, instead it is a process with the objective to co-create a sustainable food industry on local level and to enhance sustainable food consumption on national level in Sweden. This process covers building knowledge and exchange of experiences in workshops and network meetings as well as offering a sustainability coach and a sustainability assessment to the member organisations.[10] Members of the network also receive continuous development for their sustainability strategies, learn about best-practice examples and get inspiration. Additionally, the local network in Umeå co-created and published a cookbook in summer 2019.

1) Network Meetings[11]

Every local network arranges several meetups per year. The network meetings help restaurants to get in contact with each other to exchange experiences and to inspire each other. Every network meeting features a current theme (e.g. sustainable fish etc.). This is supported by a short input from invited guests. As often as possible, the Umeå team tries to collaborate with the university to invite researchers to join the network meetings. Though, the main time of the meeting is spent with discussions about how the theme relates to the restaurant's daily work in terms of relevance to the customer, feasibility, business opportunities etc..

A development meeting took place in Umeå autumn 2019. During this morning event, participants of the sustainable restaurants network in Umeå worked on a strategy about what the network wants to achieve for the upcoming three years. Participants also started to discuss how the concept of the sustainable restaurants network itself has to be developed to better meet needs and obstacles of sustainable food consumption in Umeå. Several other network meetings happened:

- Network meeting No 1 in 2020 about deposit systems for Take-Away food to reduce the amount of disposable packaging and as new business models for reducing waste from disposable take-away items. Presented by Åsa Stenmarck from the Swedish Environmental Institute.

- Network Meeting No. 5 in 2019 about energy consumption and possible energy savings in restaurants.

- Network meeting No. 4 in 2019 about a review of what has happened at the member restaurants with regards to their sustainability work so far and what needs to be developed for the future of the network.

- Network meeting No. 3 in 2019 about sustainable beer. One of the member restaurants shared their story about working as a brewer and how restaurants can think about sustainable beer on the menu.

- Network meeting No. 2 in 2019 about sustainable fishing and collaborations with the local food festival (Smakfestivalen).

- Study visit to Pecka's tomatoes in Härnösand[12]. It is one of Europe's largest aquaponic companies with a cultivation of growing trout fish in a pool and tomatoes in plant beds in a closed circulation system.

- Network meeting No. 1 in 2019 about the REKO ring. REKO stands for Real Consumption and is a way of shopping locally produced food, without any intermediaries. Consumers and producers in one locality come together and start a REKO ring where raw materials and products are sold directly from producer to consumer. One of the founders of the REKO ring in Umeå, Maxim Vlaslov, gave an input and it was discussed how a cooperation between REKO ring and Umeå's restaurants could look like.

2) Educational Workshops

Based on the national concept the educational workshops in each local sustainability restaurant network cover similar topics. The workshops always start with a lecture on a specific topic which is followed by discussion rounds of how this relates to the restaurant's work. Discussion rounds also support deeper learning about a specific topic and help to facilitate exchange of experiences between the member organisations[24].

- Workshop 1 was about the general idea behind the sustainable restaurants network. During the workshop Julia Senninger from the sustainability consulting firm U & We introduced participants to the network and what the concept of sustainability means for food consumption as well as food waste and how restaurants can work with sustainability strategies.

- Workshop 2 was about ecological and especially climate impact of food consumption. The concept of planetary boundaries was introduced and WWF Sweden presented the meal concept of One Planet Plate.

- Workshop 3 was about energy economics. Two energy advisers from Umeå municipality talked about the energy footprint of restaurants and ways to reduce it. Furthermore, an expert on compostable and biodegradable products was invited to introduce the topic of resource savings with regard to packaging and other nonfood aspects of consumption.

- Workshop 4 covered sustainability communication. Jennie Vennberg, communication manager in the project 'Den koldioxidsnåla platsen' from Umeå municipality provided a deeper understanding of how to communicate about sustainability, both internally with staff as well as externally to customers. Additionally, Sweden's organic certificate KRAV[25] was introduced as an instrument for communicating about sustainability.

- A fifth workshop took place as a collection workshop for the Sustainable Restaurants Network in Umeå. It covered the topics of the workshop series that took place earlier (workshops 1-4) in one workshop. The aim was to provide knowledge from the educational workshops to restaurants that had been new to the network or that missed one or some of the occasions, or for a colleague who has not had the

opportunity to attend any workshop. Each restaurant had the opportunity to register up to five persons.

3) Sustainability Assessment and Coaching

Every member restaurant of the network receives support from a sustainability coach, for example to conduct a sustainability assessment of its business. The coaches are students that are employed by the national network in cooperation with Sustainergies, a consultancy that specialises in training students to become sustainability experts.[26] The students are recruited from local universities and trained by Sustainergies. For Umeå, most students were recruited from Umeå University. Each sustainability coach is then assigned to one of the member restaurants to conduct a sustainability assessment.[27] The aim of the sustainability coaches is to help restaurants analyse their sustainability work, identify and carry out improvements, communicate their sustainability work as well as to engage staff in the restaurants. The coaches are responsible for analysing in detail how much food waste restaurants have, how many dishes on the menu they have that contain meat, how many vegetarian dishes they have, how much energy they use etc. From the initial sustainability assessment, the coach develops a strategy to improve the restaurants sustainability performance with regard to feasibility and implementation possibilities in the respective context. Sustainability coaches also assist with implementing the measures to become more sustainable.

Even though the sustainability coaches are recruited by the national networks, the local networks have a close collaboration with them. The municipality is supporting the coaches in cooperating with the restaurants. On the other hand, the coach reports the sustainability assessment of each restaurant back to the municipality which helps to gain an overview of how the network in Umeå is developing. This also helps to prepare network meetings, educational workshops etc. The sustainability coaches are usually students in their final semesters and are only employed for about half a year.

4) The Cookbook

In spring 2019 the network decided to create a cookbook with recipes from each member restaurant in the network to communicate about the network itself and to strengthen sustainable food consumption in Umeå. The cookbook is also a way to document the work that the restaurants do and to try to make it possible for citizens in Umeå to learn about sustainable food consumption. Eventually, eight of the network members wanted to be part

of the cookbook. They were interviewed by the project coordinator of the network about their achievements and recommendations as a network member. Restaurants also stated why sustainability was important from their perspective and which measures they take to reduce food waste. The book starts with highlighting all smaller and bigger steps that the restaurants have taken. This includes showcasing how they cooperate with local farmers and how they use kitchen equipment less energy-intensive. The cookbook also invites citizens to be more sensitive towards their food consumption[28]. The cookbook also explains sustainability challenges related to food and therefore included only recipes for vegetarian dishes[29]. Finally, the book was written based on interviews with the restaurants by the project coordinator for the network and the project's communication manager. Both developed a communication strategy for the book launch. The final editing was done by a communication's agency. Only few copies of 400 books were printed and have been spread out to different departments here in the municipality and have been used as a gift to speakers at events. The book is also available free of charge on the project's website and can be borrowed at Umeå's libraries.

Specification on methods, tools and communication

As the sustainable restaurants network is based on the national concept 'Nätverket Hållbara Restauranger' it usually follows the annual process structure. In the beginning of each year in the network members can join four educational workshops. This is followed by about 2-3 network meetings until the summer. The sustainability coaching and assessments start approximately in spring. After the summer break there are additional 2-3 network meetings. In autumn the team takes time to do much more communication work to recruit new members. During the whole year the municipality communicates about the sustainable restaurants network, e.g. by attending conferences and other events.

In the first year of the sustainable restaurants network in Umeå the municipality worked very close along the process and content structure of the national concept. The consultancy U&We helped with the overall process structure, provided presentations and recommended experts to invite. In the second year, the project team of 'Den koldioxidsnåla platsen' adapted the national concept to the circumstances and needs of local network members. Concepts for the educational workshops and the network meetings were redesigned. The municipality was very responsive to what the local restaurants needed. Form the sustainability assessments the team learned about the actual potentials as well as obstacles that the restaurants wanted to work on. Network members in Umeå have of course

different opportunities than restaurants in Malmö etc. The network adjusted the concept to these opportunities, e.g. in terms of cooperation with local food producers and suppliers etc. This affected on the one hand the redesign of the topics that were discussed in educational workshops and network meetings. For example, regarding the content it was decided not to generally talk about what sustainable food is and how this relates to biodiversity but to take production and consumption of palm oil as one concrete example and use this to exemplify the need for sustainable food consumption. The team also redesigned the way the educational workshops were conducted. It was first planned as a three-hour workshop with several presentations leaving not much room for discussion. Restaurants in the network said they would need more time for discussion issues. Therefore, in the second year the workshop consisted of two-hours input and one-hour discussion which was split to 30 minutes presentation + 15 minutes discussion followed by 30 minutes presentation and 15 minutes discussion etc. As a feedback the restaurants demand even more time for discussion which results in a new redesign of the educational workshops for the upcoming period. The restaurants in the network appreciate to have time for discussion with other colleagues and with experts, because the daily business does not leave room for this kind of questions.

The workshops are documented by the team for the use of the municipality, i.e. minutes are taken to explore further development of the network. The project coordinator also cooperates with another project that is called 'coaches for energy and climate' at the municipality. This project helps small and medium sized companies to reduce their energy consumption. One of the team members is responsible for moderation and the other one takes notes for writing a meeting memo. To enhance transparency about the network the project coordinator provides a simple documentation of the meetings of the network. This means that all workshops and network meetings are announced on the website of Umeå municipality and give a small summary of what has happened at the workshops that took place.

Regarding communication with citizens the municipality's strategy is to tell about the network as a whole and its progress. They try to avoid to highlight just one of the members in one activity. The municipality also supports restaurants in improving their own communication about sustainability. The communication's manager of the project gives inputs about how to use social media for talking about sustainable food consumption and how to use other tools in this respect. Furthermore, she also helps restaurants to facilitate

internal communication with their employees about sustainable food. Participating restaurants in the network are also encouraged to use the brand and stickers of 'Nätverket hållbara Restauranger'.

Specification on cooperation and conflict

Cooperation between the participating restaurants in the network has been very good. Though, most of the participating private business restaurants are competitors on the restaurant's market in Umeå. Nevertheless, they share their experiences with each other – the good and the bad. This is partly because there is trust among the network members and a general willingness to contribute to a more sustainable restaurant industry. The municipality provides a safe space for participants to share their stories and to enable learning with and from each other. One of the participating restaurants even stated to the project coordinator that during the network meetings the restaurants are more colleagues than competitors. Furthermore, private business restaurants and publicly-owned canteens also gain from exchanging each other's food practices (e.g. minimizing the amount of meat in meat loaf and using more vegetarian ingredients instead). This contributes to stable costs and a lower carbon footprint of each meatloaf dish. Participants also discussed their learnings and further development in terms of different nudging techniques, e.g. offering smaller plates so that customers do not take too much food at once (which otherwise often leads to food waste).

Cooperation between restaurants and the project team of the municipality has also been very good. The restaurants have benefited from the work of the sustainability assessment and coach, including the development of action plans in order to support them on their sustainability journeys. Furthermore, the municipality actively supports sharing the knowledge and awareness that has been created by the restaurants in the network, while also shining a light on their good work and presenting some of their 'sustainable dishes'.[30]

During the project duration, the sustainable restaurants network has been developed as an independent network without cooperation with the restaurant's network that the municipality's business department is running and facilitating in cooperation with 'Visit Umeå', the tourist agency of the municipality. This network consists of a big range of different restaurants in Umeå and discusses questions that are most often related to economic and regulatory issues. So far there are no future plans to enhance collaboration between the networks, but it is not unlikely that any form of collaboration is established in

the future. As a side effect, organisations that engage in the restaurant network and did not talk to each other much during the usual network meetings are now talking more to each other because of their involvement with colleagues in the sustainable restaurant network. This was mentioned to the sustainable restaurant network coordinator by 'Visit Umeå'.

Specification on political influence

No political influence on the sustainable restaurants network has been reported. Though, in the beginning of the project 'Den koldioxidsnåla platsen' as a whole, the municipality's business department was worried about the focus on sustainable consumption because they thought it could be a threat to the trade and commerce in the city center.

Follow-up of the 'co-creation process'

A continuation of the project is ongoing from January 2020 until December 2022. The project is again financed through Tillväxtverket with the support of the European Regional Development Fund, Umeå Municipality, Region Västerbotten, Umeå Energy, Umeå Municipality, Skellefteå Municipality and the City of Gothenburg. Umeå University is no longer partner in the project. Project budget is 12 Mio SEK which is about 1,14 Mio Euro. By 2020, the intention is for the network to be further developed with an increased focus on the local and regional sustainable food systems. The network invites regional wholesaler and food producers to join 'Restauranger för hållbarhet'. The network is a way of supporting and creating the conditions for a change in the local restaurant industry and the hospitality industry. Restaurants are also trendsetters and through their sustainability work can move norms around food and thereby contribute to a more sustainable food consumption in general. An important ambition in further developing the network during 2020 is to create a model that is possible to operate long-term for the municipality. The network is now financed through the second phase of the 'Den koldioxidsnåla platsen' project in cooperation with the 'Coaches for energy and climate' initiative of Umeå Municipality.

Scaling

With regard to the national concept 'Restauranger för hållbarhet' local restaurants make themselves visible through the national sustainable restaurant guide[31]. The guide increases openness and transparency about sustainable food. Restaurants report about what food they serve, staff policies, washing chemicals and more. In that sense sustainability is seen as a development in which restaurants start to give full disclosure about their sustainability related measures. The plan is to keep spreading the concept to more restaurants all over Sweden and to engage restaurants wanting to cooperate for a sustainable restaurant business. Though, Umeå municipality has decided to establish a local version of the sustainable restaurant network, fully customised for the members in Umeå and coordinated only from the municipality. The city of Gothenburg is planning to do the same and is therefore a partner in the next phase of the project 'Den koldioxidsnåla platsen'.
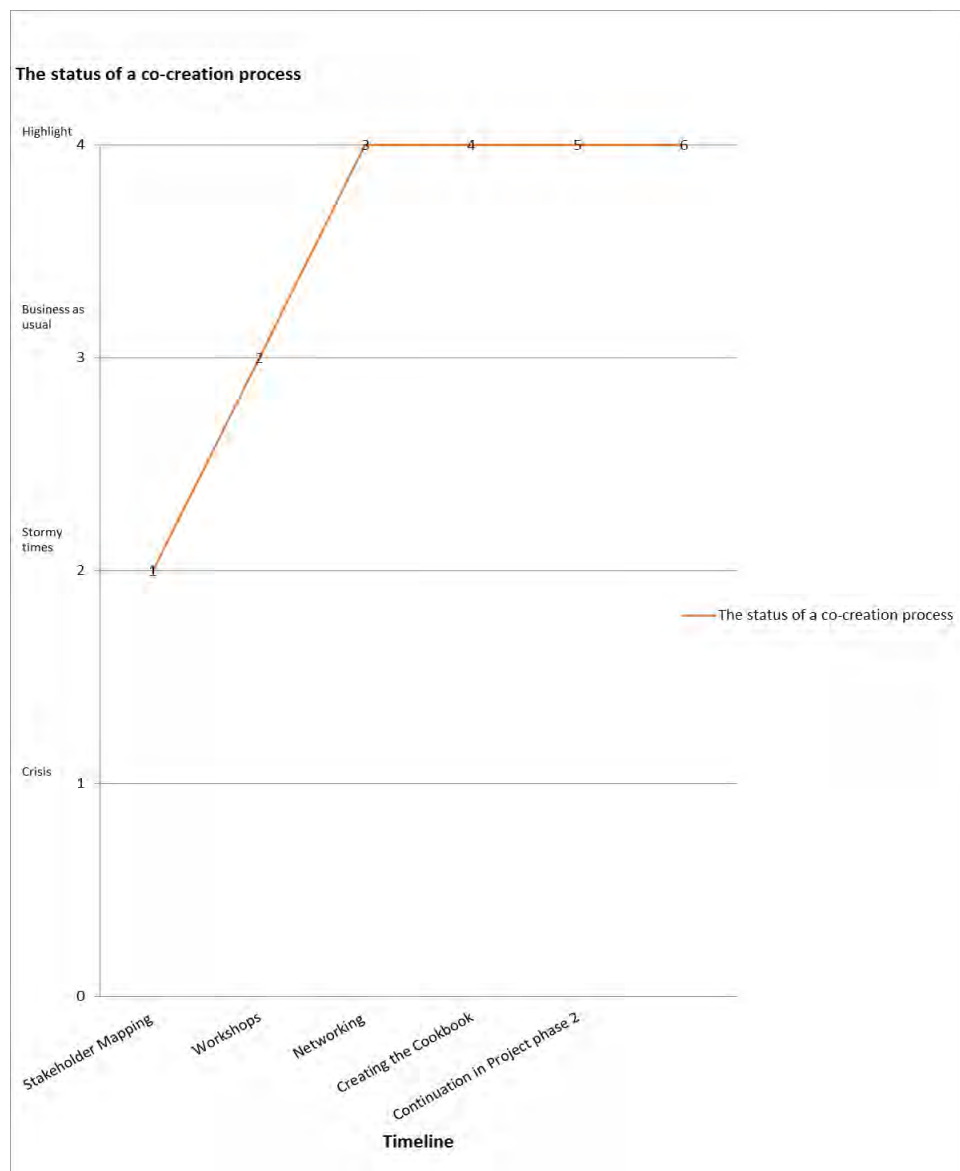
For Umeå municipality the sustainable restaurant network has been one of the most successful sub-projects within 'Den koldioxidsnåla platsen'. It has strengthened the municipality's work with sustainable consumption. The network serves as a good example to showcase that it is possible to support local businesses in their sustainability endeavours. By engaging in the network participating restaurants did not become less profitable. Instead, they could raise awareness and strengthen their position on the local restaurant's market. Therefore, this is a good example in order to work with other kind of businesses. It is now easier to make sustainable consumption a topic throughout different departments within the municipality.

Systemic change

In terms of systemic change, it is one of the best achievements of the project that it has reached out to so many stakeholders. The project received a lot of public interest as well as media attention. Furthermore, other municipalities and public officials use 'Den koldioxidsnåla platsen' as a best-practice example for citizen-centred climate actions on municipal level. This includes recognition from the Swedish national parliament as well. 'Den koldioxidsnåla platsen' has been a project with quite unusual ways of communicating with citizens as a municipality. The project has developed unique new knowledge of Umeå's climate impact, it has communicated positively and not always maintained a 'municipal appearance' and it has innovatively facilitated climate-smart choices for residents and

businesses. The team itself is aware of the communication style and methods they have used and is proud of being one of the first municipalities in Sweden that approaches citizens in that way. In the final report[32] about the project the team reviews their most successful examples which they hope will continue in the municipality's day-to-day activities or sow the seed for processes and new ideas that can be tried out in subsequent projects or by other municipalities. As already mentioned, a continuation of the project is ongoing from 2020-2022 with the support of the European Regional Development Fund, Umeå Municipality, Region Västerbotten, Umeå Energy, Umeå Municipality, Skellefteå Municipality and the City of Gothenburg.[33]

Visualisation

Which learnings emerged?

As an overall learning, the project team realises that both the project 'Den koldioxidsnåla platsen' and the respective climate efforts of people involved made an impression. Municipalities are important players who can facilitate a change in sustainable urban planning but can also support more sustainable consumption patterns of their citizens. Therefore, the team has invested time to develop tools to inspire people to make choices and lead lifestyles that are climate-smart. This resulted both in praise and criticism, e.g. for the style of communication. The purpose of the project has been to test new approaches and to pave the way for a municipality that addresses the consumption aspect of its climate impact. In order to do this, the team decided consciously on 'leaving the comfort zone' to engage with citizens in ways that municipalities usually would not do.[34]

The Sustainable Restaurant Network in Umeå has been one of the most successful sub-projects of the project. First of all, it was one of the rather long-lasting elements of the project because it started early after project start and is even continuing after the first phase of the project ended. One important learning here is that the idea of creating a sustainable restaurants network was very clear from the beginning, partners to cooperate with could be convinced to join early and the support from the national platform 'Nätverket Hållbara Restauranger' helped to give the sub-project a promising start. Furthermore, the network is based on a structured process for engaging stakeholders and requires a motivated facilitator and communicator to build trust among participants and to create a shared and safe space for participants. The communication strategy for the network building was developed and implemented by the network coordinator. A person with very good communication skills and with a clear role of being a facilitator for the network. The process behind the sustainable restaurant network is about getting people and organisations to meet and talk with each other and to have a common goal. This is an unusual commitment of a municipality to provide the platform and the competences to create this kind of network. The national concept 'Restauranger för hållbarhet' has been tried in other Swedish cities as well, so it is not entirely new. But it is innovative in the context of Umeå municipality and showed that it is worth to put some 'time and love and effort' into an initiative like this. This way, the municipality gained a lot of impact on its sustainability agenda and beyond. The lessons learnt for creating a sustainable restaurants network are summarised as follows:

- Networks need to be designed in a way that is relevant to the local context, e.g. local food industry and restaurant businesses.

- A good facilitation of the network is important to get people committed and to keep them engaged with the network.

- The network needs to create a common vision and mission for a more sustainable food industry.

- The facilitation needs to provide a safe space, e.g. to create trust among participants so that they start sharing their knowledge and experiences.

- Create clear expectations of the members' involvement in the network, for example through a Letter of Intent.

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Anna Gemzell (former Project Manager 'Den koldioxidsnåla platsen', Umeå Municipality)

Jennie Vennberg (Communicator, Umeå Municipality)

Märta Streijffert (Project Coordinator Sustainable Restaurants, Environmental and Health Protection Department, Umeå Municipality)

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Den Koldioxidsnåla Platsen - Klimatvisualisering Innovationsprint | Sweden

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Summary

The Klimatvisualisering Innovationsprint has been part of the project 'The Low Carbon Place' ('Den koldioxidsnåla platsen'). The Low Carbon Place is a project about climate-smart choices for sustainable lifestyles running from 2016–2019 in the city of Umeå in northern Sweden. The project is part of Umeå's climate work and has been implemented in a collaboration between Umeå municipality and Umeå University together with other partners. By testing and evaluating different ways to promote climate-friendly choices in everyday life, the project developed new tools for the municipality's climate actions.[1] One of the sub-projects 'Klimatvisualisering' was about creating a platform where citizens can get informed about their climate-effects. The data-basis for the visualisation was part of a survey which Umeå municipality conducted. Umeå municipality already has data on travel habits and energy use of its inhabitants, but in other areas there was very little information about consumption habits of the population, for example with regard to food, clothes, consumables and other goods and services. In order to gain better knowledge about these climate-effects the project 'Den koldioxidsnåla platsen' conducted a survey of consumption

habits in Umeå in spring 2018. A statistically representative sample of 4.004 Umeå residents was invited and 1.475 people responded. The responses in the survey have then been the basis for a calculation of the climate emissions caused by consumption. The calculation has been made by the Stockholm Environment Institute (SEI). In order to make the results and analysis more accessible to citizens, the project team created the website Klimatorentering.se. The website enables people to easily explore the results of the climate calculation and to find out what the climate impact looks like in different districts of the city. All reports are also available on the website. The overall aim of the platform is to increase knowledge about the climate impact of consumption habits and that this knowledge should inspire sustainable choices and changes. The purpose of the Klimatvisualisering Innovationsprint was to develop and implement the website platform Klimatorentering.se in a user-friendly way. The Innovationsprint was facilitated by Hello Future, a Swedish Service Design Agency.

Context of the 'co-creation process'

'Den koldioxidsnala platsen'[2] is a collaborative project. It is part of Umeå's climate work and a collaboration between Umeå municipality and Umeå University. As a city that aims at sustainable growth the municipality pursues several actions with regard to lowering climate-sensitive emissions (see Case Study 'Sharing City Umeå). For many years, Umeå municipality has worked to inspire its residents to switch to sustainable travel and transport. The project The Low Carbon place took an even more holistic perspective and looked at how individual lifestyles impact the global climate in terms of food and energy consumption as well as mobility. The overall question for the project was how to engage citizens in more climate-friendly behaviours. To this end, the project acknowledged that municipalities are generally important facilitators in enabling more sustainable lifestyles of their citizens. They provide for many services as well as infrastructure either with means that are rather more sustainable or less. Furthermore, the municipality can lead by example with regard to sustainable consumption and production (e.g. snow clearance, public transport, library services, school meals, waste collection etc.). During the three years of the project, the team worked to inspire others to make choices and lead lifestyles that are climate-smart. The purpose has been to test new approaches and pave the way for a municipality that addresses the consumption aspect of its climate impact. Instead of focusing on one area or cause of climate impact, the project took a holistic approach about

individual lifestyles and consumption habits. This way, the project examined how different elements of life and municipal operations can facilitate more sustainable habits. The overall objectives of the project have been to:

1) Make new data available on the climate impact of the area,

2) Develop methods and tools to visualise statistics,

3) Develop a public-sector toolbox and

4) Collaborate and share knowledge.

The project was carried out with financial support from the European Regional Development Fund, Umeå Municipality, Umeå University, Region Västerbotten, Umeå Energy and Upab[3]. The project application had to be submitted to Tillväxtverket[4] (Swedish Agency for Economic and Regional Growth). It is a government agency under the Ministry of Enterprise and Innovation responsible for coordinating different EU funds. The ERD-Fund for the project was 12 Mio SEK with another 12 Mio SEK coming from local partners. The project budget overall was 24 Mio SEK which is about 2,3 Mio Euro. Furthermore, the project had collaborative agreements with

- Energikontor Norr (North Sweden Energy Agency is a non-profit independent expertise resource and a regional cooperation institution))

- Trafikverket (Swedish Transport Administration)

- Naturvårdsverket (Environmental Protection Agency)

- Visit Umeå (Umeå Tourist Office)

- Kompetensspridning i Umeå AB (municipal-owned company within the Umeå municipality group with a focus on international business development and one of the driving forces behind the platform North Sweden Cleantech)

- Bostaden (public housing company).

The project covered a variety of topics and methods to achieve the project goals and pursued around 20 different sub-projects. A selection of sub-projects is presented in the final report[5]. Almost all of the sub-projects involved engaging citizens in different ways. Through the funding agency certain themes were pre-defined as well as different aims with these themes that had to be conducted within the sub-projects. Additionally, the project team discussed the current state of climate actions in the city with specific emphasis on processes that had already been started and that could be further developed (e.g. with other

departments of the municipality) or processes that were of specific relevance to the overall project goals. A preliminary list of ideas for sub-projects was discussed and agreed upon with the project's steering committee. One of the sub-projects is presented in the SISCODE Innovation Biography 'The Sustainable Restaurant Network' in Umeå.

For each sub-project the project team looked at consumption habits of its citizens and the respective climate-effects. Based on previous studies the project team already knew about consumption habits in different terms, for example food, shopping and travel. This included a differentiated perspective on target groups with the sample of residents of Umeå (e.g. men often travel less sustainable than women do; women often do more shopping because they are more responsible for shopping groceries etc; men are more often responsible for bigger investments, e.g. for solar technologies; younger people are more willing to make sustainable choices etc.). With this knowledge the project different target groups to address with the project including different communication strategies. During the whole project, the team decided to use a positive way of communicating. This meant not to make people feel guilty or blamed. The communication strategy was focused on making people feel proud of what they can contribute to a sustainable Umeå. For example, one of the sub-projects 'Going car-free!' enabled ten families to go car-free for three months[6]. The families have tested their everyday lives without using their own car. The project wanted to explore how a combination of mobility solutions can facilitate a car-free life. The communicator's role in the team helped to design the test-phase. This was done in a target-group centred way, e.g. how to make the test interesting, attractive and relevant to the target group. For the test period (15.09.2018 -15.12.2018) participants received a bus pass for local traffic for everyone in the household, electric bikes and electric cargo bikes for rent, a car pool membership and gasoline costs included. The participants were in-depth interviewed before, during and after the test period by researchers at Umeå School of Business, Economics & Statistics (USBE), Umeå University. The purpose of the interviews was to deepen knowledge about obstacles and opportunities that exist to further develop combined mobility services. At the same time, the municipality investigated whether citizens can be encouraged to use the car to a lesser extent by using the method of 'user-test'. One conclusion drawn is that many people want to try a car-free life but need support to make the first step. Regular interviews during the test-period resulted in ongoing contact, which helped to keep the families motivated. Several families said they found it easier to go car-free than they expected. Eventually, several of them have now sold their cars and the car-free lives have established new behaviours and knock-on effects (e.g.

fewer impulse purchases and small shopping trips; fewer visits to shopping centres and DIY warehouses; combined and completed errands in the same trip; less need to travel, even by bike or bus; better planning and less stress; increased climate focus, including reduced meat consumption and increased recycling; during the test period the participants spoke with their friends, relatives and colleagues about the life choices made in respect of cars, the health benefits of cycling and the financial aspects of not using a car)[7]. Other sub-projects included working with public schools, housing companies and other stakeholders.

Starting point of the 'co-creation process'

The consumption perspective is becoming increasingly important as an element of contributing to sustainable development. In order to deal with the global climate challenge, it is important that we understand causes of emissions. The environmental impact that arises from our consumption is also strongly linked to several other goals within the Agenda 2030 for sustainable development. Umeå is among one of the first municipalities in Sweden to explore and calculate the climate impact of consumption of its inhabitants[8]. The results of the consumption habits survey ('Konsumtionsbaserade utsläpp i Umeå kommun - Konsumtionsvanor 2018', SEI 2018) provide a local picture of climate impact as well as valuable knowledge for politicians and civil servants in their efforts to support citizens in making sustainable choices in their day-to-day lives. In spring 2018, Umeå municipality conducted a survey with a statistically representative sample of 4.004 residents and received 1.475 survey responses. The questions were based on the IVL Swedish Environmental Research Institute's climate account. In autumn 2018, the Stockholm Environment Institute got the municipality's assignment to develop a calculation model for calculating the consumption-based climate impact of Umeå' inhabitants based on the results from the consumption habits survey. The assignment has consisted of developing a calculation model based on the results of the consumption habits survey of Umeå' inhabitants in relation to additional statistics on national level. The calculation model is also designed in such a way that Umeå municipality is able to do the calculations on their own for future consumption habit studies. It is an Excel-based calculation tool which can be used to filter the results based on demographic factors, such as gender or income. The purpose of the climate impact calculation is to enable Umeå municipality to better understand how the lifestyles of its citizens affects climate (climate imprint) and to identify the areas that the municipality should prioritize to promote sustainable consumption

patterns among local residents.[9] The report and its analysis highlighted four key areas where a change in consumption habits could reduce emissions substantially:

1) Reduction in air travel and car use,

2) Reduction in meat and dairy consumption as well as a reduction in food waste,

3) Reduction in domestic energy consumption,

4) Reduction in consumption and increase in the reuse of furniture and clothing.

When the report about the climate impact of consumption was available to the municipality the project team discussed how to make results of the report accessible to a wide audience. The team discussed several questions like what do we mean with 'visualisation', what do we want to achieve with this, who do we want to reach out to and why do we want to reach out to this group or that group. Furthermore, the team discussed what should be most interesting for the target group about the visualisation and what should citizens be able to do with the visualisation. Additionally, they elaborated on what the users should feel or know or think when they the tool. But one of the problems was that the team could not specify who was the target group of the tool. The team could not define the target group in a way that did not raise other questions which led to a re-questioning of the target group again. The discussion about the direction of the 'visualisation' kept the project team busy for a couple of weeks, along many other tasks in other sub-projects, without coming to a satisfying progress. Rather by a coincidence, team members realised that the municipality had made a public procurement for a consultancy that specialised in Service Design approaches. The group went to an internal introduction workshop where the consultancy informed employees of the municipality about the possibilities of service design. They realised that using a Service Design approach could help them in order to create a visualisation that would be valuable to users. As the Service Design agency 'Hello Future' was already procured by the municipality, the project team could easily access the service. This enabled the kick-off of the use of a innovationsprint in the process of creating the 'Klimatvisualisering'[10].

Further development of the 'co-creation process'

The project team had a kick-off meeting with the Hello Future team to introduce the problem setting. Hello Future suggested the Innovationsprint as a suitable method to get

forward with the process. The Innovationsprint method was slightly adjusted to the needs of the team. For example, a classic sprint method usually takes up to five days and it was adjusted to the capacities of the team members. This meant that because the project team could not attend a sprint for five days in a row Hello Future designed a process that was a little longer (stretched over about four weeks) but sufficiently intense for the project needs. Before the Innovationsprint started the team had a web-conference with Hello Future about some important aspects to keep in mind during the process. For example, the team needed to define a 'decision-maker', meaning someone in the group who would have permission to finally decide on a step in the process if the team could not agree on one option. This was really appreciated by the team because lack of final decisions prevented the team in making progress on the visualisation tool beforehand.

Landscape of stakeholders

Hello Future is a consultancy and agency specialised in digital transformation. The organisation offers the provision and facilitation of service design, software development, innovation sprints and digital strategy to create long-term change and innovation with customers.[11] Hello Future is part of the international Service Design Network (SDN), founded in 2004, which is the leading non-profit institution for expertise in service design and innovation processes.[12] The consultancy has already facilitated several service design processes for municipalities in Sweden and has good experience in working with municipalities. They asked the team to form a small group of staff from the municipality to do the Innovationsprint. The sprint group consisted of the following people:

- Petter Hanberger (Facilitator, Hello Future),

- Sebastian Hall (Facilitator, Hello Future),

- Anna Gemzell (Project coordinator, Umeå kommun),

- Jennie Vennberg (Communications manager, Umeå kommun),

- Ebba Sundström (Climate calculation/urban planner, Umeå kommun),

- Märta Streijffert (Sustainable consumption, Umeå kommun) and

- Johan Sandström (Head, environmental development, Umeå kommun).

The mixture of the group was very valuable for the team. Although they all worked for the municipality they brought different perspectives in to the process. It was especially important to have the project leader and head of department in the sprint team as well. This

way, the process ensured that all steps and ideas that were further developed were known to everybody in the team, including the decision-makers.

Phases of co-creation

1) November 8: Target group definition, workshop

2) December 6: Interviews with target groups

3) December 12-13: Design sprints day 1-2

4) December 20: Usability testing

1) Target group workshop

The process started with a workshop to identify target groups in order to be well prepared for the actual innovationsprint. The aim of the workshop was to find out which target groups might be addressed, to prioritize what the team wants to focus on and to give an indication of aspects that the team might know or not know about the target groups as a status quo before interviews are taken. During the workshop, the group developed different parameters and weighed target groups based on their possible relevance as the primary target group for the visualisation tool. The parameters included 1) Influence / reach, 2) group size and 3) available time to engage. The team narrowed the main target groups down to 1) Politicians, 2) Environmentally aware people in general and 3) Teachers. Finally, 'Environmentally aware citizens' were selected as the main target group to address with the visualisation tool. The team developed an 'Empathy map' for the target group where all team members stated what they think about attitudes, behaviours, interests, dreams and ideals as well as what is important for the target group and how people want to be involved.

2) Interviews with target groups

After the target group definition, a qualitative interview study was conducted with five people from the target group to gain more knowledge before the start of the sprint process. The team wanted to learn more about the target group's view, including their climate attitudes, consumption habits, their perspective on Umeå in the world, attitudes towards gathering and sharing of knowledge as well as their usage habits of data and statistics. Hello Future conducted the interviews by phone or skype because the agency is located in Stockholm and interviewees were supposed to be citizens of Umeå. Considering the

perspective of Umeå's citizens was of course very relevant to the team. The interviewees were first recruited by a social media ad where interested persons could do a small survey with questions that the team prepared together. The small survey was based on the findings of the target group workshop and addressed people that were worried about climate change but did not really take any action so far. This way, the project team excluded environmentally engaged people and purposely focused on the ones that made a self-description of being environmentally aware but did not change any consumption practices up until now etc. The team wanted to reach out to the people that were 'reachable' but didn't act. They wanted to investigate how the municipality could make them be more active in these issues. Based on the social media survey answers, Hello Future suggested some persons for interviews and the team decided together whom to interview, including a good mixture between young and old, women and men, for example. The group of interviewees included a 22 years old, female Medicine student; a 25 years old, male HR student; a 39 years old, male Marketing & Communications Manager; a 47 years old, female real estate agent and a 49 years old, female opportunity worker. As a result of the interviews some of the thoughts the team had about the target group were confirmed and some were not.

3) Innovationsprint

The innovation sprint started with an update of the 'Empathy map' based on responses from the interviews. On day one, the team developed an overall sprint goal which should be a long-term, optimistic goal that describes an ideal future and they needed to state why they should want to pursue the goal. As an overall goal of the sprint the team stated that in two years' time when the next consumption habits survey will be conducted people will see a substantial change to more sustainable consumption practices of Umeå's citizens. Following that the team discussed several questions that needed to be answered during the sprint in order to create steps to reach the goal:

1) Will the user experience clearly which parts of the visualisation tool they can change and in which way?

2) Will the service inspire the user to increase the pace in their change of consumption habits?

3) Will the user experience the tool as enough inspirational and important to share?

4) Will the target group see this as new knowledge?

5) Will the service be experienced as serious and trustworthy?

In the next stage, the team created 'Lightning Demos' where they collected examples that could give inspiration for how to design a solution. The purpose was to examine how others solved similar problems, how similar data has been displayed visually, how an offer should be formulated or what smart solutions of a user interface and best-practice examples for tools could be. At the end of the first sprint day, the team had the task of sketching solutions individually. With the knowledge about the target group and the goals with the target group as well as knowledge about best-practice examples they started to draw the future website. The purpose was to take the end-user perspective and to find design solutions that also considered answers to the sprint questions.

On day two of the sprint, the team started with reviewing the sketches from the previous day. After looking at everyone's sketches and ideas the team voted for ideas that stuck out. After voting on individual parts of the tool they voted on combined/larger parts and discussed their choices in a structured way. Based on the winning sketches and ideas Hello Future produced a draft of a storyboard as a plan and script for how the prototype should be designed from beginning to end. This storyboard was the basis for the prototype that Hello Future developed for the user test. The clickable prototype website had a simple design. Relevant for the user test were the functions that the team decided on to see how users react to these functions. For example, one function was that after users would see all information about consumption-based emissions in Umeå they would have the possibility to get active by putting together their own consumption goals (e.g. what kind of actions could I commit to lowering my emissions). The goal of the prototype is to demonstrate a realistic and possible concept so that test subjects can give valuable feedback. Furthermore, the prototype can be used as a support for further development. It is not intended as a finished demo version of the actual tool. All data and graphics were temporary proposals for further development.

4) Usability testing

On December 20, the prototype was tested with five potential users. Three men and two women participated in the user tests. Some of them are persons that were interviewed in the first step and some of them were recruited in other ways. The team was involved in the user test for the whole time. The tests were conducted in a way that the test leader and the user sat in one room. The sprint team and another person from the agency sat in another room. They could hear the person testing and the test leader and could also see what they

did on the screen. The sprint team received a sheet based on the sprint questions. The task was to value the result of the user test based on the targets the team had set up. For example, for the target 'user thinks the tool gives her new knowledge', the team could evaluate whether this applied or was true by what the user was saying and doing or by the answers they got from users when they were asked by the test leader directly. The team appreciated the way of testing, because everyone in the group was involved and drew their own conclusions based on the responses and reactions of the test users.

After an analysis of all answers the team summarised key insights for further developing the visualisation tool. Overall, the reactions were very positive and the users liked to scroll through the platform. Users liked to feel positive in the collective aspect 'to do this together with others in Umeå'. The overall improvement potential lies in raising the clarity of figures and statistics including to provide more content. This is to create better credibility but also to help users interpret the numbers. Users also wanted to have more explanation on why the question of consumption is important including an in-depth elaboration on the relevance of the SDGs, climate goals etc.

Following the user test, Hello Future already developed an outlook on the next iterative steps in producing the visualisation tool. The team would have liked to continue working with Hello Future. But the procurement by the municipality was already made with the Gullers Group, another agency that specialised in communication and that was responsible for communication work in other parts of the project (e.g. the Campaign 'Breakup'/ #bryt upp)[13]. In terms of what the innovation sprint did for effects, the project team had a much clearer picture of what they wanted and a clear basis to pass on to the Gullers Group that was responsible for developing the climate visualization tool.

Specification on methods, tools and communication

The Innovationsprint as a Service Design method was very valuable to the project[14]. It gave speed and direction to a process that went in circles before. The clear methodology forced the team to make and take decisions for further development. The team also appreciated to work 'hands on', meaning that their usual way of working is with writing, reading and discussing documents and sitting in meetings. With the innovation sprint they had to communicate their ideas in different ways and make it more accessible with visualisations (sit, draw, and sketch). An innovation sprint always has a participant who has the utmost power as a decision-maker, but it is really only for those cases where the group does not

reach a consensus. The basis of the format is democratic majority decision, another key aspect that helped the group move forward. The methodology is democratic in that sense. Everyone gets to develop their ideas and then these are utilized based on how a majority decides. This also involved that decisions were taken fast and that the aspects that were discussed were not so elaborated at all times. Before the team started the process with Hello Future they might have been afraid sometimes to make any decisions because of all the questions they were raising. The innovation sprint made them to take decisions without knowing the consequences. Here, the team had to acknowledge to let go of things, even if they were not fully perfect. Even though the process was fast the team felt safe because all steps build upon each other and it was easier to let go off some ideas whilst to continue working with others.

Furthermore, the team realised that involving users does not need to be that complicated and large scale. Because involving even only five people easily results in more knowledge than involving no users at all. The user tests became eye-opening for the team. User tests are often described as strenuous and time-consuming, but if they are structured in a good way they can easily be facilitated. The team members were active listeners in the test-phase instead of just sharing the results second-hand in a report with someone else's conclusions. They were able to help themselves to the conclusions because they actively participated. For the project coordinator it was important that both the team members and external experts and those who commission clients attended and listened to the test-settings. This is because Hello Future as an agency with experience in hundreds of other user tests can compare and evaluate answers in a different way than the customer (the municipality) which contributes with a subject-specific perspective to the process.

The team appreciated to have a service design expert at hand who was responsible for facilitating the process. Hello Future facilitated the process in an easy way and it was apparent that they specialised in this methodology. Furthermore, the team appreciated that Hello Future adjusted the process in a way that all team members could be part of the whole process. They developed the format of the innovation sprint to suit public organizations as well. The original format requires five full days in a row, but by moving some parts and packing it together more efficiently, the sprint could be conducted on three full days. The days were scattered over two weeks, with a fourth day in between where Hello Future developed a prototype based on the work of the first sprint days. All the time the team invested in the sprint is about the same as they had previously spent a long time in

the project. The time taken is comparable but it is very compressed. When the difficulty occurred of booking the whole team for two days in a row they realised it is not a lot of time altogether, it just looks a lot in the calendar and in relation to other processes that have several interferences. A full day set aside in the calendar can look daunting, but it depends on the perspective.

Overall, the Innovationsprint gave guidance and a clear direction for the team, including all visualisations of ideas. This way, the team had a good start for building the first demo version of the tool. Furthermore, the sprint provided a good atmosphere for discussion and enabled the team to stay committed to the process. The Innovationsprint was a new method for the project team but a really interesting way to realise the needs for a specific target group and how projects can select target groups.

Specification on cooperation and conflict

The cooperation between the project team and the agency Hello Future was good. Team members did not report about any conflicts during the process. One thing that has been a challenge is the way the project communicated. They were criticised for their communication campaigns but at the same time it is one of the things that was really successful because the project got to reach out. Especially the #bryt upp Campaign was critiqued, but also praised for their exceptional style of communication. Regarding the #brytupp campaign it was a strategy of the municipality to give the PR agency The Gullers Group trust and space to be creative. The project team as a client had the last word in the process. The Gullers Group created an expressive campaign. The local media did not react positively on the campaign and started to ask critical questions. As the communication campaign included a plan for an evaluation the project team responded to critics that they would wait for the campaign survey results before making any evaluating statements on the campaign. Eventually, the results of the evaluation showed that the campaign was successful and that people reflected on their traveling behaviours. In some cases the process did not work as the team had wished, but overall the team at the municipality was satisfied with the results and effects that this strategy led them to. But the project was not only criticised for the way they communicated but also for the content they communicated. This means that another important aspect for conflicts in the project was the consumption habits survey itself. The result of the climate calculation and the result that air travels have a large part of the local carbon footprint started a debate within the city. Many people criticised the results and criticised that questions like this were raised in the first place. But

at the same time it has started a discussion that is useful to make people reflect about consumption habits.

Specification on political influence

Especially some politicians were not pleased with the climate calculation results. Regarding flights and the air travel they criticised the outcome. Because there is a common view that people in Umeå need to continue flying because is located in a rather remote area in northern Sweden. There is also an argument that northern parts of Sweden will suffer from economic and social recession if people start flying less often. Therefore, some people including politicians are offended about the kind of knowledge that the climate calculation tool is providing. On the other hand, this knowledge gives opportunity to the movements in the city that work with sustainability and climate change. They use this knowledge in their work to make people more aware. Overall, getting criticised is a good result at the same time and providing knowledge to people that don not like the content is as well as important to the team as reaching out to environmentally aware citizens.

Follow-up of the 'co-creation process'

The team would have liked to continue working with Hello Future after the user test. But the procurement by the municipality was already made with the Gullers Group, another agency that specialised in communication and that was responsible for communication work in other parts of the project (e.g. the Campaign 'Breakup'/ #bryt upp)[15]. In terms of what the innovation sprint did for effects, the project team had a much clearer picture of what they wanted and a clear basis to pass on to the Gullers Group for developing the climate visualization tool. The Gullers Group was commissioned to package the statistics in a way that made it accessible and interesting to the residents of Umeå. They decided to create a communication campaign that has an effect on both the brain and the heart. Therefore, Gullers Group's solution for the visualisation platform became a combination of facts, packaged in a more easily accessible way, and emotions where music, stories and real primal screams were put together.[16] The agency collaborated with music producer Alexander "Academics" Juneblad. Together they created a short film called the 'The Uåååh song – the sound of climate anxiety'. Based on reactions to visualizations of the actual climate imprint voices were recorded of several citizens who express their anxiety. This builds the foundation and first part of a short film that features three Umeå residents to talk

about their feelings about the climate. To make the figures from the report and climate calculation tool available to a wider audience, the platform Klimatorentering.se was created and launched with 'The Uåååh song – the sound of climate anxiety'[17]. The website seeks to inspire others to take action by conveying the feeling that together, we can all make a difference. The aim is to increase knowledge about the local challenges and to show different climate impacts in different parts of Umeå (down to individual districts). The municipality hopes that the website Klimatorentering.se can contribute to a change in consumption practices and to a large-scale transition in Umeå.[18]
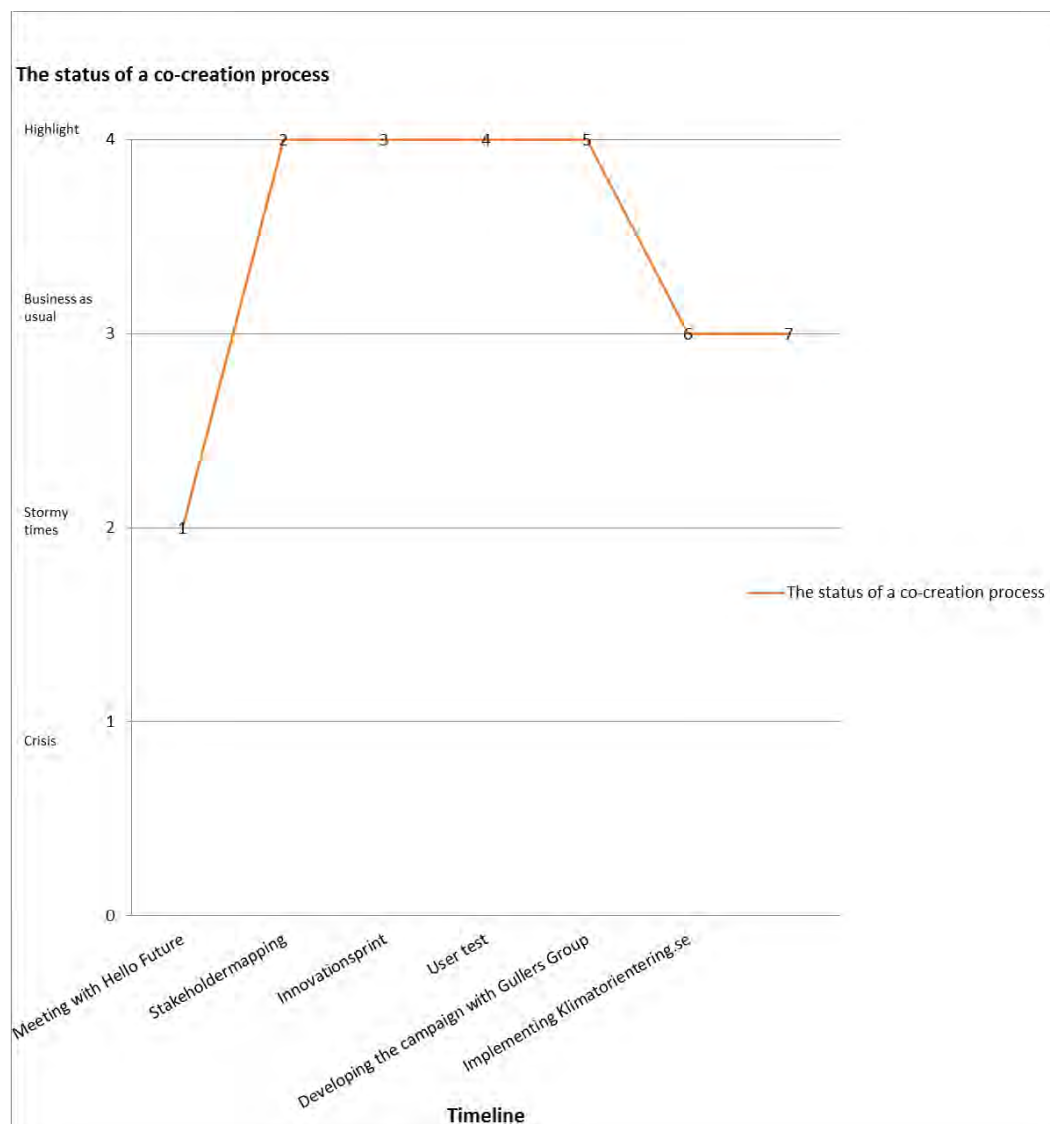
Scaling

A continuation of the project is ongoing from January 2020 until December 2022. The project is again financed through Tillväxtverket with the support of the European Regional Development Fund, Umeå Municipality, Region Västerbotten, Umeå Energy, Umeå Municipality, Skellefteå Municipality and the City of Gothenburg. Umeå University is no longer partner in the project. The project budget is 12 Mio SEK which is about 1,14 Mio Euro. Some of the results mentioned in the summary of the project[19] will continue after the first project phase. For example, the climate calculation tool can be applied on the next consumption habits survey of Umeå's population. Additionally, learnings about new methods for working on problems will be considered for future projects.

Systemic change

In terms of systemic change, it is one of the best achievements of the project that it has reached out to so many stakeholders. The project received a lot of public interest as well as media attention. Furthermore, other municipalities and public officials use 'Den koldioxidsnåla platsen' as a best-practice example for citizen-centred climate actions on municipal level. This includes recognition from the Swedish national parliament as well. 'Den koldioxidsnåla platsen' has been a project with quite unusual ways of communicating with citizens as a municipality. The project has developed unique new knowledge of Umeå's climate impact, it has communicated positively and not always maintained a 'municipal appearance ' and it has innovatively facilitated climate-smart choices for residents and businesses. The team itself is aware of the communication style and methods they have

used and is proud of being one of the first municipalities in Sweden that approaches citizens in that way. In the final report[20] about the project the team reviews their most successful examples which they hope will continue in the municipality's day-to-day activities or sow the seed for processes and new ideas that can be tried out in subsequent projects or by other municipalities. As already mentioned, a continuation of the project is ongoing from 2020-2022 with the support of the European Regional Development Fund, Umeå Municipality, Region Västerbotten, Umeå Energy, Umeå Municipality, Skellefteå Municipality and the City of Gothenburg.[21]

Visualisation

Which learnings emerged?

As an overall learning, the project team realises that both the project 'Den koldioxidsnåla platsen' and the respective climate efforts of people involved made an impression. Municipalities are important players who can facilitate a change in sustainable urban planning but can also support more sustainable consumption patterns of their citizens. Therefore, the team has invested time to develop tools to inspire people to make choices and lead lifestyles that are climate-smart. This resulted both in praise and criticism, e.g. for the style of communication. The purpose of the project has been to test new approaches and to pave the way for a municipality that addresses the consumption aspect of its climate impact. In order to do this, the team decided consciously on 'leaving the comfort zone' to engage with citizens in ways that municipalities usually would not do.[22] The team identified five major lessons learnt:

1. A project that wants to address citizens and other stakeholders needs to develop target-group thinking. Because of the different sub-projects the team had to clearly identify characteristics of the targeted groups. This meant to think through what one wants to achieve, who the recipient is, and what the target groups' needs and wants for each sub-activity might be. There are a lot of different methods to help the project team maintain the user perspective throughout the process (e.g. providing specific target groups with the opportunity to increase their knowledge, offer a series of public climate breakfasts, sent text messages to new citizens, use interviews, test-settings, nudging, gamification and service design). This included various ways of communication, e.g. creating magazines, giving away bike lights and bananas, show-casts on TV, in the papers and on radio and social media. Regardless of the channel or format, the conclusion is that projects like 'Den koldioxidsnåla platsen') have to be seen and heard where the target groups are and on their terms.

2. Another key insight the team members gained through the project is the importance of social norms for long-term sustainable habits and behaviours and that changing norms is difficult and takes time. Although norms are slow to change, the team is convinced that those people who took part in the project's activities are, in various ways, contributing to this shift in norms through their newly found habits, knowledge and attitudes. Personal norms and habits change gradually when people take a first step towards something new, which eventually becomes a habit. This is true for both municipal activities and personal choices. Climate-smart choices often start with a single step that feels easy, but which is

often followed by other sustainable steps, such as what people eat, how much they buy or where to go on holidays. Therefore, it is relevant to adopt a holistic approach to sustainable lifestyles.

3. Facilitating meetings with others who also want to act establishes the sense of community and bringing about change together. For example, the car-free families started their journey together, which reinforced the fact that there were others challenging themselves at the same time. People are motivated by meeting others who are in similar situations. Therefore, the platform Klimatorentering.se has been founded on the idea of demonstrating the changes that citizens can achieve together as residents of a municipality.

4. Start with those who are open to change and the others will follow later. Some people can act as role models and frontrunners for those who are yet to reach this point. This way the team identified people to start working with while other stakeholders could be reached at a later stage in the project. Showing people that changing practices is possible in concrete terms (create sustainable dishes, use electric cargo bike for shopping etc.) makes it easier for others to make changes as well.

5. One lesson learnt that is closely related to the first lesson learnt is to create campaigns that attract attention and especially extreme challenges give rise to discussion (in the media, on policy level and in private realms). Provocative campaigns make people think and establish a sense of community for a problem. To raise awareness, it might be useful to try not to use the usual means of communication of public authorities. Daring to try new things goes with being prepared to take criticism. Furthermore, engaging strong communicative competences is helpful for a citizen-centred project. The communications manager in the team was not only involved in disseminating results but also in designing communication strategies and helping communications work for all sub-projects from their beginning until end. It was a strength that the communications manager was part of all processes from a very early stage on. This way, the overall communication contributed to the project's success to a large extent. It was not a traditional way of telling about some activities but more about telling in a manner that made more people interested in participating in the different activities ('You need to know what kind of situation your target group is in when they meet your content or your activity').

There are also several lessons learnt for the Innovationsprint. An innovationsprint makes things happen. For the team at Umeå municipality this was a new method to work with.

Using service design and design thinking elements enabled the team to realise what a relevant target group could be as well as what are the needs for a specific target group. The whole process was facilitated in a very structured way and helped the team to concentrate and be very specific on the process. Furthermore, doing the Innovationsprint made the team realise that involving users does not need to be that complicated. Eventually, the team acknowledged the potential of user-centred design for creating new services and products.

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<u>Interviews</u>

Anna Gemzell (former Project Manager 'Den koldioxidsnåla platsen', Umeå Municipality)

Jennie Vennberg (Communicator, Umeå Municipality)

Märta Streijffert (Project Coordinator Sustainable Restaurants, Environmental and Health Protection Department, Umeå Municipality)

Katrin Holmqvist-Sten (Umeå Universitet)

The description of the co-creation process is based on the report 'Hello Future AB 2018, Klimatvisualisering Sprintrapport for Umeå kommun, Skellefteå / Stockholm'. The report was provided with courtesy of the project 'Den koldioxidsnåla platsen'.

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[11] https://hellofuture.se/#, 19.05.2020

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[13] https://www.umea.se/umeakommun/byggaboochmiljo/samhallsutvecklingochhallbarhet/klimatmiljoochhallbarhet/koldioxidsnalaplatsen/resultat/hallbararesor/kampanjforcykling.4.10e78ac01661b30919b6fe2.html. 15.06.2020

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5. Summary and link to Comparative Analysis

The data presented in this deliverable will be used for a comparative analysis (D2.3) to create a systematic view of co-creation, comparing diverse initiatives all across Europe by analysing and, uncovering transversal and situated approaches and solutions to better understand how co-creation can be effectively applied to facilitate the integration of society in science. This contributes to SISCODE's overall aim to better understand co-creation in its contexts. D2.3 will present an in-depth qualitative content analysis of all data provided by the Co-Creation Case Studies and the Innovation Biographies. Altogether, the text basis for the comparative analysis will cover all 55 cases presented in this report. Both text types (case studies and biographies) have been written on the basis of the two comparable templates of questions explained at the beginning of chapter 3 (Case Studies) and 4 (Innovation Biogrphies) of this report. The templates are based on the analytical grid for 'ecosystems of co-creation' (see chapter Research Design in D2.3). Therefore, both text types yield comparable contents. For this reason, coding for Cases and Biographies in D2.3 will be aligned, meaning that the same code system will be applied to Case Studies and to Biographies using MaxQDA as a qualitative data analysis tool. As a first remark, we mention that the content of the cases in relation to the templates varies to a certain extent. This means on the one hand, that cases are outlined in different depth of detail both for the Case Studies and Innovation Biographies. Some of the cases are written in a way that comprises answers for all questions of the template. Other cases could not give answers on all questions of the template due to several reasons (e.g. no access to relevant stakeholders for (further) interviews). Furthermore, the comparative analysis of Co-Creation Case Studies (chapter 4 in D2.3) and the comparative analysis of Co-Creation Innovation Biographies (chapter 5 in D2.3) partially include similar explications of the cases, because they are derived from the same co-creation projects, initiatives and processes. Though, the difference is of course that the Innovation Biographies aimed at a more detailed description and analysis of one single co-creation process within the projects and initiatives presented as Co-Creation Case Studies. Even though all authors tried their best to develop the cases according to the templates for Case Studies and Innovation Biographies, certain redundancies between the content given in Co-Creation Cases and Co-Creation Innovation Biographies could not be avoided. Hence, these redundancies have to be reflected in the comparative analysis as well.

In summary, both tasks, writing the case studies and the biographies, have been a complex task for all partners involved due to the complexity of processes that are of relevance to the SISCODE analysis. In general, when comparing all cases, we will be able to highlight certain elements that become evident for most cases and can single out important enablers and barriers on all four levels of the ecosystemic model. This will be possible, since partners who contributed in developing the case study research matured a deep knowledge about the concerned case study, e.g. due to previous research. Furthermore, partners had in most cases good access to stakeholders and interview partners. Last but not least, most cases where conducted by native speakers in the respective context which also allowed improved access and understanding of the case. All partners stated that writing up the Co-Creation Case Studies and Co-Creation Innovation Biographies has been an important learning experience, because each case represents in itself a detailed analysis of a specific co-creation project/initiative. It has broadened the perspectives of authors on the complexity of the processes involved.

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Annex A: Case Study Guideline and Template

1 Intro & Instruction

This document is the guideline for SISCODE's case study research in WP2 – Task 2.2/2.3. A lot of information needed is already included in the survey extract that was sent to you. If you have completed the questionnaire yourself, you might already have a lot of extra-information at hand which you have not used in the previous working phase. If you process a case that was developed by another partner organisation, or a colleague of yours, please contact this person for further material s/he might have.

The 40 cases serve as examples for co-creation in contexts. Therefore, the focus lies on a closer examination of **_practices of co-creation in their specific environments_**. The upcoming biographies focus more on the **_process-character_** of the co-creative practices, their **_path-dependencies_** and **_trajectories_**. There will be another template for the biographies. Please look at chapter 3 for further information.

The sections to fill in are partly overlapping. For example, when you do research related to pathways, drivers and barriers, you automatically generate information on the context (2.3), on practices of co-creation (2.5), their tools and instruments (2.6) as well. So, when a situation comes up where you think: "I have written about that already!", do not worry. The final case study will follow a narrative style. So, in the end it is up to you where to insert specific information.

Please have in mind that for every case, we are interested in

- the co-creation activities themselves, in which ideas and solutions are developed;

- the coordinating structure/organisation/network/… facilitating these co-creation activities

- the interrelation between

Sometimes, these two layers are not easy to differentiate. However, please be sure to address both co-creation activities and the responsible initiative as well as their relation to one another in the first section.

You will find an example text for every module in the template. It is meant to give you an idea of the form and overall direction of the case-study to be produced.

1.1 Procedure

We suggest the following overall procedure:

1. Generate an overview on the **desired** information in every section of the template – Please read the example, too.
2. Take a close look at the extract from the survey/ the already completed questionnaire for the respective case that was sent to you. Check what information is **already available** there.
3. Please figure out which information **is not available, yet,** and prepare a corresponding inter-view guideline.
4. Make sure to use **all available resources** before starting an interview: You might find sec-ondary statistics on the co-creation contexts also on the municipal webpages etc. During the interview you will then be able to ask for intersections and to tie together 'loose ends'.

1.2 Preparing and conducting the interview

Please **prepare a list of questions** based on the questions in the template, which have not yet been answered. This list of questions will be your interview guideline. As the case-study follows a qualita-tive and explorative approach, please make sure to be flexible and oriented towards what your inter-view partner 'offers you'. Your interview partner will likely come up with insights and perspectives you have not thought about.

For preparing the interviews, we recommend to get in touch with the contact person only when you are sure which information you would like to get. **Make sure you know the background of your in-terviewee** and his/her position before doing the interview. If necessary, organize a short informal meeting (via skype, phone call, etc.) with the interviewee before the formal interview.

Please make sure you ask for the **permission to record the interview**. A full transcription will not be necessary, though. In addition to recording, take notes about those aspects that cannot be grasped by listening to the recorded texts.

Ask the interviewees the set of questions prepared in advance, but **be flexible**: be attentive to what your interviewees are saying and let the conversation touch upon topics and issues that are important for them; try to keep the conversation as smooth as possible. Be an

active conversation partner, ask questions and support the interviewee's statements, but also be a good listener – provide your inter-viewee with enough time to think and speak.

2 Case Study template

2.1 What is the project/ initiative all about?

Desired Information (*Approx. word count: ~ 500*):

Basic information

- name, location, activeness and/or duration, main objectives, key concept and characterization of the case

- Key idea and scope

- Place of origin and extent

- Form of organisation, financiers, societal challenges addressed, cross-cutting themes (cf. survey) adopted, specifications, role of co-creation

- Relation between co-creation activities and the entity facilitating the process

As the information in this section has been widely gathered in the survey, the most important aim here is to verify the given answers in some parts and to write them down in a fluent text. Please verify the information especially if you are unsure, recognise incoherence in the stated answers or did not research the case yourself.

2.2 Context and environment: Where does it all take place?

Desired Information (Approx. word count: ~ 500-600):

- Socio-economic/ demographic structures of the area of scope and if these are relevant.

- The normative/ regulatory context in which the process happens and its influence on the process.

- Economic, political and societal norms and values (imperatives) towards cooperation, transparency and co-creation.

- This includes:

- Structural features of the co-creations' ecosystem

- Institutionalized behaviour of actors below the legislative level as an expression of specific cultures of communication, living, working, innovating etc.

"Spirit of cooperation"

This part certainly requires **additional** research, as there is only few information in the questionnaire. In general, the information you provide here will feed decisively into the comparative analysis on co-creation ecosystem at the end of Task 2.3 (Deliverable 2.3). Please keep the following questions in mind:

- What is/ was the given context before the project initiative?

- To which contextual tensions/ reference problems is the case a solution?

- Which contextual factors are of influence and which are relatively unimportant for the projects forthcoming? (~550 words)

2.3 Brief outline of the project/ initiative's pathway

Desired Information (Approx. word count: ~ 500-600):

- Initiation of the co-creation activity and problem definition.

- Reasons to think that co-creation might be a good way to solve the specific problem.

- Stages and intersections of the of the co-creation process.

- Development of partnerships, growing/ decline of networks, partner's role in forthcoming of the project/initiative.

Overall aim: Generate an overview on the history of the initiative, its critical turning points, particular smooth intersections, possible bottlenecks and so on. This section is crucial in assessing if the case could be selected as one of the 15 Biographies. When you collect the data please try to keep attention if there could be interesting information behind the surface regarding the events that led to specific phases. It is necessary, to draw a connection to the contextual and environmental factors that will be detailed further in section 2.4.

2.4 Management & Organisation: Who interacts how to facilitate co-creation?

Desired Information (Approx. word count: ~ 400):

- Networks the case operates within, existing partnerships.

- Focus of the supporting action through partners – in which way do they offer support to the project?

- Desired partnerships that do not exist at the moment

Here, the main objective is to get closer to the quality of the network in which the case is embedded, especially regarding support-structures that accompany the process and organisation of co-creation. This tells us something about context, too, as it can display also which forms of support are more easily accessible and which are not. Please try to be sensible especially for the unusual, unexpected cooperation and how these were formed.

2.5 What are the concrete processes and practices of co-creation?

Desired Information (Approx. word count: ~ 600):

- Modi of co-creation and your point of reference of the case study

- Further description of the co-creation: Overall process – focus area, stakeholders involved; specifications of the participants

- Selection of participating stakeholders (was it planned? Was it open?) If the process was designed in a specific way, why so?

- Overall course of the activities and general approach in the phases

- Modus of the initial briefing of the participating actors

    - How

    - When

    - At what extend

- Mismatches, drivers and barriers and lessons learned in co-creation activities

Overall aim: The focal point of examination here is the concrete co-creation process and the cooperation of actors and collaborations involved. Here, we want to reach a narrative of the co-creation practice itself. Please be as specific as possible and use the different phases

of co-creation that SISCODE builds upon (Problem identification/Understanding, Ideation, Prototyping, Verifying/ Testing; Feedback/iterate) in your description. It is possible that 'your' case runs a **series** of co-creative activities or uses co-creation occasionally. Please choose only up to three of the processes in these cases.

2.6 Specification: What tools and instruments are/ were used to co-create?

Desired Information (Approx. word count: ~ 400):

Co-creation methods and their success/ matching to the process in user understanding.

- Stakeholders experiences with co-creation tools

- Tools in other phases of co-creation incl. feedback/ restart

- Reflexive assessment/ evaluation of the tools and instruments

These section correspondents highly with section 2.5. Your interview partner might have already spoken about tools and instruments in the course of previous questions – some of the questions listed below are therefore already answered. You can, i.e., start like this: "I already got extensive insights into the tools and instruments that are used to facilitate a co-creative activity. I'd like to find out a little bit more on this point…" "

2.7 Which learnings emerged?

Desired Information (Approx. word count: ~ 400):

Final remarks and conclusions.

Overall aim: When you read the **lessons learned section** please think firstly of where to use the given answers in another section of this template. The most aspects were most likely already addressed in the previous sections. Please see this section as the conclusive section of the interview that gives room to address any aspects that were not mentioned before.

2.8 Conclusive remarks

Overall aim: Here, you are asked for derivations from your perspective as an expert for the respective case. How do you reflect on what you have learned during the process of researching it? The focus lies on a concluding review.

- Your perceptions of co-creation in the field

- Please state your final considerations on how co-creation is reflected within the field you examined for this case study. .

- Your impression from the case concerning it's 'culture of creation'

- How would you describe an innovative environment in the light of the case?

- Your very own reflection. How did you as a researcher experienced the case-study? Was it easy to access the information? What do you think about the research pattern? Is something missing here?

2.9 References

Please list all references with endnotes.

Please list all interview partners with name (organisation, function).

Annex B: Biographies Guideline and Template

Introduction to task description

This document should help the Task 2.3 partners in developing the biographies as part of SISCODE's qualitative case-study research in WP2. The biographies focus on questions of how oneparticular co-creative process has emerged, evolved and overcome barriers – or not. In writing an innovation biography, we try to assess how a socially innovative practice developed and encountered successes and barriers in specific contexts through a co-creation process.[1] The 15 biographies serve to deepen SISCODE's understanding of innovation processes, developmental trajectories and stakeholder interactions at the micro-level of the single co-creation initiatives in specific contexts.[2] It is important to note that biographies are not stories of the organisation conducting the innovation, but rather of the innovation process that occurs in an original surrounding.

1 Procedure, steps and timetable

- September until December 2019:
  - Selection of cases to become an 'Innovation Biography'. Please fill in this form until 16 September: https://docs.google.com/spreadsheets/d/1Eg-WW9ZPKrPSk8aRNYRpzcoN6JzBHvBVJsrki3PYrcU/edit#gid=443472262
  - T2.3 Call on 16 September, 15.00-16.00 pm, for discussion and final Biography case allocation
  - Desk research: Gather already available information on the basis of SISCODE survey and case-studies. You can find all SISCODE survey extracts uploaded on basecamp in WP 2.2 folder.
  - Identify missing information to answer the guiding questions and prepare and conduct approximate. 3 interviews. Relevant interviewees can be users, as well as actors from public, private, informal and/or the non-profit sector.
  - Write biographies and hand in your preliminary biographies for revision to TUDO (e.g. mid of November).
  - 20 December 2019 final deadline for Biographies
- January until April 2020
  - a. TUDO writes Deliverable 2.2 Case study and biographies report [22]
  - b. TUDO writes Deliverable 2.3 Comparative Analysis Report [24]

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[1] Cf. Van de Ven, A. H. / Polley, D. E. / Garud, R. / Venkataraman, S. (1999): The innovation journey. New York: Oxford University Press.

[2] Cf. Butzin, A. (2013): Knowledge dynamics in innovation biographies: a methodological and spatial perspective. Marburg, Univ., Diss

2 Theoretical background & methodology

2.1 Selection of co-creation cases for the Biographies

As already elaborated in the template-document for Task 2.2 Case Studies, the cases for the biographies need to provide enough information regarding the context that the 'co-creation process' is embedded in as well as sufficient information over the whole process (starting point, problem identification, phases of participation, implementation, impact etc.). A case for which a biography will be developed should provide sufficient information on all these aspects. But there are also cases that did not "complete" all phases. This is because we also look for examples with a clear cut in one of the final phases. Generally, we are particularly interested in the development of success factors, hindering factors, interventions and setbacks which we call 'bibliographical turning points' of the co-creation process. A lot of information necessary in this task that you can use for writing the biography is already gathered through the research done in Task 2.1 and 2.2.

Criteria for biography case selection:

- The biographies focus strictly on one particular process of co-creation in a specific context
- A biography needs to be expressive towards the practices, which were part of this specific process, and the inherent difficulties, bottlenecks and interplays (bibliographical turning points).
- Therefore, the availability of sufficient information of all phases of co-creation needs to be secured.
- Most important source of information are the interviews with relevant actors that have been involved in the process plus on-site visits (this means something has to happen "on-site", i.e. people have to be there, who can be interviewed, a similar process can be observed, the place, where it all happened can be looked at).
- All Task 2.3 partners are free to decide upon which case study they find suitable for a biography they prefer to examine (research partners have to guarantee the feasibility of the research process).

Conducting the interviews

The main task within the biographies will be the narrative interview with the major responsible person of the innovation process (Butzin 2013). Based on the information gathered in

WP 2.1, subsequent desk research will identify the actor network around the biographies by an intensive analysis of interactions (explaining the stakeholder's landscape). This means that selected persons (from different departments) involved in the innovation process will be identified. Additional semi-structured interviews or group interviews should as well as open observations on-site enrich and complete the preceding findings, whereby these can also be supported by own participation in processes of co-creation. Also, interviews with actors outside the organisation would be promising to «follow up» on important interactions and to complete the biography. Relevant interviewees can be users, as well as actors from public, private, informal and/or the non-profit sector. Besides, an open and explorative on-site research (if possible), during which the individual researcher tries to get "what is going on there" is a valuable addition.

Confidentiality and anonymity

Quality and quantity of the narrative interview heavily depends on the interviewee's ability and willingness to speak about the co-creation process. In some cases, the responsible persons might have issues with confidentiality. If possible, please specify if information could not be given due to confidentiality. Inform your interviewee that you can write the text and preserve anonymity for certain parts of the text, if necessary. Use information from WP 9 Ethical requirements, including the informed consent forms for conducting interviews. See also information we have given for interviews in the T2.2 Case Study template.

2.2 Innovation biography methodology

The co-creation biographies in SISCODE follow an approach of in-depth interpretation and analysis of narratives of participantsand initiators experiences of co-creation practices in relation to the larger cultural matrix of society. The key methodological principle of innovation biographies "is to follow the innovation idea by analysing the interactions of innovation actors (Butzin 2013). Through the combination of 1) network analysis; 2) Interview techniques and 3) triangulation, it will be possible to reconstruct co-creation processes from the first idea to its implementation. Thereby the foundation (e.g. preliminary network analysis) has already been built up through the survey and the 40 case studies. Writing an innovation biography is a methodology from qualitative research that allows the structured display of results in analysing innovative ideas and reconfigurations of social practices (in example via design). In innovation studies, case-study research decisively builds upon generalized assumptions about how innovative practices come to light, as well as on presump-

tions towards the determining factors and variables of an innovation. The last step - Triangulation - will combine data from the individual, structural and contextual level and is the task of TU Dortmund as WP2 leader.

3 Embeddedness in SISCODE and WP2

In WP2 we build upon the methodological strands:

1. the meta-analysis of a large set of co-creation initiatives;
2. the co-creation case studies, which provides important means of understanding how co-creation is currently implemented and which outcomes is producing in practice; and
3. the development of co-creation biographies, which should establish synergies between the co-creation contexts, its dynamics and related policies, capturing the mechanisms of interaction among actors and trajectories in the life cycle of co-creation.

3.1 Tasks and Deliverable Objective

T2.2 Co-creation case studies

[M11-22] Partner(s): TUDO (leader), DDC, IAAC, POLIMI, SPI, UCL, APRE, ENoLL, Continium

Forty (40) co-creation initiatives will then be chosen from the knowledge base based on results from the meta-analysis and criteria established in section 1.3.2 in order to analyse their mode of operation within their respective environments, as well as their pathways to implementation. A conceptual ecosystem of drivers and barriers combining micro- and macro-perspectives will serve as an analytical skeleton. Data collection will take place through the application of participative research approaches under the usage of the same co-creation and design tools the stakeholders consider as fruitful for their own work. The case studies will be available online in the digital learning hub (T4.4) as soon as they will be released.

T2.3 Co-creation biographies

[M14-22] Partner(s): TUDO (leader), IAAC POLIMI, SPI, UCL, APRE

Within this task, theoretical presumptions from social innovation, design and co-creation research will be used to 'tell a story': 15 cases will receive a check-up in their actual state. This means their biographical dynamics will be examined in-depth in order to have a comparative view of what happens at the case studies' micro level. As innovation biographies provide a methodology designed to study the time-space dynamics of knowledge and ways of knowledge integration within innovation processes (see 1.3.2 methodology), it will be possible to situate relationships into contextual settings and to capture the general 'what has made them into what they are'. These stories will provide a two-folded service to the overall project: they produce data on micro level dynamics of co-creation to be triangulated with other data and they provide a benchmark for comparing and monitoring the implementation of co-creation journeys in WP3.

T2.4 Comparative analysis

[M20-24] Partner(s): TUDO (leader), IAAC, POLIMI, SPI, DDC, APRE

Under the responsibil-ity of TUDO with the support of IAAC and POLIMI, the outcomes of the previous tasks will be triangulated (see 1.3.2 section) and synthesised into a structured and comparative way, leading to the evidence-based refinement and adaption of the classification/typology of co-creation across Europe and its elements, including examples of good practices. The synthe-sis will be focused on the factors, processes, infrastructures and models. All the results pro-duced will be made available through the digital learning hub (T4.4) and in a related report.

D2.2 Deliverable Objective

In relation to deliverable 2.1 SISCODE Knowledge base T2.2 and T2.3 follow the same eco-systemic framework as an analytical grid for exploration. Therefore, both tasks include the same questions but will be answered in a different level of depth. From D2.1 we refined variables and corresponding questions in order to use for T2.2 and T2.3.

D2.3 Comparative analysis report [M24]

The deliverable contains results from T2.4

3.2 The social innovation spiral as a heuristic model for the innovation biographies

The overall goal of T2.3 is to collect and connect sufficient contextual information on the concrete practices / cases to describe their specific co-creation culture and *'innovative eco-*

system', and their path-dependencies in the overridden narrative of social change. The case-studies already are one part of the biographies and contain a broad overview on the necessary information. The following figure exemplifies the underlying process model: It is a heuristic description of typical stages a 'co-creation process' case will go through – or not, because there are always exceptions from the rule.

The social innovation spiral (Murray et al., 2010)

1. ***Problem context: Prompts*** (challenges) – societal challenges and motivations to de-velop a new solution that is different from the ones tried out already; the ***problem identification*** is part of this first phase.
2. ***Starting point of the co-creation process: Proposals/ Ideation*** – first ideas and try-outs
3. ***Further development of the co-creation process: Prototyping*** – a more formalized pilot project addressing the challenge; often improvised and not a regular practice
4. ***Follow-Up of the co-creation process: Sustaining*** – adapting / refining the proto-type; enhancing its viability and long-term resistance through ***verifying and testing***
5. ***Scaling*** – Further development of the approach and expansion of the idea – maybe only on a minor scale through reaching new target groups or extending the group of addresses, ***feedback and restarts*** are part of this phase
6. ***Systemic change*** – the impact the co-creation already gained, is supposed or ex-pected to gain

4 Visualisation of „Ups and Downs during the Co-creation process"

In Chapter 8 of the biography template you are asked to fill in a graphic showing modes of co-creation over time. This graphic should help you to reconstruct the progress of the co creation process you examine.**Please use the excel spreadsheet you will find in the base-camp biographies folder in WP2 for developing the visualisation!**

Please visualise the overall highs and lows of the 'co-creation process' and shortly explain (with reference to the text you have already written) the respective status of the co-creation process at a certain point in time. The graphic will help you to reconstruct the progress of the co creation process you examine. It is a simplistic representation intended to reduce complexity. With reference to the comparative analysis, to be done by TUDO, the graphics will help to identify different patterns of progress in co creation processes. Please use the most important and predominant momentum at a certain point in time that characterises the co-creation process. This means that we ask you to choose a single status per time unit and not to fill in different modes at the same point in time in parallel.

On the ordinate you can see four different possible varieties of the status that a co-creation process can be described with (Highlight, business as usual, stormy times, crisis).

The abscissa shows the timeline. It is up to you if you choose units to specify your graph. And if you do so, what kind of units it should be. For a long process you can choose years, half years or quarters of a year. For short processes you can choose months as unit. Please indicate at least the start and end point of the co-creation process. If one page is not enough to draw the process use as much pages as you want.

We differentiate four varieties characterising the status of a co creation process:

1. **Highlights (Code=4):** Important targets or milestones were achieved. For example the ac-tors found a solution for a problem or did an important step towards the solution. Bringing together all the actors needed for the co creation process could be a highlight too.
2. **Business as usual (Code=3):** As the title says this stage covers times the process runs without certain incidents. Cooperation works good and there is no reason to worry.
3. **Stormy times (Code=2):** Some problems occurred. For example one (or more) of the stakeholders oppose against the agreements concerning collaboration. Or an event was planned and it had to been canceled because there were not enough

participants. One more sign for stormy times could be struggle with funding organizations.

4. **Crisis (Code=1):** One had to fear the project could fail. Main actors were short before leaving the process. There is no resonance from important groups (e.g. ´civil society). Fi-nancial resources break away.

To create your visualisation please use the Excel spreadsheet "Time and status of the co-creation process". In the left column you can fill in units of time if you decided to use them or you can leave it aside. If you want to illustrate more moments just add more rows. In the right column you should fill in the code for the respective status. You should refer to the graphic in your Biography and explain the different modes and what has happened exactly in the text referencing it (no. highlight), … (no. stormy times) etc. Additionally, please make a list of all points of reference below the visualisa-tion with a very brief explanation for each occasion/point in time.

Biography Template Description

1 Summary

Desired Information (Approx. word count: ~ 400):

- o   Please write a short biography of the co-creation practice: From problem identification and invention over its implementation to diffusion and institutionalisation.

2 Context of the 'co-creation process'

Desired Information (Approx. word count: ~ 500):

Please describe at first the societal challenges or external triggers, which worked as the leverage point to set up the 'co-creation process' in the first place.

- o   What is the respective cultural, historical and policy background that the 'co-creation process' is embedded in?
- o   Which societal challenges is the 'co-creation process' trying to work on?
- o   Which specific problem, need or idea has been identified as a starting point for the co-creation process?

3 Starting point of the 'co-creation process'

Desired Information (Approx. word count: ~ 500):

Please describe the emergence of the 'co-creation practice' and its embeddedness and theproblem addressed. Please explain in detail the process of problem identification and prob-lem framing also indicating the space and time dimension (where and when took it place).

- o How and when did the 'co-creation process' start?
- o Please list the main actors involved in the foundation phase of the co-creation pro-cess, also indicating their roles (e.g. who initiated the process; who led the processin the beginning). Please include insights and findings leading to the idea to develop the co-creation (– especially the interrelations in their connection to the biograph-ical turning points).
- o Please describe the governance dimension of the initiative, specifying if the action was initiated by the political level (top-down), or if the request originated bottom-up, and at which governance level the action realized (Municipal/local; Regional; National).
- o Was a specific budget allocated for this co-creation process? And where did the budget come from?

4 Further development of the 'co-creation process'

Desired Information (Approx. word count: ~ 1200):

Please give a brief description of the process from problem framing to solution building, with particular attention to the participative phases.

4.1 Landscape of stakeholders

- o Please list the main actors involved in the process, also indicating their roles (e.g. who facilitated the process; who implemented; who benefitted; who evaluated the process...).
- o Please give a short description of all stakeholders (according to sector, organisation, gender, age, profession, political background etc., if applicable)

o For each actor involved, identify each actor's corresponding motivations, need, and its underlying driving values. Highlight any divergent need, if applicable.

o Which were the assets brought by the different actors into the process (such as sector-specific knowledge; resources; experiences; competences)?

o How were the stakeholders engaged?

o Which criteria were used to select them?

o Were incentives used to involve actors?

4.2 Phases of co-creation

Please describe 'the story' of the co-creation process, including all major steps and bibliographical turning points (Identification of critical turning points, interfaces, breaking points)

o Please also refer on the role of major drivers and barriers in these phases

o Please also refer on the space and time dimension (where and when took it place)

o In the spectrum which goes from ideation to production of the given solution, in which phase(s) did the co-creation take place?
   - Ideation phase
   - Design phase
   - Implementation/production phase
   - Impact monitoring, measurement and evaluation

4.3 Specification on methods, tools and communication

Please describe the role of formalisation and openness in the whole process, especially in the design of the process.

o What is the role of communication and the steadying of communication structures?
   - Is there a common mode of operation and communication?
   - What kinds of communication are used within the process?

o Was the dialogue between the actors structured based on codified approach and/or methodology?

o Was the dialogue guided by professional facilitators?

Please describe the co-creation methods and their matching to the process in user understanding.

- Which methods were used at what point for which purpose?
- How did stakeholders experience the co-creation tools?
- Was there a reflexive assessment and evaluation of the tools and instruments?

4.4 Specification on cooperation and conflict

Please explain all bibliographical turning points during the 'co-creation process' in terms of cooperation and conflict.

- o What have been the reasons for turning points?
- o Did the intensity of collaboration diminish during the process (disaffection)? If yes, is it possible to identify the reasons why this happened?
- o Was any measure/initiative taken to correct such a "disaffection - effect"?
- o How were conflicts managed?

4.5 Specification on political influence

- o Can the initiative be explicitly connected (e.g. endorsed) to any direct political programme?
- o Did any positive or negative political power play a role in the process, in an unintended and unexpected way? If any, please explain how such a political influence played a major role (e.g. in accelerating/slowing down/stopping the process; guiding the process towards given results rather than others; misappropriation of the process and or of the results…)
- o Would you state that the governance level(s) (national, regional, local) of the initiative had a specific impact on the result?

5 Follow-up of the 'co-creation process'

Desired Information (Approx. word count: ~ 400):

Please describe the follow-up and possible steadying of the 'co-creation process'.

- o Did the process create a 'shared solution' among stakeholders?
- o Is the solution different from the traditional/previous ones (if there were any) and specifically innovative in that context? Is there an innovative character of the co-creation practice and its course of development compared to existing practices?

o Has a follow-up and/or implementation of outputs been agreed among the stake-holders?

o Did the 'co-creation process' produce new relationships? And if yes which form did they take (e.g. partnership, informal relationship...)

o Did an institutionalisation of communication structures, projects or other forms of cooperation etc. emerge?

6 Scaling

Desired Information (Approx. word count: ~ 300):

Please describe the further development of the approach and expansion of the idea.

o Is the project/process replicated/imitated/adopted in other contexts, e.g. through reaching new target groups or extending the group of addresses?

o Is there a diffusion strategy, e.g. with sector specific conditions to different drivers and barriers?
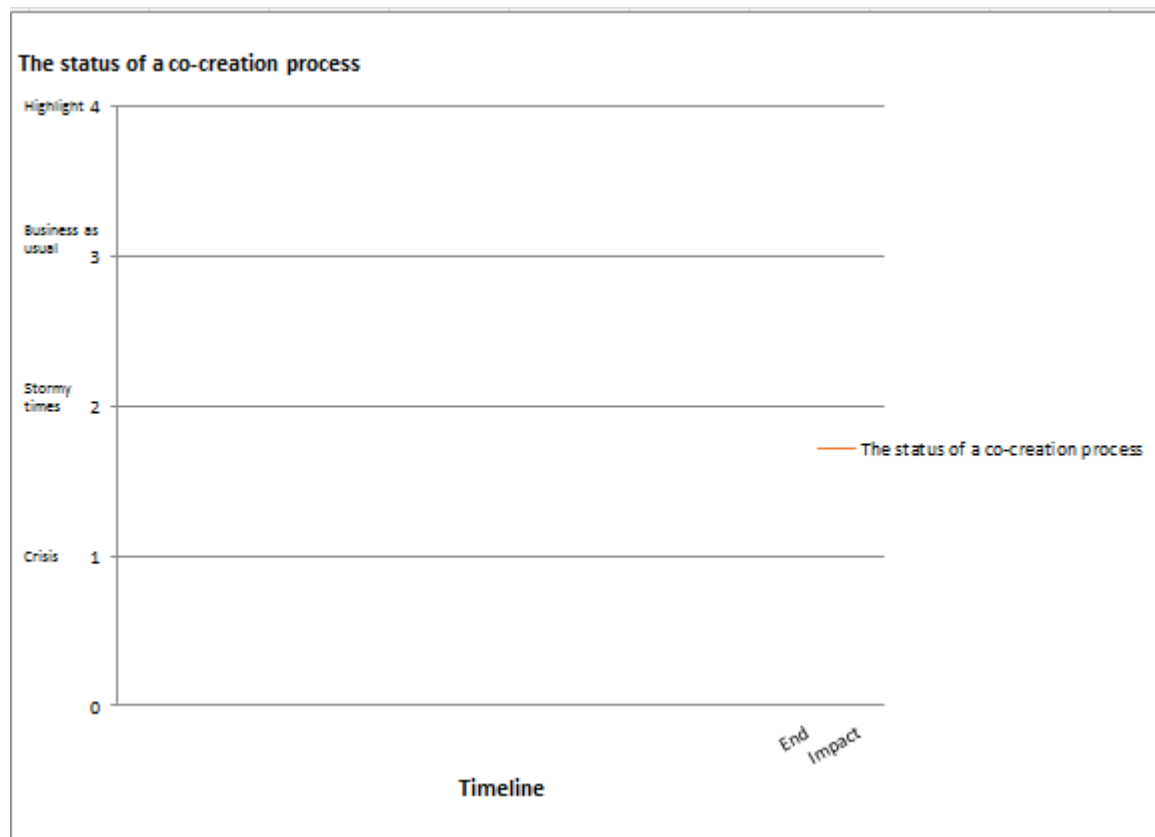
7 Systemic change

Desired Information (Approx. word count: ~ 300):

Please describe the impact that the 'co-creation process' already gained, is supposed to gain or expected to gain in the near future.

o Is the solution expected to produce relevant impact on the short-term (1-3 years) or on the medium/long-term (3-8 years)?

8 Visualisation

Visualisation: Please visualise the overall highs and lows of the 'co-creation process' and shortly explain (with reference to the text you have already written) the different modes and what has happened at which point.

9 Which learnings emerged?

Desired Information (Approx. word count: ~ 400):

Please state your final considerations on how co-creation is reflected within the field you examined for this biography.

- o   What is your impression from the case concerning the overall 'culture of co-creation'?
- o   How would you sum up your learnings about an 'innovative environment for co-creation' in the light of the case?

10 Conclusive remarks

Desired Information (Approx. word count: ~ 400):

Please describe your perspective as an expert for the respective case.

- o How do you reflect on what you have learned during the process of researching it?
- o How did you as a researcher experience the case?
- o Was it easy to access the information?
- o What do you think about the research pattern (see Murray's (2010) social innovation spiral in the task description)?
- o Is something missing here?

11 References

Please list all references with endnotes.

Please list all interview partners with name (organisation, function).

SISCODE CO-DESIGN FOR SOCIETY IN INNOVATION AND SCIENCE