



Drasil

Blackpaper

Build The Future



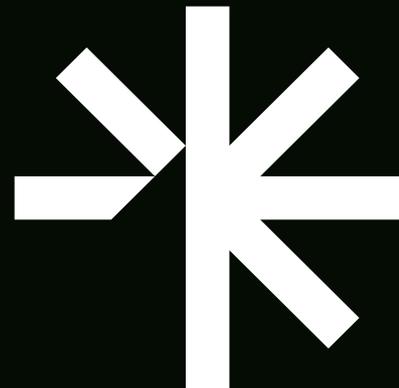
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Ideas are the fuel that enable us to imagine better futures, while new technologies hold the promise for greater freedom, autonomy, transparency, privacy and decentralisation. However, as creatives and technologists ourselves, we have seen first-hand how the gap between “what could be” and “what is” can often seem like a chasm. When the new technology is also difficult and complicated, the flip-side of its innovative and exciting nature is the daunting fact that there are no established paths or best practices to follow. The flip-side of everyone being a pioneer is that everyone can end up completely lost in the forest.

Drasil aims to bridge the gap by offering solutions built by builders for builders, removing complexity and lowering barriers to entry. We aim to give those with vision, imagination and drive all that they need to bring their blockchain projects from The Dream World into The Real World. Given a fair shot, we believe that the best of these projects have every chance of rising to the top and succeeding — as they should!

Yggdrasil (old Norse Yggdrasill or Askr Yggdrasils) is the mighty tree whose trunk rises at the geographical center of the Norse spiritual cosmos.



Even though we're keeping it quite simple in this paper, if you're not technical or completely new to blockchain, trying to imagine how Drasil works may be challenging the first time round! You'll recall our mission is to make these things as accessible as possible, so if that describes you, then there's a fun analogy we sometimes use to explain all of this (feel free to skip this section if it doesn't). OK. Still here? Imagine you're the lucky parent or guardian who has to be responsible for a children's party in a "make-your-own-pizza" restaurant that's just opened in town. From a menu you can select things like the type of base, cheeses, toppings and salads, which you can then assemble together in any way you like. You can then give this to their front-of-house baker who'll cook it for you live right there in their classic Italian oven, much to the children's delight! It's your job to make sure each child gets the meal they want but also catered to their needs, with all the right toppings and finally presented in a way that they'll accept - kids are fussy!

In our analogy, you're the developer (Drasil client) of the dApp (decentralised application). The dApp is represented by whatever meal you end up giving to each child (representing a "dApp user"). The kitchen then represents the blockchain (Cardano in our case). This is where all the ingredients and essential tools live, and where all the magic really happens. We can think of everything on the menu as representing a "service", and the waiting staff who communicate our requests to the kitchen act like an "API" (Application Programming Interface). Back in the kitchen the chefs (Drasil-Core) will have to act on these instructions from the waiting staff, who will then return with whatever we ordered. When we have what we need, we can arrange the pizzas and other ingredients (composing and adding and cutting and doing whatever we want) before handing them in to be baked (published), perhaps optimistically adding a healthy side-dish of salad before we can finally give them to the kids to enjoy.

It's not perfect, but there's a couple of cool things that our analogy captures : first of all, notice how we never have to interact with the kitchen directly ourselves, and the most difficult or dangerous parts of making the basic pizza elements (making the dough, cutting the tomatoes, grating the cheese etc.) are all handled for us. We only ever have to deal with the lovely waiting staff, and we certainly don't need any specialist cooking skills. Furthermore, we can ask the waiting staff for anything on the menu, whether that's single items (like "mushrooms"), or 'standards' (like "funghi pizza"), which may include all of the most common and useful ingredients for making a 'standard' pizza. A 'standard' pizza analogises to a "Drasil Application", by the way.

Although certain things usually include some key components - most pizzas would usually come with at least a base for example - and a lot of things typically go together (eg tomatoes and lettuce in salad), we are generally free to combine our orders in all sorts of creative ways to create whatever kind of meal we - or the child - can imagine. If a child insists on just eating a bowl of mushrooms, that's completely fine. Also, there's nothing stopping us from re-using the same ingredients each time with only tiny changes, or making a completely different pizza (or salad) for each child! In addition, this particular pizza restaurant is very cool and allows you to bring your own ingredients too - so if one particular child absolutely must have Buffalo cheese and British Columbia lettuce from the rival , even bought from the rival or another has some allergy we need to be aware of, no problem!

Of course, this analogy can't be stretched too far and is only intended to aid an intuitive, initial understanding for those who are completely new to all of this. We certainly don't mean to imply an exact correspondence at either a technical or conceptual level! After all, which sane parent would take on such a mission?

Below we outline some of the key terminology we use throughout the paper :

Blockchain - the decentralised data ledger (in our case, Cardano)

dApp - decentralised application, or web3 application : an application which interacts with the blockchain in some manner by means of interaction with a user's wallet

Drasil API - the API (Application Programming Interface) used to access and communicate with Drasil services. It is intuitive, well-documented and follows standard industry forms.

Drasil Application - set of Drasil services that are either usually used together, or related by genre. They are grouped together and can be managed through Drasil's Client Portal e.g. DAO Management Application, Rewards & Distribution Application, etc.

Note: Applications are really just groups of services and the concept exists only for organisational and conceptual convenience. They do not restrict how the services may be used in any way i.e. any of the services which make up an application can be used independently, and conversely, not all of the services of an application need to be used together

Drasil-Core - the library of utilities and tools that interacts directly with the blockchain to provide the core functionality for Drasil Services

Drasil client - anybody subscribing to Drasil services is a Drasil client. This enables them to use Drasil's services directly, either in order to create and manage smart contracts, or to configure Drasil services to work with their dApps. They could be the developers of the dApps, managers of projects, etc.

Drasil Service - a microservice (or set of microservices) created by Drasil and used to enable particular features and carry out particular operations on the blockchain. A Drasil client can make use of any and all of the services offered, in any combination or order. They can also use them to construct whole new services!

examples: Reward Calculation, Token Minting, In-game payments...

End users - everyone who uses the public-facing dApps (also : 'dApp users')

Microservice - a small software component which, as part of an architecture composed of many such microservices, offers functionality accessed and communicated with via well-defined APIs (Application Programming Interfaces).

It's no secret that developing dApps on Cardano is pretty hard right now. This is despite the fact that it is one of the most promising blockchains, featuring sophisticated, rigorous peer-reviewed architecture and the use of pure code which means that the behaviour of applications can be mathematically proven, making it much more secure than other chains. Both Drasil founders were part of an early cohort of Plutus Pioneers, the first wave of developers to be taken through a break-neck course in Cardano's brand new scripting language which was still yet to hit mainnet at the time! We experienced first-hand the growing pains and rapid iterations, as base code definitions and protocol changes would change from week to week. We also saw many reasons why developing would inevitably remain a challenge for some time to come. Aside from the lack of experience obviated by Cardano's use of its brilliant but novel eUTxO model, there was also almost no tooling, frameworks, or standard methodologies. Techniques and libraries that worked on other chains were rendered irrelevant here, as one could not simply translate from an account model to a eUTxO one¹.

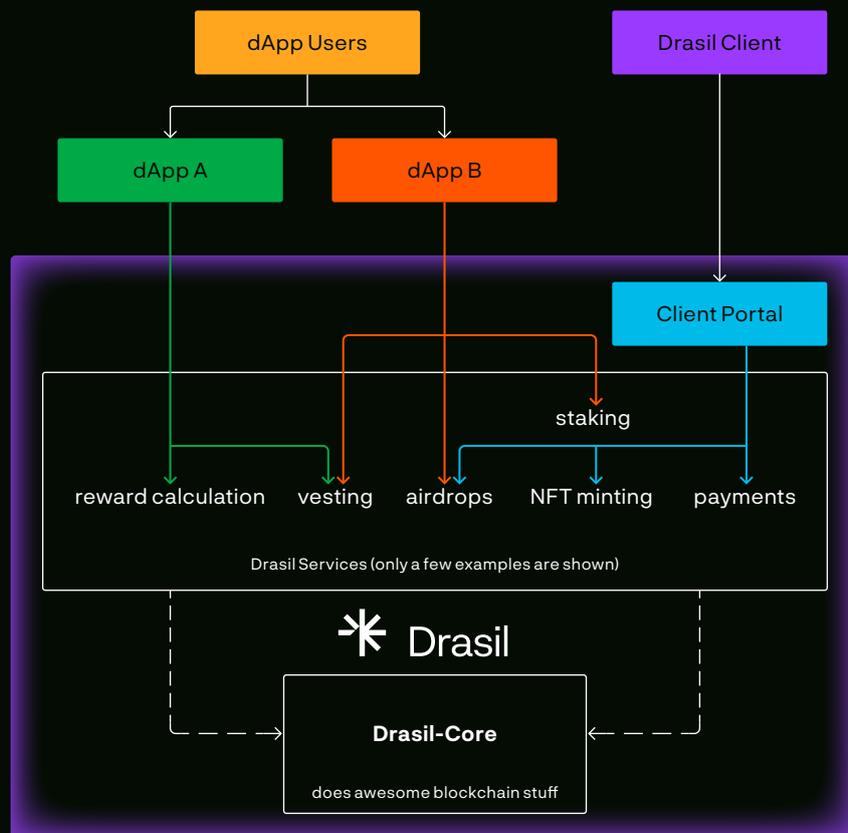
In order to build a secure and reliable dApp, it's not enough to just master Haskell/Plutus and be able to create smart contracts. You also need a very firm grasp of the rapidly evolving landscape around the Cardano protocol, a fundamental understanding of functional programming and the ecology of the Cardano system, comprehension and appreciation of smart contract development paradigms, and a grounding in concepts like congestion and rollbacks (and how to deal with them). And this is just the beginning, as like most things in crypto it's easy to find yourself in a rabbit-hole with no obvious end.

¹ - Concurrency and all that: Cardano smart contracts and the eUTXO model (article on IOHK blog)

All this ensures a very steep learning curve and that on-boarding new developers is slow and time-consuming, or that products can hit a brick wall once they hit mainnet, which limits the capacity of projects and hinders the pace of growth of the network. Applications thus take a long time to reach the marketing phase and the costs of research and development can be very high when contrasted with other "easier" blockchains.

Behind-the-scenes, the relatively small number of existing dApp developers who persevere end up repeating each others' workflows as they develop similar but incompatible solutions in parallel, over and over again. This is obviously extremely inefficient and results in "island" solutions, each with their own unique potential for bugs and issues in each case. Every one of these needs to be vigilantly maintained into the future to accommodate changes in specifications and updates to the protocol. Clearly what is missing is the synergy of a mature network, one in which creating dApps is much more intuitive, productive and accessible.

Drasil is a suite of services that enables its users to easily create dApps and smart contracts that are safe, reliable and secure. At the heart of Drasil Services lies Drasil-Core, the library of utilities and tools which interact directly with the blockchain. All of the complexities which normally make developing on the blockchain so difficult are abstracted away and handled by Drasil-Core, while Drasil Services expose simple, easy-to-use API endpoints of the kinds all developers are already familiar with.



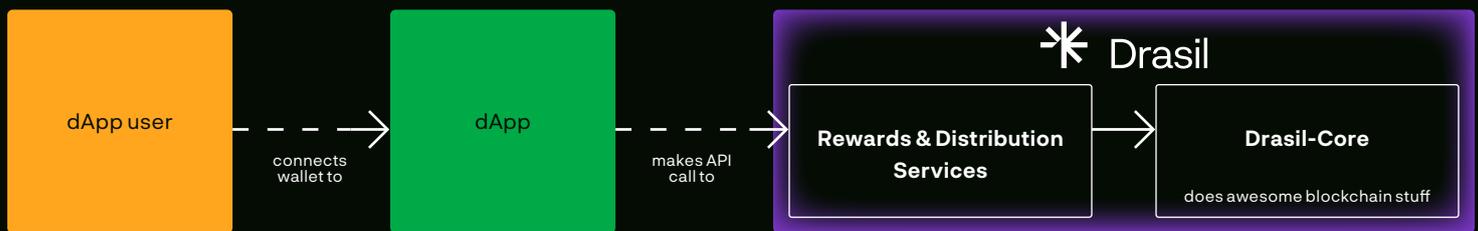
04

What Is Drasil?

powered by Drasil

For a dApp developer, it can be useful to consider Drasil from two perspectives. From the "Front-End perspective", we can look at the relationship between the dApp, the dApp user and Drasil. Alternatively, the "Back-End perspective" shows how Drasil clients use the Client Portal to work directly with their Drasil account and configure their services.

Drasil from a Front-End perspective



dApp users

dApp users can use compatible wallets to connect with any of the dApps powered by Drasil.

dApps

Any web application can easily be made into a dApp by Drasil clients simply by making use of API calls to Drasil Services.

Drasil Services

Drasil offers a host of services, grouped under "applications" (sets of services either intended to be used together or related by genre), which can be configured through the Client Portal. They include the following :

- DAO services (group voting, token voting, DAO administration, member vesting)
- Rewards & Distribution services (distribution, calculation, administration, earning, airdrops, ISPOs)
- Token services (marketplace, auctions, minting, NFT shops)
- Crypto Gaming services (in-game payments, Play-To-Earn, in-game wallets, blockchain integration)
- Miscellaneous services (vesting, payments, vaults, staking)
- IOT (Internet Of Things) services
- Identity services
- more services will be added as Drasil and the blockchain mature

The services will be maintained, improved and expanded over time, with new services coming online as the Cardano protocol and eco-system evolves. All services are available to all Drasil clients.

Drasil-Core

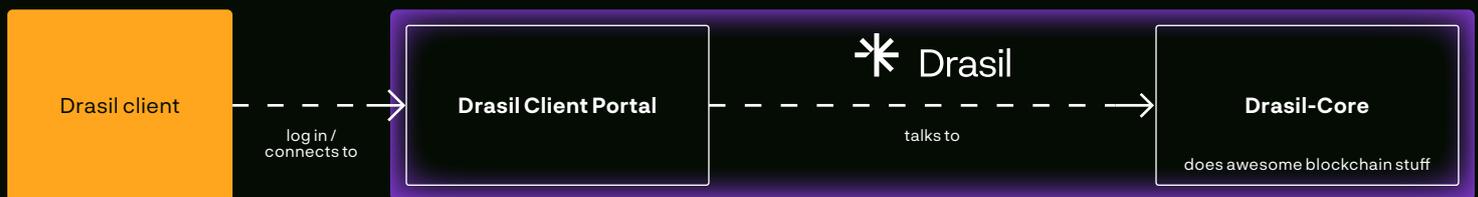
This is the engine and consists of core libraries which interact directly with the blockchain and handles many important aspects eg UTxO management, Tx building, rollback management, etc.

Drasil clients don't usually have to worry about any of the complexities or details here - it just works!

04

What Is Drasil?

Drasil from a Back-End perspective



Drasil client

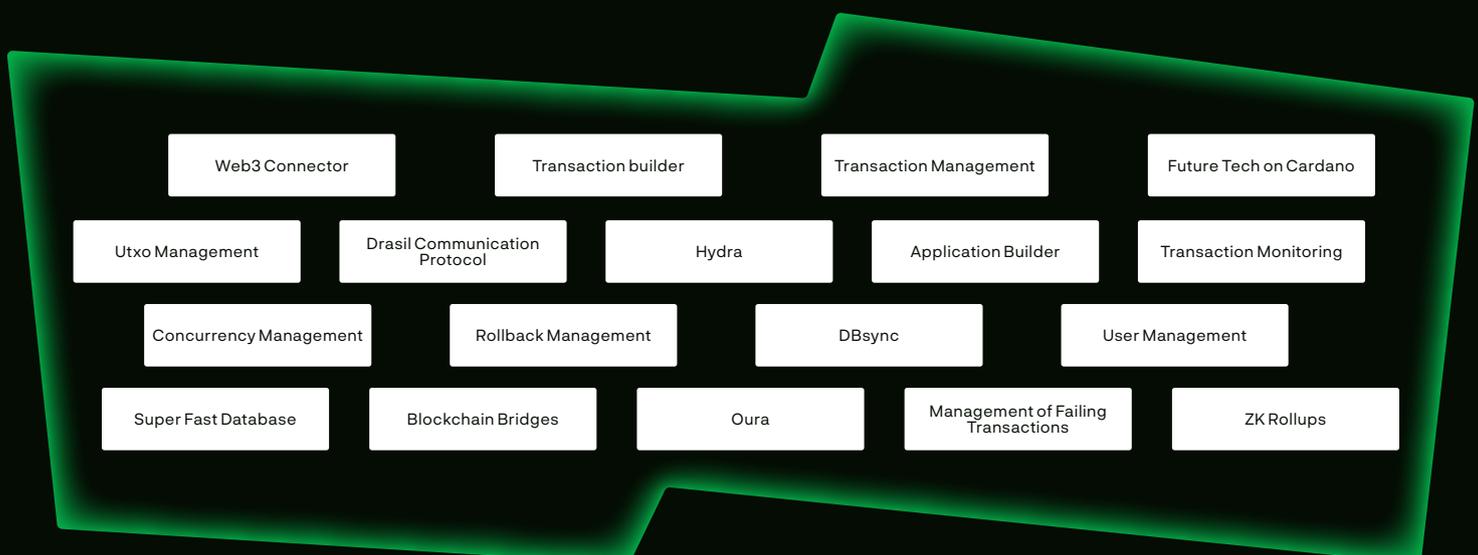
Drasil clients can login to the Client Portal with their login credentials.

Drasil Client Portal

From here Drasil clients can create, edit or remove any of their smart contracts and configure how they will make use of the services, as well as handle all account administration. Anything requiring a blockchain transaction requires a signature from an appropriate wallet.

Drasil-Core

Under the hood, the Drasil-core library handles all interactions with the Cardano blockchain:



Drasil consists of several fundamental features which all of the services share, and for this reason we sometimes refer to them as Drasil's "Roots". This collective usage allows for fast, parallel transactions.

Drasil Roots (fundamental features)

Root 1 - Web3 Connector

The Web3 Connectors are Drasil's HTTP endpoints, through which users can access the services which interact with the blockchain : retrieving information from the chain, sending transaction requests, etc. Transaction requests are made by means of simple, standard HTTP 'POST' requests and corresponding JSON data payloads that are called with standardized patterns from the connected wallet. To ensure it is as straightforward as possible, we also provide tutorials and sample code demonstrating how to integrate each wallet and the correct form of the payloads required.

Root 2 - Transaction Builder

By means of a standardized transaction building process, users are able to generate transactions of many different types for thousands of users simultaneously. New types of transaction can be added very quickly and easily without affecting existing code.

Root 3 - Transaction Management and Monitoring

Transactions for the blockchain are initially built using parameters given by the user, after which they are signed and submitted. After this they need to be monitored and tracked so that it can be determined if and when they eventually make it onto the blockchain. Whatever the case, appropriate actions need to follow. Responses to failures can be customised for the service eg it could attempt to re-submit the transaction a certain number of times. The Monitoring function allows dApps to keep records of submitted transactions, for example by using the appropriate endpoint to call for a history of transactions.

Root 4 - Rollback Management

One of the challenges of public blockchains is that rollbacks happen regularly i.e. when transactions held to be valid are later invalidated due to a regression of the chain. This can lead to many problems for dApps, such as inconsistent states when the resulting UTXOs of revoked transactions (those that were previously successful) have been re-submitted into new transactions, which has the potential to cause a domino effect. Drasil's Rollback Management tracks the transactions that were part of a rollback and handles them according to the rules specified in its internal system. dApps can subscribe to rollback events and get automatically informed, allowing them to take special measures such as correcting their databases entries.

Root 5 - Global UTxO Management

The Global UTxO Management system allows the user to take full advantage of the parallelization potential of the eUTxO model. It tracks all pending transactions and used UTxOs, ensuring that 'bad' inputs are not selected for use by new transactions. The system takes advantage of a stunningly fast open-source in-memory database and blockchain event system to handle this (thanks Oura!).

Drasil plans to release the Global UTxO Management system as an open-source solution once we are satisfied that the code meets our quality standards. In the meantime, we shall operate the database for the Cardano community as a free service and provide tools and code that will allow anybody to use this powerful feature in their own dApps, whether or not they use other elements of Drasil. SPOs can even 'hook' a small tool into their relays to propagate their mempool data directly into the global UTxO Management, with network effects meaning that the benefits will be multiplied for everyone. One such benefit is the ability of SPOs to easily monitor the mempools.

Root 6 - Transaction Submit System

The Transaction Submit system ensures that transactions don't get lost i.e. that they make it onto the chain.

Root 7 - Application Builder

The Application Builder is a tool to allow for the various functions to be combined into single requests and is mainly used internally. In this way different services can be used as building blocks for more sophisticated ones. It comes into its own in the case of enterprise-level builds, where efficient use can lead to very fast development times. It also allows Drasil to quickly and securely incorporate new features and improvements.

Root 8 - Blockchain Data & Events

Drasil leverages several data streaming tools such as DBsync, Oura and mini protocols, all of which are used to retrieve blockchain information. Drasil thus enables information to be requested from the blockchain without the need for client-run databases or external services.

Root 9 - Concurrency Solver

Concurrency challenges occur when different transactions try to use the same UTXOs at the same time. These issues can be challenging to deal with, but Drasil's Concurrency Solver handles this automatically and transparently in the case of both native and custom Drasil applications.

Root 10 - Hydra support

Once Hydra is released we plan to implement native Drasil support for the protocol. We plan to work with SPOs in order to make it possible for dApps to use Hydra-as-a-service, as well as native applications.

Drasil Branches (Drasil Application Layer)

Drasil's application layer groups together services which are either intended to be used together or related by genre. We refer to these as "Branches" and they cover a number of areas or use cases :

- DAO Management
- Token Rewards & Distribution
- Asset Generation & Sale
- Custom Applications (IOT, Industry, Gaming...)
- Single Contract Solutions

Management of these services and their respective contracts can be done via Drasil's Client Portal. Among the facilities here is a "smart contract generator", which makes the building of smart contracts related to the applications above achievable with a mouse-click.

A Bundle Of Microservices

Drasil is built up from a number of communicating microservices, each of which is specialised to handle a particular set of tasks. There are a number of advantages to this approach. First of all, scaling is simple - since one can simply add more instances (live running versions) of specific services as demand increases, Drasil can scale easily to meet the demands of users.

Another advantage is that special features or independent tasks for custom applications can be easily be implemented which integrate seamlessly with the overall system and still take full advantage of the common features.

However, the primary motivation for this architecture choice is our goal of arriving at a decentralised service by working with SPOs who would run instances of Drasil. This could provide welcome additional income for single pool operators in particular, though SPOs running such services would need to be verified and have certain specifications to ensure security, quality and up-time. Our plan is to start with a group of carefully selected single pool operators. Over time, we hope that every qualifying SPO who wishes to do so will be able to can participate.

Drasil Clients & Price Model

Drasil operates a subscription model for membership, which gives access to the Drasil Client Portal and the ability to use any and all of the Drasil services, in any combination. The subscription model is deliberately set up to make it as accessible as possible, while still allowing Drasil to provide enterprise level service.

Price Model

The price model for a package consists of a monthly subscription rate plus a per-transaction fee. "Transactions" are defined as verified, validated transactions on the Cardano blockchain.

PACKAGE PRICE = MONTHLY SUBSCRIPTION RATE + (TRANSACTION FEE x TRANSACTIONS)

Note : In the case that significant extra customisation or assistance is required, or for more complicated uses, a SCOPING & SETUP FEE may be applicable (agreed in advance). However this will not usually be necessary for most users, particularly at the lower package levels.

Drasil clients can choose their own subscription rate by selecting the package that best suits them. This can be changed at the beginning of each quarter. The lowest rates still allow full access, but the per-transaction fee will be highest. The higher the package rate and subscription fee, the lower the per-transaction fee. The charges are calculated so that optimal choices of packages can be made based on accurate estimates of the number of transactions expected.

To promote the maximum possible accessibility of our services, our package rates will start at a very low rate.

PACKAGE A = Lowest subscription rate, highest per-transaction fee

PACKAGE E = Highest subscription rate, lowest per-transaction fee

Lower Subscription Rate
Higher per Tx-Fee



A

B

C

D

E

PACKAGE

Higher Subscription Rate
Lower per Tx-Fee



It is important to remember that Drasil does not have any say or influence on the fees that Drasil clients themselves charge their *dApp* users i.e. it is completely up to the developer whether fees are passed on, a surcharge is added or the fees are absorbed to effectively give users a subsidised or free experience. Within the terms of service and subject to their package charges, Drasil clients may use the services as they wish: create multiple *dApps*, new 'front-ends' for access to the applications (usually accessed via Drasil's client portal), etc.

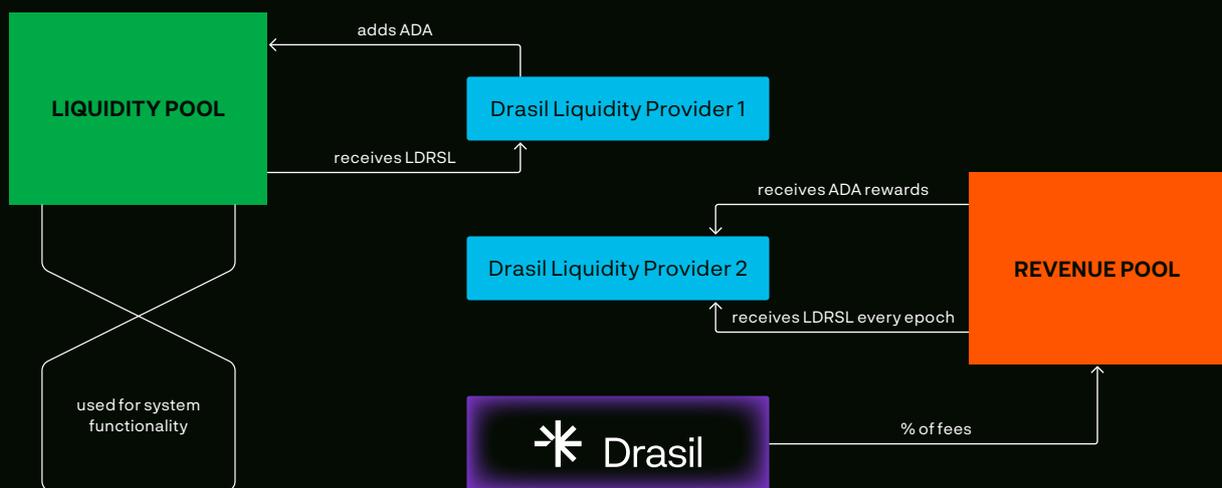
Drasil will offer discounts for quarterly and yearly payments.

Some of Drasil's functionality requires a high degree of parallelisation. An issue that arises from this is that a significant amount of liquidity is required. This is due to the fact that each available UTxO is required to host a minimum amount of Ada (Min-Ada). We refer to these as "carrier UTxOs", since the Ada is never actually required to leave Drasil's system while it is in use, but must be present in the UTxOs that are used for Drasil operations. This raises the problem of where exactly to source this liquidity from, or more precisely, from whom to source it. Our proposed solution is to utilise the popular idea of "yield farming".

In our proposed system, anybody would be able to provide Ada as liquidity to the Drasil system, for which they would receive rewards comparable to when staking Ada in a stake pool. However, in our case Ada would be sent to a Drasil contract and the user would receive back LDSRL tokens instead of Ada. These tokens would represent the liquidity that the staker has provided to the system. This is somewhat similar to 'liquidity tokens' in DEXs, but with a different mechanism for calculation. The number of tokens a staker receives for a certain quantity of Ada would be related to the demand for liquidity in the system as a whole at the time of staking. This demand depends on the usage of the system, how many contracts are in use, how many tokens exist, and many other factors.

An algorithm would examine the current liquidity demands of the system and work out how much more is needed, if any. As the demand for smart contracts, native scripts and blockchain services increases so too would the demand for liquidity increase, until at some point a saturation point is reached. In this state the token (LDSRL) would be expected to become somewhat stable (in relation to Ada) until the demand for the system changes. In general its price would be expected to reflect the demand for liquidity.

Yield generated accumulates in the "revenue pool", which accrues revenue generated from all Drasil transactions. This revenue pool is what provides liquidity providers with their earnings (yield).



It is important to note that Ada in the revenue pool does not serve as liquidity. LDRSL owners would earn Ada from the revenue pool and earn additional LDRSL token every epoch. The LDRSL tokens would then be claimable directly via SmartClaimz, for example.

The Ada in the revenue pool is used for two things:

1. Staking in a dedicated Drasil Revenue Stake Pool. This will be a saturated stake pool specifically set up to generate more rewards for the revenue pool itself.
2. Staking with external stake pools operated by the single pool operators who are running Drasil nodes to maintain the network. Each LDRSL is backed by Ada, and to ensure stability a maximum of 25% would be made available for payout each epoch. LDRSL would also be exchangeable for Ada by request, with fulfillment occurring the following epoch. Larger rewards would be earned for fixed-term stakes of 6 or 12 month periods.

This is an early, approximate blueprint for the liquidity solution and token ideation, and subject to updates and improvements as more investigation is carried out. The precise details of the final implementation are still to be determined. In any case, LDRSL will be utility tokens and are not intended as investments.

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2022

Q1

- MVP Drasil-Core
- Partnerships for first products

Q2

- Testnet first public product

Q3

- Official launch - first public-facing product on Mainnet!
- Token : Reward & Distribution Services
- Asset Generation & Sale Services (1)

Q4

- Asset Generation & Sale Services (2)
- DAO Management Services
- Single Contract Solutions (1)
- Hydra (if ready / online)

2023

Q1/Q2

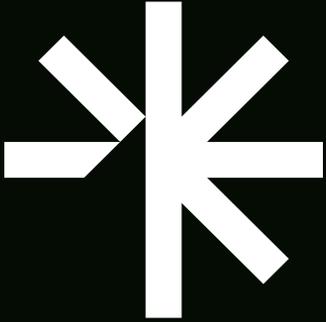
- Gaming Solutions (1)
- IOT Connector
- Single Contract Solutions (2)
- ZK Rollups
- Gaming Solutions (2)
- Identity (1)
- Single Contract Solutions (3)
- ZK Rollups (if ready / online)

Q2/Q3

- Identity (2)
- Industry Solutions (1)
- Single Contract Solutions (4)

Q3/Q4

- Industry Solutions (2)
- Single Contract Solutions (5)
- Crosschain



Drasil was founded by Torben Poguntke and Zak Bassegy.

Both founders are Plutus Pioneers and dedicated to the growth and success of Cardano and the wider crypto and blockchain industry.

Torben Poguntke | Co-Founder & Chief Technology Officer

Torben is an experienced blockchain developer and engineer specialising on Cardano. In addition to working on digital ledger technologies at Fraunhofer IML (Dortmund), Torben has also occupied vital roles across the technology industry across the years, including as a Key Account Manager at Cross Control AB and as a Lead Engineer at Erus GmbH.

These experiences have equipped him with the knowledge, know-how and skills to be able to manufacture and architect complex and secure solutions to real-world problems using the full capabilities of blockchain technologies. The architectural solution that grew to become what we call "Drasil-Core" was his brain-child, after he became frustrated with the lack of adequate tooling. As a perfectionist, he works tirelessly to create products that meet the exacting standards that a technology underpinning the world of the future demands.

Zak Bassegy | Co-Founder & Head Panther

Zak is a mathematician and technology consultant, with years of experience advising governments, organisations, NGOs and companies. Zak's motto is "to inspire and empower" and he has both designed and delivered workshops all over the world: not only to those in positions of power (royalty, government ministers and CEOs of some of the world's largest companies), but also teachers and disadvantaged school-children in some of the poorest parts of the UK. He is much more proud of the latter.

Zak cares deeply about the intersection between humanity and tech, and is also part of the core team at Mind Over Tech, a dynamic young UK company which helps organisations and individuals to cultivate healthier relationships with their technology. His strong passion for privacy, decentralisation and transparency brought him over to crypto. He was attracted to Cardano in particular due to its mathematical rigour and IOG's early investment in the African continent, which he believes has the potential to transform the continent and help its next generation to finally achieve the prosperity it deserves.

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By reading or using this Whitepaper/Blackpaper, you shall:

Not rely on any provision or statement in the Whitepaper/Blackpaper for any LDSRL token decision. Acknowledge and agree that LDSRL tokens may have no value. There is no guarantee for representation of value or liquidity for the LDSRL tokens. Recognize Drasil, its affiliates, or its team members shall not be responsible or liable for the value of LDSRL tokens, transferability, or liquidity. Agree that Drasil, its respective affiliates, service providers, and team members shall not be liable for any losses resulting from the use of the Whitepaper/Blackpaper or any other related materials published, including without limitation any risks and uncertainties associated with LDSRL tokens. Recognize that all information contained in this Whitepaper/Blackpaper only serves informational purposes and does not constitute any legally binding obligation. Acknowledge that the information contained in this Whitepaper/Blackpaper may be changed, amended, or replaced in the future. Agree that the information disseminated in the Whitepaper/Blackpaper does not entail regulatory approval or compliance with any applicable laws, legal requirements, or soft-law framework. Acknowledge that the mention of any third party, name, or trademark does not imply any endorsement or affiliation with any third party, product, or company. Agree not to copy, distribute, reproduce, or modify (either partially or entirely) the information stated in this Whitepaper/Blackpaper without the consent of Drasil. Moreover, by using the services provided by Drasil, you fully understand and agree with the following:

Drasil is an entity subject to local laws and regulations. All activities conducted or performed by Drasil are in compliance with such regulations. The User understands and accepts to be subject to the laws and regulations in the jurisdiction in which the User is domiciled and that Drasil accepts no responsibilities for the legal status of the User. The User should obtain local legal advice to clarify the legal status of the User in their own jurisdiction before participating in the Crowdsale. The User understands and accepts that the technology described in the Whitepaper/Blackpaper is still at an early development stage and its application of experimental nature carries significant operational, technological, financial, regulatory, and reputational risks. User understands and accepts that Drasil, including its shareholders, directors, management, employees, and any other person affiliated with Drasil, carries no liability for issues beyond the control of Drasil, including but not limited to transaction mining delays and node-related issues.

The User understands and accepts that while Drasil will make reasonable efforts to develop and complete Drasil's platform, as described in the Whitepaper/Blackpaper, it is possible that such development may fail and that the User's LDSRL token may become useless and/or lose its value due to reasons of technical, commercial, or regulatory nature (or any other reason within or outside Drasil's control). The User is also aware that even if all or parts of Drasil's platform are successfully developed and released in full or in parts, the said platform could be fully or partially closed, remain commercially unsuccessful, or shut down due to lack of public interest or for any other reason. Drasil has the right to engage subcontractors to perform the entire or partial development and execution of the platform. The User understands and accepts that Drasil undertakes no obligations to act on behalf and in the interests of the User.

The User further confirms to have carefully reviewed the Whitepaper/Blackpaper, the technology described, its functions, and this Disclaimer, and hereby confirms to fully understand the

risks and costs related to the LDSRL token.

TAX WARNING - The User understands and accepts that Drasil does not act as a tax agent of the User. The User bears the sole responsibility to determine their tax responsibility for creating or obtaining LDSRL token(s), and to determine whether the ownership, usage, the potential value appreciation or depreciation, or any gain or loss resulting from the purchase or sale of the LDSRL token, have tax implications for such User. More specifically, the User fully understands and agrees to the following:

The User and Drasil carry their own tax obligations solely under the applicable laws of the jurisdiction they reside in. Should Value Added Tax (VAT) obligations or other indirect taxes apply as a result of the trade of products/services provided by Drasil or by third parties, Drasil reserves the right to adjust the product/service price by adding a VAT/ indirect tax as applicable for each respective country. Nonetheless, Drasil recognizes the dedication of time and resources, as well as engagement of qualified personnel in the process of structuring Drasil platform optimally (within legal frames), are necessary to ensure seamless transaction flow. The User understands and accepts that Drasil may have to disclose information on the User, including but not limited to the value of any LDSRL tokens held, if explicitly requested by any government authorities in accordance with any applicable jurisdiction. By creating, holding or using the LDSRL token, and to the extent permitted by law, the User agrees not to hold Drasil or any associated third party, including developers, auditors, contractors, or shareholders, liable for any tax liability associated with or arising from the creation, ownership or use of LDSRL token or any other action or transaction related to Drasil platform.

NO WARRANTIES – All information provided within the Whitepaper/Blackpaper is provided “AS-IS” and with no warranties whatsoever concerning the LDSRL token and the technology described (including the accuracy, completeness or use of any information provided therein, to the extent permitted by any applicable law). This includes but is not limited to expressed or implied warranties of title, merchantability or fitness for a particular purpose.

DISCLAIMER OF LIABILITY – The User acknowledges and agrees, to the extent permitted by any applicable law, that the User will not hold Drasil or any associated parties, including but not limited to any group entity, management, developers, contractors, or shareholders, liable for any and all damages or injury whatsoever caused by or related to the use of or the inability to use the LDSRL token, the platform, or the technology described under any cause or action whatsoever in any jurisdiction. Drasil specifically, without limitations, disclaims liability for any loss or damages, including incidental or consequential damages, and assumes no responsibility or liability for any loss or damage suffered by any person as a result of the use, misuse, or reliance of any of the information or content in the Whitepaper/Blackpaper, Drasil's AS's business plan, or on the www.Drasil.com website.

Under no circumstances shall Drasil, or any associated parties as stated above, be liable to the User for any special, indirect, incidental, consequential, exemplary, or punitive damages (including lost or anticipated revenues or profits and failure to realize expected savings arising from any claim relating to the services provided by Drasil), whether such claim is based on warranty, contract, tort (including negligence or strict liability) or otherwise or likelihood of the same. The User further specifically acknowledges that Drasil, or any associated parties as stated above, are not liable, and the User agrees not to hold them liable, for the conduct of any third parties, including other creators of LDSRL token(s), and that the risk of creating, holding and using LDSRL token(s) rests entirely with the User.

USE AT YOUR OWN RISK – By utilizing Drasil's service, platform or the www.Drasil.io website, including but not limited to, the transferring of any assets to Drasil, the User undertakes and understands all possible risks that directly or indirectly arise from the activity connected with the User's participation in the Crowdsale and/or use of Drasil's services and products.

FORCE-MAJEURE – User understands that Drasil will not be liable to the User for any breach hereunder, including failure to deliver or delays in delivery of the services occasioned by causes beyond the control of Drasil. These include but are not limited to unavailability of materials, strikes, labour slowdowns and stoppages, labour shortages, lockouts, fires, floods, earthquakes, storms, droughts, adverse weather, riots, thefts, accidents, embargoes, war (whether or not declared) or other outbreak of hostilities, civil strife, acts of governments, acts of God, governmental acts or regulations, orders or injunctions, or other reasons, whether similar or dissimilar to the foregoing (each a “Force Majeure Event”).

MISCELLANEOUS / FINAL WARNING – Utilizing services offered in the Whitepaper/Blackpaper, on Drasil platform and on the www.Drasil.com website, may result in significant losses or even in a total loss of all value submitted and obtained.

This Disclaimer, Drasil Whitepaper/Blackpaper, Drasil's website, and platform or any related documents or site do not constitute a prospectus of any sort, is not a solicitation for investment and does not pertain in any way to an offering of securities in any jurisdiction. The User guarantees that they are a legally capable person of sufficient age to use the services and technology described in the Whitepaper/Blackpaper, including the acquisition of LDSRL tokens. Moreover, the User must comply with all legal rules and applicable laws of the jurisdiction where the User lives to use the services or acquire LDSRL tokens. The User further confirms to be legally permitted to hold and use the LDSRL token in the jurisdiction where the User is domiciled and accepts to hold Drasil harmless should the User not be compliant with any such laws and regulations.

LDSRL tokens are only functional utility tokens and serve no purpose other than being applied on Drasil platform, provided it is completed and deployed as stipulated in the Whitepaper/Blackpaper. In particular, the User understands and accepts that the LDSRL token neither represents nor constitutes any ownership right or stake, share or security (or equivalent rights), any right to receive future revenues, or IP rights. Furthermore, the User acknowledges that ownership of the LDSRL token is associated with no form of participation in or

relating to Drasil platform other than access for token holders and Users. LDSRL tokens and Drasil platform are not for speculative investment. No promises regarding the value or future performance are made regarding LDSRL tokens. No other rights associated with holding LDSRL tokens are given. Drasil's team is investing heavily in the safety and security of the services that Drasil provides. However, we cannot protect against all possible sources of error and malicious deeds initiated by any party. Therefore all risks assumed by using Drasil's platform in any capacity, transferring, receiving, and accumulating LDSRL tokens are solely assumed and accepted by the User.

LDSRL tokens are meant to be held and used by those well experienced and knowledgeable in cryptographic tokens, their acquisition, transfer, and use (only for accessing the services available on Drasil's platform). The User represents and warrants that they have a deep understanding of the functionality, usage, storage, and transmission mechanism associated with cryptographic tokens and blockchain-based software systems.

The User further represents and warrants to have knowledge of the token creation process and that the User will have their own account and crypto wallet, with a private key associated to this address and password. The password is used to encrypt the User's private key. Following the creation of the LDSRL token, the LDSRL token will be transferred to the User's address. The User understands that the User must keep their password and private key safe, and that the User will not be able to generate a new password or recover their private key should this private key and/or password be lost or stolen. The User understands that if such private key and/or password is lost, the LDSRL tokens associated with the User's account will be unrecoverable and will be permanently lost. In such instance, neither DrasilAS nor any other person or entity will not be able to help the User retrieve or reconstruct the lost password and/or private keys, and the User will not be able to access any lost LDSRL tokens.

The User understands and accepts that Drasil platform will be run on a blockchain through a network of resource providers. The User understands that the majority of these resource providers could agree at any point to make changes which could lead to the LDSRL token losing its intrinsic value. By transferring and/or receiving LDSRL token(s), no form of partnership, joint venture or any similar relationship between the Users and/or other individuals or entities involved with the deployment and setting up of Drasil's platform is established.

The User understands and accepts that no market liquidity may be guaranteed with regard to the LDSRL token and that its value may experience extreme volatility over time, including full depreciation.

Should the User be a consumer and should any applicable consumer legislation or cancellation rights apply to such User in relation to the creation and obtainment of the LDSRL token, the User waives, acknowledges and accept any such consumer and cancellation rights, unless otherwise prescribed by mandatory law.

The User understands and accepts that the blockchain technology allows new forms of interaction and that it is possible that certain jurisdictions will apply existing regulations on, or introduce new regulations addressing, blockchain technology-based applications, which may be contrary to the project and which may, inter alia, result in substantial modifications of the technology and/or Drasil platform, including its termination and the loss of LDSRL token(s) by the User. The User confirms that they have read, understood, and agreed to comply with all restrictions set forth above. The User further agrees not to obtain the LDSRL token for any illegal purposes including but not limited to money laundering, corruption of any sort, or any other illegal means in the jurisdiction in which the User resides. The User acknowledges and agrees that if any part of this Disclaimer or the Whitepaper/Blackpaper is found illegal or unenforceable, in whole or in part, such provision shall be ineffective solely to the extent of the invalidity or unenforceability under the laws of the applicable jurisdiction without affecting the validity or enforceability thereof in any other manner, and without affecting the remaining provisions of this Disclaimer or the Whitepaper/Blackpaper, which shall continue to be in full force and effect. This Disclaimer is governed by law and any claims brought forward against Drasil arising out of or in connection with the creation of LDSRL token and the development and execution of Drasil's platform, shall be resolved and finally settled by the ordinary courts. Drasil and its team will in any case abide by the laws outlined in each of its operational country(ies), and each operational unit shall be subject to its local laws and jurisdiction for the explicit operation such unit provides. Drasil's Whitepaper/Blackpaper, its business plan, its website, and this Disclaimer, may be subject to changes at Drasil's discretion, either before, during, or after the Crowdsale.

This Disclaimer complements the previous disclaimer found on all the previous versions of Drasil whitepapers, blackpapers or papers of any colour, is valid from the moment of publication, and could be subjected to regular changes and updates.



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