

An Independent Bot Economy to Support the Future of AI



Everything Grows From SEED

Cryptoeconomics White Paper version 1.3

March 2018

seedtoken.io

Contents

3	Abstract
4	The SEED Token
6	Token Network Components
7	Network Architecture
8	Token Economics
9	Licensing
10	Ratings & Reputation
11	Conclusion
12	Appendixes

Contributors



Mark Stephen Meadows
CEO, Botanic Technologies
mark@botanic.io



Nathan Shedroff
Executive Director, Seed Vault
nathan@seedtoken.io



Aron van Ammers
CTO, Outlier Ventures
aron@outlierventures.io

Thanks to the many reviewers and contributors:

- Kian Wilcox
- Jaime Burke, Stephan Apel, Greg Murphy, Eden Dhaliwal, Matt Law, and others at Outlier Ventures

DISCLAIMER: The following description of the SEED token and network by Seed Vault Ltd. are preliminary and may be revised at any time. Further details and revisions will be provided to potential funders by Seed Vault Ltd and select partners. This is not an offer of any security or a solicitation of offers to buy any security. Potential funders should discuss any investment opportunities offered by Seed Vault Ltd. and its partners with their financial advisers.

The Future of AI Relies on the Future of CUIs.

Conversational User Interfaces (CUIs) are rapidly proliferating, enabling new kinds of interactions (and generating new kinds of user data) across an increasing variety of industries and applications. They represent a paradigm shift in computing systems. Just like graphic user interfaces (GUIs) replaced command-line interfaces (CLIs) and ushered-in new users, services, and applications, so will CUIs impact the future of digital services and the economy, as a whole. AI technologies are advancing quickly, enabling these new interactions, and represent the back-end of these solutions. CUIs are the front-end portion of a complete solution, which are required for AI deployments to reach their potential with maximum impact.

CUIs are Difficult to Create.

The CUI market is already growing rapidly from \$3B today to over \$20B in the next four years. This growth is fueled by technological development on CUI the front end and back end. However, CUIs are difficult to create, manage and, for end users, trust. CUIs are also complex, taking many different forms, deploying in different channels, and using different services and technologies to perform naturally with users.

The SEED platform will Enable the CUI Future.

The SEED™ network's pioneering peer-to-peer ecosystem tools and marketplaces promises faster, easier publishing, sharing, and developing of quality, multimodal CUIs, assistants, and digital agents. The SEED token makes it possible to monetise these components and to allow users to be compensated for the value of the data they share with these systems.

SEED allows CUI developers, end-users, publishers, and analysts to participate in the value created by interaction with CUIs. It allows us to decentralize and democratize the value economy in AI and conversational interfaces.

The SEED Network is comprised of many communities and companies that share Botanic Technologies' vision from across the converging worlds of AI, VR, and blockchains. SEED will act as a shared currency to help unify these industries and the creation and exchange of valuable data, for the first time.

Imagine a Bot Marketplace as Usable as an App Store and Secured by Blockchain.

The SEED platform also allows the community to rate and review CUIs and CUI components (and their developers). This can reward good actors and reduce the influence of bad ones. We believe recording all these transactions via blockchain is the best way to establish trust through transparency of transactions to help the CUI economy grow as CUIs become the preferred way people interact with computing and AI systems.

1.0 The SEED Token

The SEED Token

SEED is a digital utility token created for the purpose of authenticating CUIs (conversational user interfaces) and enhancing digital transactions among CUIs using the SEED Network. The SEED token will be the recognized currency for the SEED Network and its marketplace and wallet applications.

When CUI developers of all kinds upload code, content, or other components of CUIs to a SEED marketplace, they will designate, in units of SEED, the licensing terms for the use of these components. Correspondingly, other developers or deployers of CUIs can license any components, regardless of the license type, and compensate the creator of these components in SEED tokens in the amounts stipulated in the license.

In addition, any end-user of a partnering, SEED-compatible online service or tool can earn SEED, in exchange for sharing data about themselves and their interactions with that service.

SEED tokens are not mined (unlike Bitcoin, which relies on “proof-of-work”). Instead, the entire allocation of tokens are created at the beginning of the service and assigned unique identifiers. SEED uses “proof-of-stake” as its method of managing tokens.

In order to create a healthy ecosystem of CUI developers and democratize CUI and AI technologies and services, as much as possible, we’ve designed a token and network to shift the “**frontier of the firm**” to small developers. This doesn’t exclude larger developers or service providers in any way. Rather, it allows small and large developers to coordinate more efficiently by reducing the effects that scale and large resources have on development and deployment of CUIs and CUI services. This ultimately reduces consolidation that leads to imbalanced economies.

Proof of Stake

Developers of CUI components who upload content for licensing into a SEED marketplace or deploy a SEED-connected CUI, have to stake an amount of SEED tokens in the process.

“Validators,” those “guarding” the tokens, are always those who own the tokens (although we will provide an allowance of lending staking power to other nodes). Validators use some of their tokens as a stake in transactions. This allows them to validate blocks on the blockchain and receive a reward proportionate to their validation bid. If a Validator is bidding equally across blocks their tokens are returned so as to avoid the “Nothing-at-Stake” problem and be more Byzantine Fault Tolerant (BFT), similar to Ethereum’s Casper protocol. This behavior is mitigated with “slashing,” a concept introduced by Vitalik Buterin in January 2014. Slashing, and the conditions that dictate that punishment, is instrumental to all non-degenerate Byzantine Fault Tolerant (BFT) protocols.

Additionally, if a node that has been bidding fails or goes off the network the stake is lost. Punishing nodes who fail or go offline improves network security, incentivizes validators to be careful about their node uptime, reduces censorship of transactions and increases decentralization. Forfeited SEED tokens are returned to the Seed Vault Ltd. foundation for use in paying developers for enhancements to the protocol, network, marketplaces, or other initiatives.

Definitions:

AI: A host in the background of many (and growing) digital services use a range of engineering services and techniques to enhance their “understanding” or user requests and present a “natural,” conversational interface to these services. These technologies can include: machine learning, pattern recognition, speech recognition, voice synthesis, knowledgebases, neural networks, face recognition, gesture analysis, sentiment analysis, detailed evaluation of conversational data, etc. “AI” is not intended to mean an artificial “intelligence” in the human sense of the word (which is now referred to as “artificial general intelligence.”

Bot: A “bot” is a nickname for any digital service presenting a CUI (see below) to users of digital services.

CUI: Conversational User Interface: a software service that uses conversational in any form, whether through writing, spoken words, or video avatars as the primary mechanism for interacting with a digital service of any kind. CUIs rely on a range of background digital services, classified as “AI.”

Deployer: Any individual or organization that offers a CUI interface or service under its own person, brand, or organization. These CUIs are understood by users as the entity represented by the CUI, regardless of who built, hosts, or administers it. Developers generate CUIs, often for deployers. For example, Ferrari would be seen as the deployer for a CUI on its website or within its telephone response system even if the CUI was built by a different developer, hosted at an ISP, and managed by that or another developer.

Developer: any person or company that creates components that could be used in a CUI or conversational user interface (CUI). These could include small components like personality templates, behavioral descriptions, or code or large components like fully functioning CUIs. Some developers may assemble and host CUIs for others (individual, governmental, or corporate deployers) while others may assemble and complete CUIs for others to host. Classes of developers could include writers, authors, illustrators, artists, modelers, programmers, coders, writers, hosting services, management services, etc.

User: Any individual that interacts with a CUI-based service. Organizations interacting with CUIs (as opposed to deploying them can be users, as well). Users potentially generate content in the form of text, images, personal and affective data, etc. Users can, in addition, be or become developers should they post components to a SEED marketplace, as well as a SEED token as stake for that content.

1.0 The SEED Token

The high-level strategy of this PoS system is to use existing Ethereum protocols and then modify those when we introduce our own blockchain through tighter integration with identity and licensing components of the token. This allows forking and evolution without destroying the ledger.

An Example Scenario:

A Deployer or Developer uploads a script that enables voice control over the performance of a sports car. The licensing terms are listed and, according to the restrictions of the license, an amount of SEED is automatically required (staked) to support those terms.

This staking method powers three interactions:

- **License Quality:** The stake encourages investment in the licensed work (the intended result is higher quality content and functionality).
- **Token Age:** Content that is listed earlier (and, therefore has older stakes), provides the owner of those tokens a greater influence as a Validator (the intended result is to ensure that early adopters are more people than bots, increase users' long-term commitment, and allow voting based on token-age. Token-age facilitates PoS creator of the next block. In order to earn the right to generate the next block (yet avoid centralization among the wealthiest members of the community) the PoS method generates a number derived from the product of the number of tokens times the number of days those tokens have been held.
- **De-incentivizing Bad Actors:** It will cost to deploy a CUI and the more advanced it is the more it will cost, therefore negating motives that are not beneficial to the largest number of contributors.

Stake is not required to author simple components nor to provide end-user/personal user data. This allows for anyone to enter the network, provide at least a small value, encouraging CUI user network effects and data network effects. The distribution of SEED is, therefore, increased and the overall value of the network, as a social media system, is increased by providing free entry tools.

2.0 Token Network Components

The SEED Token is designed as a smart contract containing four functions.

There are four main functions within the SEED token:

- **Unique Identifier**
- **Licensing Terms**
- **Location Identifier**
- **Current Balance**

The SEED token is processed on the Ethereum (ETH) blockchain. We may partner with other technologies (such as Sovrin) to enhance portions of the token or to create interoperability with other tokens through ABIs (Application Binary Interfaces). Some of these ABIs may be used for storage of data and resources, which will be kept off the blockchain for maximum reliability and scalability.

There will be two main interfaces to the SEED token on the SEED wallet, represented in two different applications:

- **SEED Greenhouse**
- **SEED Wallet**

The **SEED Greenhouse** distributed application will be a complete developer environment that allows CUI developers, deployers, and authors to upload components to marketplaces, set licensing terms, rate components and developers, connect CUIs to third-party services (such as natural language processing or other AI services), activate and deactivate CUIs, and collect and transfer SEED tokens. SEED Greenhouse will also include social media functions (such as chat) to support the developer community.

The **SEED Wallet** application is much smaller and meant only for end users to access SEED token collection and transfer. It will allow users to connect to SEED-compatible services, view their balance, and transfer SEED to SEED-compatible exchanges.

For examples of these draft interfaces, see Appendix A.

SEED Token Components

Unique ID

- 512-bit hexadecimal metaname
- ID <name>
- AML/KYC compatible
- EIDR compatible

Location ID

- Pathname or node-name
- URI or alternative ABI / ID used by StoreJ, FileCoin, or other decentralized storage system

Licensing Terms

- Term/renewal
- Territory (restrictions)
- Fees
- Parties
- Deliverables
- Other

Current Balance

- Amount divisible by 1000 (1k)
- Territory (restrictions)
- Fees
- Parties
- Deliverables
- Other

3.0 Network Architecture

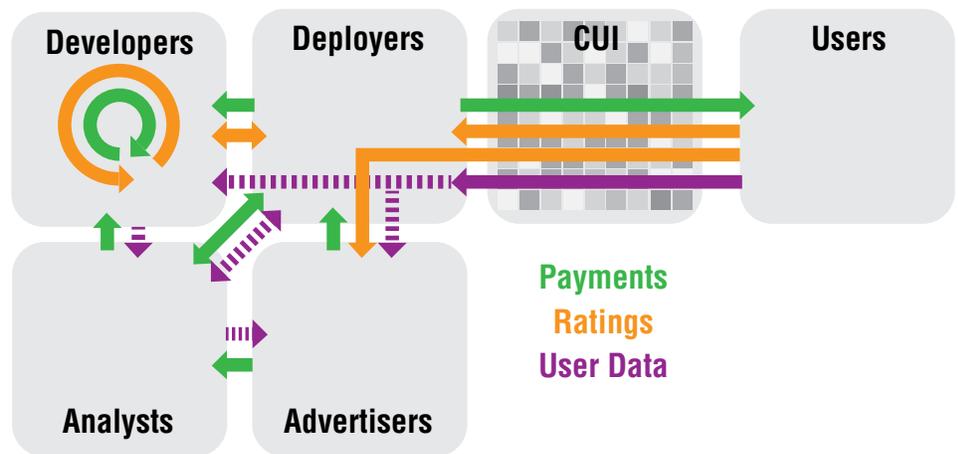
The SEED network is designed to facilitate a healthy ecosystem of data and tokens between five categories of stakeholders.

There are five categories of stakeholders that the SEED network is designed to include:

- End-Users
- Deployers
- Developers
- Advertisers
- Analysts

These are defined in more detail on page 4 of this document as well as in the SEED White Paper.

SEED Stakeholders



SEED token, ratings, and data are exchanged between various pairs of stakeholders:

Stakeholder:	User	Deployer	Developer	Advertiser	Analyst
User		Deployers pay SEED to Users in exchange for Data		Advertisers are rated by Users.	
Deployer	Users earn SEED in exchange for sharing data. Users rate Deployers (CUIs).	Note: Deployers (CUIs) may interact with other Deployers (CUIs).	Developers get paid by Deployers for bots they've created or hosted. Developers rate Deployers (CUIs).	Advertisers pay SEED to Deployers to place ads and to buy data.	Analysts pay SEED to Deployers in exchange for user data. Analysts may sell enhanced data back to Deployers.
Developer		Deployers pay SEED to Developers for CUI building, components, or hosting and rate them.	Deployers pay other Developers for components (and rate them on the components they've used).		Analysts pay SEED to Developers in exchange for data. Analysts may sell enhanced data back to Developers.
Advertiser	Users rate Advertisers.	Deployers may share data with Advertisers in exchange for SEED. Advertisers pay to show ads within CUIs.			Analysts sell Advertisers enhanced data.
Analyst		Deployers may share data with Analysts or buy data from them.	Developers may share data with Analysts in exchange for SEED.	Advertisers may buy data from Analysts.	

3.0 Network Architecture

For all purposes, end-users see CUIs and their deployers as interchangeable. For example, a CUI deployed by Nike, would be understood as an interface with the company. In this way, CUIs can enhance a company's brand as well as its relationships with customers with an appropriate and custom personality to reflect brand values. To do this, however, CUIs must be distinct from the services they use (unlike common CUI services today). Instead of a CUI appearing as a third-party (like Alexa), a Nike CUI would appear to users as Nike.

Unlimited Layers

There is no technical reason that would prevent an unlimited number of CUI components and services to be used in the development and deployment of a CUI, occurring within many layers. For example, component developers may create and make available in the CUI store, CUI components and assemblies that include other developers' CUI components. The SEED backlicensing system will keep track of these components and their licenses because any nesting is "flattened" when a new component is created, apportioning all licensing into one level, regardless of how many components are used. In this way, any CUI or component only has one set of licenses to transact, regardless of how many licenses are involved. In practice, we expect CUIs with under one hundred components. See the Licensing section for more detail.

Transaction Processing

To improve blockchain performance and scale, calculation and settling of all SEED accounts from CUI interactions (CUI component use and user data sharing) will be batched once per day. These will occur at a randomized time each day (to thwart potential gaming of the system).

Note: while user data is designed to be shared within the system, this is so under the control of users. The system is designed so that users can set their own levels of private vs. public data, and for which kinds of services. The intent is to allow users to be rewarded for sharing only the data they are comfortable sharing.

3.1 Token Economics

Money Supply

The supply of SEED tokens is fixed at 10 Billion tokens (10,000,000,000) and will neither be increased by minting new tokens or decreased by "burning" or destroying them.

Token Velocity

By partnering with existing global CUI developers and introducing supporting customers, we intend to create an economy that grows symmetrically and with stability. Use of the system requires developers and deployers to buy and exchange SEED tokens. The purpose of making the token available on multiple exchanges is so that developers and deployers can easily gain access to tokens for their CUI development.

Once the CUI marketplaces are completed and delivered, a true market for the SEED token will exist. Seed Vault Ltd, the foundation overseeing the development and management of the platform, will calculate and suggest pricing for different kinds of components and licensing contracts but these will, ultimately, be under the control of the developers, deployers, and others within the system. With greater size of the ecosystem, through increase in number of users, developers, and CUIs, velocity will increase as more and more tokens are required to interact with more and more CUIs.

3.0 Network Architecture

3.2 Licensing

Developers can set their own licensing terms when they upload components into the bot store. However, there are only three types of licenses allowed:

- **Free Use** (no SEED tokens for use)
- **Per Use Fee** (a set, fractional amount of SEED tokens for each use)
- **Unlimited One-Time Fee** (a one-time payment SEED with free continual use)

Note that only the second licensing type (Per Use Fee) requires tracking and remunerating SEED token to developers since most developers will look to the SEED platform to compensate their efforts in a way commensurate with the popularity of their use. We expect this to be the dominant option from developers. In the case of the Unlimited One-Time Fee, this payment will actually be handled off-chain, via the CUI store regardless of how many uses that component numbers (including no use at all).

In addition, **from day one, Botanic (through Seed Vault Ltd.) will ‘seed’ the network with free to use IP** and work to compensate existing open source CUI communities to do the same in order to grow the platform’s usefulness. The foundation will also fund development projects that further enhance the tools available to the community. One aim of this project is to create a platform with the best tools and the least barriers to CUI creation (in both engineering and business terms), for developers.

We plan to offer clear templates for setting licensing fees and types when developers upload components into the CUI store. In addition, based on models of current CUI creation and the number and kinds of components required, we will calculate and suggest starter prices for different kinds of components to help the market quickly get to a rational and equitable efficiency. As the platform grows, we may calculate new suggested prices in order to optimize the CUI economics, based on realtime performance data. However, developers are able to make whatever licensing decisions they prefer.

When developer components contain components from other developers, these licensing fees are automatically included. In fact, all licensing fees, at any level within a component are automatically calculated and “flattened” at the time of upload. This means that any nesting of licenses are resolved into one level of varying weights, calculated on a per-use percentage. Note: non-payment (free and unlimited) components are included in the tracking of use even though they don’t encumber costs.

Once components are uploaded into the bot store, their licensing agreement can only be changed for future CUIs. Changes to per use fees are allowed but only for future use of those components. Current and past CUIs and components that use any component will continue to do so for the life of that component. Therefore, changes in fees or licensing terms don’t affect past CUI builds and interactions

Staking

As discussed earlier in this document (section 1), developers must stake a nominal amount to SEED (to be determined later) in order to post components or data into the CUI store. In addition, any rating of developers, deployers, etc. also require a stake (described below). Forfeited stakes (for example, if a component is found to be in violation of its own or Seed Vault’s licensing terms), will go to Seed Vault for use toward further development of the platform.

3.0 Network Architecture

3.3 Ratings & Reputation

Part of our solution for a healthy economy involves allowing developers, deployers, and other stakeholders to rate each others' transactions. However, ratings always introduce dangers of nefarious use. To combat this and keep the economy as efficient as possible, we plan to use several kinds of ratings, simultaneously, including:

- **Three “quality” ratings** (1-5 stars, 5 being best): **Function, Worth, and Quality**
- **Use Requirement** (ratings are only accepted by raters who have not only purchased but used a component, except if the user is the same as the developer)
- **Rater’s Rating** (ratings from raters who are rated highly are weighted higher in rating calculations)

In the future, we may introduce other ratings or details, such as a mechanism to detect and deter “numbness” (when raters simply rate everything neutrally: 3), to prevent the downvoting of competitors, or other issues that might arise from “bad actors.” Evolution of the rating system will be driven by the Seed Vault foundation, with input and feedback from the SEED community, along with performance data on key community metrics. The foundation is responsible for developing and evolving a healthy community but listening to that community is a key part of those decisions.

As with the transactions of CUI interactions (and the remuneration of SEED tokens across all contributors), ratings will also only be calculated once per day (at a randomized time during the day), in order to thwart those who might “game” the ratings). However, these ratings are not on the blockchain so they will have no impact on processing speed.

The CUI store will include a function to report a “bad” CUI or component within the system. In the short term, Seed Vault will perform the reviewing these instances while it builds decentralized tools to fulfill this need. CUIs or components found to be in violation of its own or Seed Vault’s licensing terms will be deactivated in the CUI store and the SEED staked for it forfeited to Seed Vault. Violations can include: collecting user data without approval, including intellectual property belonging to others, behaving differently than claimed, etc. Developers sign a licensing agreement when uploading components to the CUI store that assure original content, IP ownership, etc. The foundation will, in further development, look to further decentralise this function.

4.0 Conclusion

The purpose of the SEED token and network is to create a thriving economy around CUI interactions, CUI for developers, deployers, and service providers, as well as for end-users who are the target for these services. This economy will function best when it is independent and all developers and users have access to it with low barriers and no prejudice.

Seed Vault Ltd.

The SEED platform is overseen by Seed Vault, Ltd., a corporation limited with guarantee, in Singapore in order to keep it independent and focused on generating value for SEED community stakeholders. As a non-profit, this foundation is not focused on enriching itself but, instead, enriching the community it oversees. The governance for this foundation is as follows:

Board of Trustees: 6 Elected trustees (plus the Executive Director)

The board will have the authority to appoint the Executive Director, set executive compensation, and elect replacement trustees. Trustees will serve for 3-year appointments, which can be repeated, on a staggered three-year cycle (no more than 2 trustees are up for appointment in any year). This ensures some continuity within the board. When the network and marketplaces are active, new trustees will be nominated by the board and voted upon by the SEED community via proof-of-stake. SEED token holders will be able to vote in relation to their SEED holdings (similar to shares in a company). Until the platform is complete, trustees will be appointed by Seed Vault Ltd.

Seed Vault Employees: The Executive Director and other Seed Vault employees will be responsible for developing and growing the SEED Community, including the token, network, and marketplaces development, as well as its policies. The day-to-day functioning of the foundation and community is under the control of these employees.

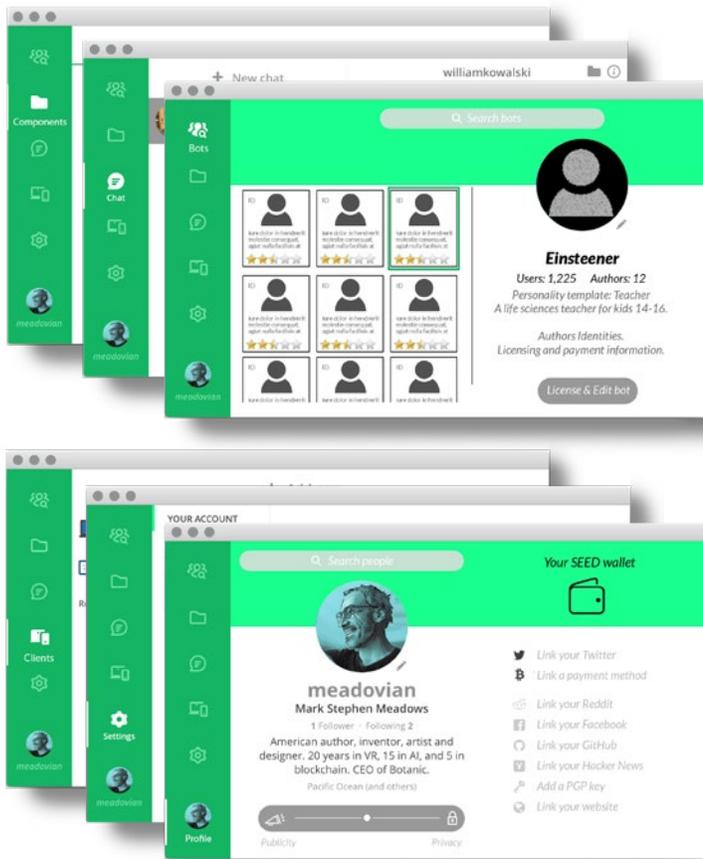
SEED Community: all token-holders are members of the SEED community. As such, they will vote for new trustees. In the future, they may be given the power to vote for significant development projects or policy changes. A voting system based on proof-of-stake token holdings will be created by the foundation to make this possible.

For more details on the SEED community governance, please contact SEED through its website: seedtoken.io

5.0 Appendixes

SEED Greenhouse Application

SEED Greenhouse is a developer application integrated with the SEED token. It includes a bot store with bots, bot components, and bot services supporting a variety of licensing terms for others to use. In addition, Greenhouse allows developers to rate and review the components they use, chat with other developers to solve challenges, and manage the SEED tokens they earn for their creative efforts. SEED Greenhouse is currently in development. These images represent comps of the interface.



SEED Wallet Application

The SEED Wallet is a simple interface for users that collects any SEED tokens they have earned and allows them to adjust privacy settings for bot interactions with services they use.

