



Clinicoin

Blockchain powered global wellness

WHITEPAPER

Clinicoin is an open source wellness platform that rewards users for engaging in healthy activities.

Leveraged by a blockchain-based ecosystem, the platform is designed to connect people, developers, and providers, worldwide, improving global health and wellness.

NOTICE: This is not a prospectus for investment.

This document does not constitute or imply a prospectus of any sort. No wording contained herein should be construed as a solicitation for investment. This whitepaper contains a technical description of the functionalities of the Clinicoin Project as well as the creation and issuance of Clinicoin (CLIN) tokens by Mosio.

Clinicoins are functional utility tokens providing access to platform functions, premium content, incentives, and rewards system within the Clinicoin platform. Clinicoin tokens are not securities, nor do they imply or promise equity, ownership in, or profit sharing with any part of the Company. Clinicoin tokens are non-refundable, are not for speculative investment, and they include no promise of future value or performance, on their own, or as a metric of Company success.

Clinicoin is intended for patients, providers, organizations, and developers in the health, research, and life sciences fields.



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Introduction

Mission

Clinicoin's mission is to connect people, providers, researchers, and developers in delivering on the true potential of health technologies, worldwide.

We believe collaboration, not competition, will be the driving force behind the success of global health and wellness.

Utilizing mobile technologies, human social interactions, and the blockchain, Clinicoin seeks to empower people in their health and wellness, while providing organizations with simple, affordable, and innovative tools to achieve desired health outcomes in the digital age.

The healthcare industry is in a communications paradigm shift. People have more access to information than ever before. They're mobile-ready and using technology to track and manage their health. Even so, they make poor or uninformed choices regarding their health and wellness. Up to half of all premature deaths (before age 80) in the U.S. are due to behavioral and other preventable factors.*

Combining wellness, healthcare, research, mobile software, and the blockchain, powerful, yet simple programs can be designed to improve and extend the lives of millions of people.

We hope you'll join us by participating in this project to advance communications and drive global innovations in health and wellness.

Non-communicable (chronic) diseases account for 70% of all global deaths.

- World Health Organization

Introduction

Vision

Regardless of what the mobile phone of the future looks like, messaging and applications will be there. Efficient and effective mobile communications, whether automated, algorithm-based, or through live interactions, will continue to be the cornerstone of engagement in healthcare, wellness, and clinical research.

For the past seven years, Mosio has helped healthcare organizations and research teams communicate more efficiently with their patients, patrons, and study participants using the most popular channel on mobile phones: Text Messaging.

During this time, we have designed and deployed innovative solutions to improve engagement and have identified shortcomings in the mobile health field. We've observed users, interested in using new mobile technologies to manage their health, met with a complexity of choices, unsure of which apps are best suited for them.

Collaborative, Social, and Fun

We've also seen, first hand, that improving health engagement does not need to be time consuming or expensive. Finally, we've discovered that people can be empowered in their health, wellness, and have fun in the process.

Clinicoin's secure, open source mobile platform leverages mobile messaging, APIs, smart contracts, and a rewards-based ecosystem to incentivize and reward people, providers, and developers for their participation.

We believe it's time for a "super app" in health and wellness, one that starts with the user, provides much needed solutions, and inspires industry innovation. It should be readily available to users, developers, practitioners, and researchers all over the world, providing them with a simple and inexpensive way to bring solutions to those who need them.

These are the reasons we created the Clinicoin project.

Introduction

Where wellness meets the healthcare industry

No one wakes up and thinks “I can’t wait to be an engaged patient, today,” but the reality is that even an avid marathon runner is considered “non-adherent” by their doctor if they don’t follow orders to rest and properly care for themselves after an injury.

Clinicoin is the digital intersection between wellness, healthcare, and research, providing a global opportunity for lasting change.

Starting with a wellness community rewarded for being proactive in their own physical and mental health, we are able to connect the necessary tools to help people manage their lives while they are at their peak performance, or need assistance after getting sick.



Much more than a “health coin”

One of the most exciting functions of the Clinicoin platform to users is the ability to earn cryptocurrency rewards for participating in healthy activities, and the platform offers a number of ways for community members to do this. However, if it stopped there, it would be missing large pieces of solutions to expensive and unfortunate problems, many of which are preventable.

In this white paper, we will cover the usefulness of the Clinicoin platform to users, while providing details as to how it also serves to the healthcare and research industry. In our opinion, a any large-scale project needs to cater to both people and providers to have a large impact with lasting success.

Health Rewards, Evolved

Old Methods

The idea of earning rewards for exercising or losing weight is not new, but the offerings to date involve selling user data, depending on brands to provide products in exchange for advertising, or zero sum wagers where one side gains in wellness and the other side loses money.

A Novel Approach

To ensure the long term success of a global project, the old and existing methods for rewards are not scalable or sustainable.

A global solution should have the following elements:

1. Open source
2. Decentralization
3. The blockchain
4. A fungible digital currency
5. Networks (both computerized and human)
6. Multiple industry player types
7. An active ecosystem

Healthcare Industry Applications

The success of using incentives and rewards to encourage healthy behaviors has been proven. Users will change their behaviors for rewards. Clinicoin brings several novel approaches to the proven model of incentives-based behavioral changes, then we look next to industry challenges.

We know from our experience solving problems in the healthcare and research industries that low engagement between people and their providers not only increases the risk of hospitalizations and readmissions, it also creates expensive and unnecessary costs to the healthcare system.

Expensive and Preventable Problems

We will not use this whitepaper to cover every challenge low engagement creates, but next two pages cover two industry problems resulting in over \$428 billion in annual healthcare costs in the U.S. alone:

1. Low Engagement
2. Mobile Health App Overload

Engagement Problems

Keeping people engaged is one of the costliest challenges in healthcare and research today.

Properly communicating with and ensuring people follow protocols to improve their health is a problem resulting in increased hospitalizations, healthcare expenditures, and new drug development costs.

Healthcare

\$150B

Annual cost of missed appointments each year¹



\$278B

Healthcare costs associated with medication non-adherence²



Research

80%

Number of clinical trials that don't meet their recruitment deadlines.³



30%

Average number of participants who drop out of a study after enrollment.⁴



Pharmaceutical companies lose \$600,000 - \$8,000,000 per day when a clinical trial is delayed due to recruitment problems.

¹ <https://www.healthmgttech.com/missed-appointments-cost-u-s-healthcare-system-150b-year>

² <https://mhealthintelligence.com/features/the-evolving-role-of-mhealth-in-medication-management-and-adherence>

³ <https://www.centerwatch.com/news-online/2017/07/24/attractiveness-conducting-clinical-trials-outside-u-s>

⁴ <https://foreresearch.com/news/infographic-retention-in-clinical-trials-keeping-patients-on-protocols/>

The Mobile Health App Problem

Many technology providers are attempting to solve engagement challenges and there is user interest, but this has created a new problem: **MOBILE HEALTH APP OVERLOAD**

Mobile apps are costly to build and manage (\$50k-\$250k), created for an audience increasingly overwhelmed by choices.

18.7

Number of doctors the average person has during their lives. At 65 years, the number increases to **28.4.⁵**

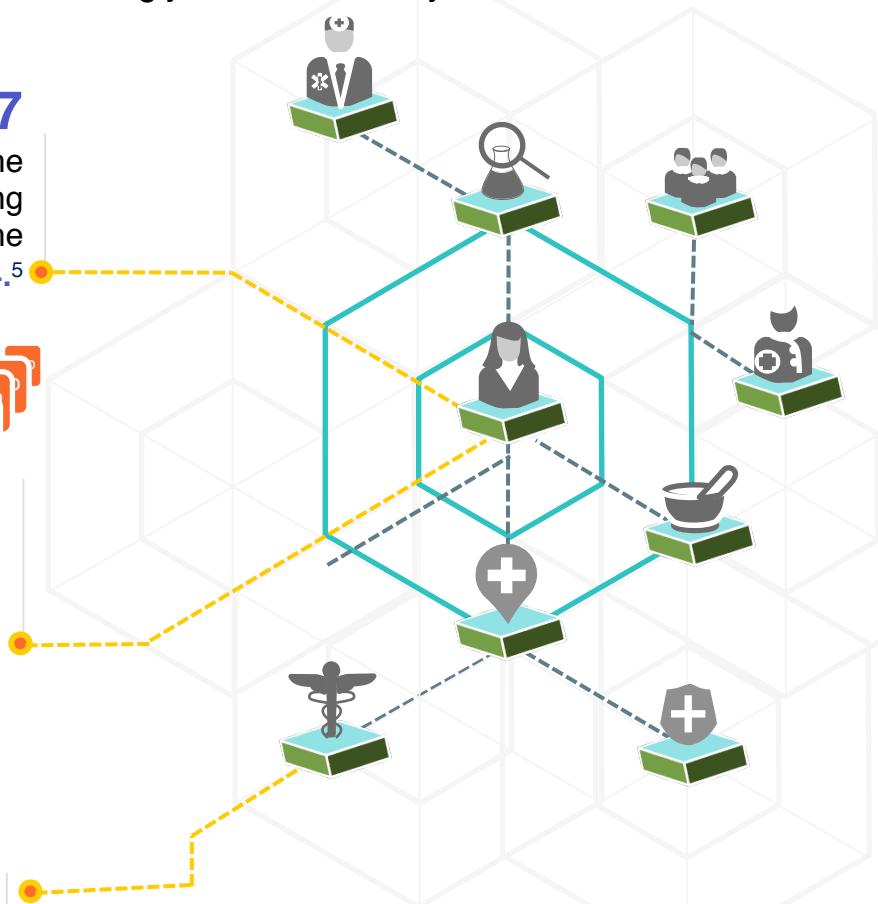


To communicate securely via a mobile messaging with providers, we must download, learn, and use a mobile app.

More providers and organizations means more apps.



Other healthcare organizations (hospitals, pharmacies, researchers, etc.) are asking people to download their mobile apps as well.



Nearly 300,000 health apps are listed in the app stores. Many of them cannot be verified as safe or secure.⁶

Clinicoin leverages the power of mobile phones to improve the health experience with a cost-effective, innovation-friendly platform.

5 <https://www.practicefusion.com/pages/pr/survey-patients-see-over-18-different-doctors-on-average.html>

6 <https://research2guidance.com/mhealth-app-market-getting-crowded-259000-mhealth-apps-now/>

The Solution

An open source, blockchain-leveraged health and wellness platform.



1. Clinicoin Protocol

The protocol powers the Clinicoin platform, enabling users, developers, and providers to interact securely in an engagement-driven rewards ecosystem. It is made up of four core functions that tie into the Ethereum blockchain. The open source protocol enables developers to create apps (“ClinApps”) and to include third party interfaces inside the Clinicoin app container.



2. Secure Messaging

The messenger uses end-to-end encryption, enabling users to interact with each other, organizations, researchers, and digital tools securely (HIPAA compliant). Rather than downloading a new app for each provider, health, or research organization they want to communicate with, users simply add them as a contact inside the Clinicoin address book.



3. Rewards Engine

The Rewards Engine enables the distribution of Clinicoin (CLIN) tokens among community members. They can be used for completing healthy tasks, to incentivize adherence, or for participating in medical research. The Rewards Engine integrates with third party apps through ClinApps, so users can earn tokens interacting with software applications outside of the Clinicoin platform.



4. Proof of Engagement (PoE) and Validators

Proof of Engagement (PoE) is the confirmation of healthy activities connected to the Clinicoin platform by one of two different types of third parties called Validators (health app developers and activity leaders). CLIN token rewards are distributed based on a PoE algorithm to users from the community rewards pool, which will be 600 million CLIN at genesis.



5. Health and Wellness Marketplace

The marketplace is where Clinicoin members spend their CLIN tokens for access to tools, content, products, and services. Starting out as centralized to ensure stability and scalability, it will move towards decentralization, where vendors and even additional marketplaces can exist as part of the network.

Technology

1. The Clinicoin Platform

The Clinicoin platform enables secure communications, rapid app development, and rewards delivery in a health, wellness, and research environment serving users, providers, and developers within the community.

Open Source, Collaboration Friendly

The platform is made up of four key functions that make it useful to all members of the Clinicoin community as well as the healthcare and research industries:

- Secure Messaging
- Rewards Engine
- Proof of Engagement (PoE) and Validators
- Marketplace

Each of these functions provides an affordable, simple platform for the development of global health and research innovations.

Community Members

The Clinicoin platform has been designed to reward all members for their participation and involvement in the community. Through varying functional qualities, each community member can contribute in a way that best suits their experiences and goals, collectively creating a thriving ecosystem.

ClinApps

ClinApps are the driving force behind what makes integration into the Clinicoin platform possible. Through APIs, ClinApps encourage outside developers of health and research software applications to build into the channel, offering secure and compliant (HIPAA, 21 CFR 11) access to users. ClinApps can leverage the Rewards Engine to distribute CLIN tokens to users.

Technology

1.1 Clinicoin Community Members

The Clinicoin project is dependent on the contributions and participation of community members for its success. Following the lead of successful communities in crypto and on the web, Clinicoin is poised to create a fun and helpful environment where members worldwide can enjoy being empowered in their health and wellness.

Clinicoins solves multiple challenges in healthcare communications and engagement by providing an open source mobile platform to three different player types in the community interacting with each other to accomplish goals.

The system was designed to be useful to technical and non-technical users of the system:

A) Technical User Example: A developer wants to integrate an outside application within the system. She or he can use tools in the Clinicoin SDK and Clinicoin APIs to create engaging messaging and app functions, leveraging the Clinicoin platform. The Developer can earn CLIN tokens by licensing her or his ClinApps or being a Validator.

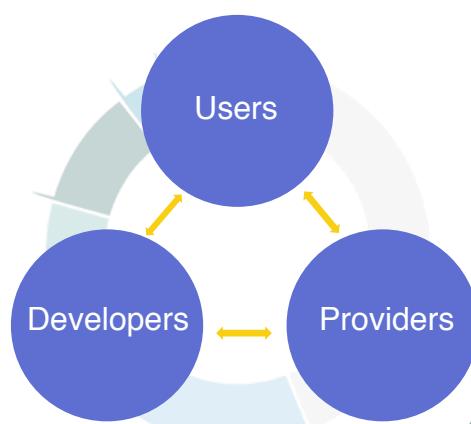
B) Non-Technical User Example: A researcher wants to incentivize and reward study participants for attending appointments and check-ins. They can acquire and distribute CLIN Tokens upon completion of those desired actions with no programming skills.

There are three Clinicoin community member types:

- **Users**
(people)

- **Developers**
(programmers, software engineers)

- **Providers**
(healthcare orgs, researchers, companies)



Technology

Users want easy access to meaningful health information, support, and tools. Clinicoin offers access to all of those things in a single app, then takes it one step further. By employing PoE and the Rewards Engine, it gives them the opportunity to gamify and incentivize their behaviors, providing them with a way to make health and wellness fun. Users download the Clinicoin app, then communicate, interact, log healthy activities, or sign on as a Validator to earn CLIN tokens.

User Explainer Video: <https://clnc.io/clinexpusers>

Developers want an easy way to develop, deploy, and be compensated for their software applications. Clinicoin offers a platform to create and sell apps and tools, or earn CLIN tokens as Validators through any existing health applications they have.

Developer Explainer Video: <https://clnc.io/clinexpdev>

Providers want an easy and secure way to communicate with users, remind and alert them, and keep them engaged and compliant in their protocols. Clinicoin facilitates these efficient communications and gives them a way to reward users with tokens through Token Distribution Events (TDEs).

Provider Explainer Video: <https://clnc.io/clinexpprov>

1.2 ClinApps

The Clinicoin platform enables the development of tools and secure connections into the system called ClinApps. They run on the platform and access software and systems outside, leveraging the protocol and platform for user access.

How ClinApps Work

ClinApps are software components connected to the Clinicoin platform. They can live and operate on their own within the components in the platform itself, or connect to outside software and systems, leveraging Clinicoin to augment their existing solutions.

Two ClinApp Types

On Platform - Those that are coded, deployed, and “live” solely on the Clinicoin platform.

Hybrid - Those that access outside systems, but utilize the Clinicoin interface/wrapper to run their functions on top of the platform.

Technology

How ClinApps Benefit Developers and Providers

Building and managing mobile apps is expensive and resource-intensive. We have NIH-funded clients who have innovative ideas requiring a mobile app to fulfill their vision, but lack the funding to build a prototype for a pilot. It is our intention to offer the Clinicoin platform as an alternative for the need to create a mobile app. Health innovators will be able to utilize Clinicoin inexpensively for their pilot programs, then rollout, rather than rebuild, the existing solution, to a larger population. The end result is cost savings and rapid deployment of useful health technologies.

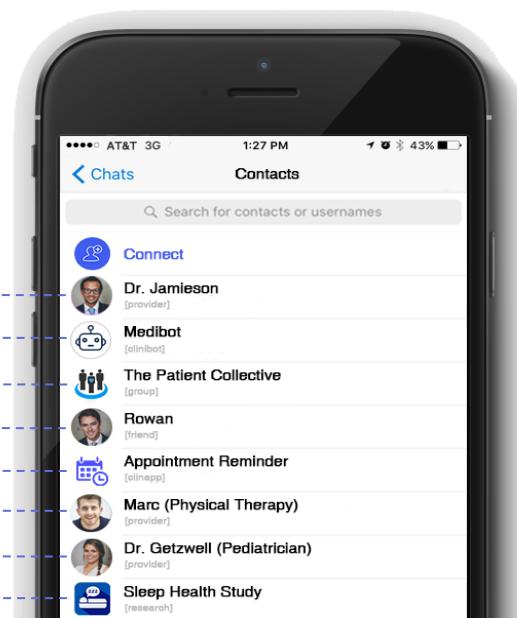
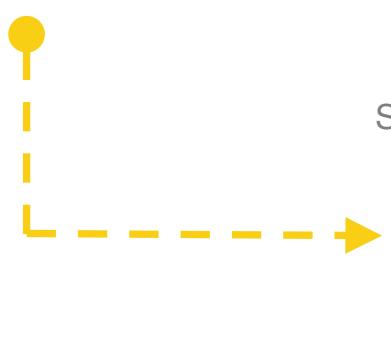
Clinicoins also provides a secure mobile messaging channel to extend the reach of existing software applications. Text messaging is a great way to reach the most people because of its ubiquity, available on 95% of mobile phones. However, because it is not encrypted, there are limitations to its usefulness in healthcare and research. Clinicoin was created with the goal of providing a secure channel for messaging used by the most number of users, while enabling a host of capabilities not available on SMS.

ClinApps connect users securely to external applications.



Easy Access, No Additional App Downloads

Users add providers, teams, and ClinApps as contacts in Clinicoin's address book, the same way they do friends and family in popular mobile messaging apps, but approved for healthcare use.



Technology

2. Secure Messaging

Secure messaging enables private communications between two or more parties and applications (ClinApps).

The best mobile communications are private and secure. Text messaging puts healthcare providers and researchers in a difficult place: SMS is not secure or HIPAA compliant. Using SMS means curbing communications or paying for secure mobile apps, then convincing people to use them. More providers means more apps to download.

The Clinicoin app acts like many popular mobile messaging apps, but with healthcare-grade privacy, data security, digital tools, and a rewards system. Rather than downloading a new app for each doctor, specialist, pharmacy, clinic, medical study, support group, therapist, or hospital, users simply add them as a contact in the app's address book. They connect to digital tools and third party software the same way.

Messaging Functions

- **One to One** (secure chat between two users or a user and provider)
- **One to Many** (alerts, info, newsletters, etc. from a user or provider to a group of users)
- **Many to One** (hotlines, helplines, coaching)
- **Many to Many** (group chat, motivation and support, wellness team)
- **One to App** (user interacting with a ClinApp)

User to Provider



Support Group



Technology

Clinicoin was designed to have distributed, yet compatible, networks for messaging, allowing for private networks and smart routing. No one is forced to trust anyone else in the ecosystem, and identity can be verified on any message.

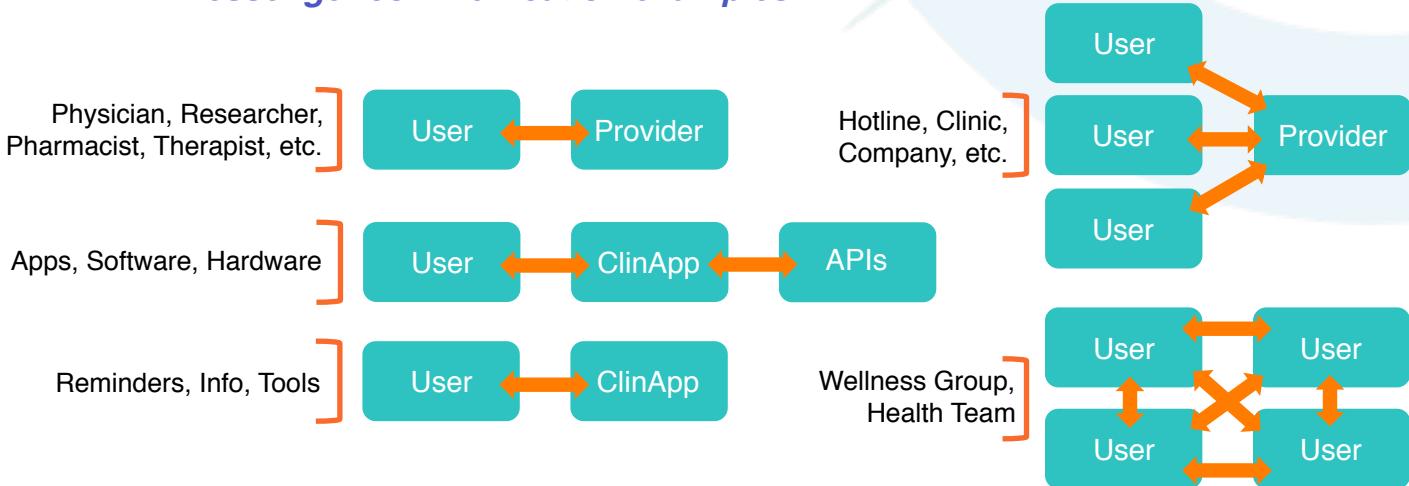
It's more than secure peer to peer messaging, it's the hub for automated communications as well, whether they be from bots running on the platform or with outside systems using ClinApps.

- **Users benefit** from having access to communications and tools from a variety of sources.
- **Developers benefit** from being able to build apps directly on the platform or integrate existing software and systems.
- **Providers benefit** from increased adoption, a cost-effective, secure messaging platform, and the ability to improve engagement through digital rewards.

Use Cases

- One to one communications with providers.
- Group messaging for support groups, healthcare teams, etc.
- Quick access to resources and automated bots.
- Digital health tools like medicine and appointment reminders.
- Surveys to collect research and insights data.
- ClinApp integrations with third party software and applications.
- Opt-in alerts for clinical trial recruitment, health info, or marketing.
- Users can log healthy activities and earn tokens.

Messenger communication examples



Technology

Messages and Objects

The heart of the platform is a mobile app that knows how to interact with subscription-based messaging paths. By adding a path to their app, a user is able to submit to and receive messages from this path. On the other side of the path may be another user, a group of users, provider or an application.

Message content will not be limited to text, emojis, and images. Message objects can be sophisticated datasets that the app will know how to render and implement appropriate logic to execute the message rules.

Automated Data Collection via Complex Objects

For example, one of the first complex objects available in Clinicoin is surveys. Clinicoin allows a path to deliver a multi-question survey, including media, branching logic, reminder notifications and completion notification rules. By serving up one message or data set, a path can deliver a comprehensive survey and results will be packaged up and delivered upon completion.

Privacy and Control

The purpose of Clinicoin is to provide an open source infrastructure and allow organizations to control their own data. Practically speaking, this means each path will point to its own messaging queue, and the queue can be hosted by the owner of the path. Since all messages are end-to-end encrypted, a path's data can be considered private and secure within the path's queue and on the user's app. Only users with access to the path can decrypt the messages. This allows organizations with strict data security policies or regulatory compliance requirements to confidently follow those policies without depending on third party providers.

Teams (group messaging) can be created by individual users, organizations, or providers who want to communicate beyond one-on-one communications.

Technology

User to User Chat

One-on-one chat between users will initially be maintained by a Mosio-hosted message queue. All messages will be encrypted on the app, so Mosio will not be able to read or alter the contents of the messages. The community can verify the implementation of the encryption system by reviewing the app source code, updated on Github.

Publicizing Paths

Channel registration will be hosted and the path database will allow anyone to add a path which can be searched for within the app. To add a path, users will either search in the app, or enter a short URL that will deliver path details in JSON to the app.

Trusted Paths

In order to prove ownership of a channel, users and organizations can sign a path's identity and other users' identities with their private keys. As identities are built within the system and a further number of verifications accrue, users will start to see a trust rating on identities that have collected numerous signatures. In this way, the community can verify legitimate users and identify possible bad actors.

Decentralized Paths

Typically, a developer would have to register a channel with the application provider to get access. Think of submitting an app to an app store, or creating a chat bot on a messaging platform. However, this creates a central point of failure and a central point of control. Paths in Clinicoin will be stored on the Clinicoin blockchain so that they may be added, verified, and searched like any other identity, in a decentralized fashion. The Clinicoin blockchain will be public to foster an industry-wide source for directory information.

Further Decentralization

As the platform develops, use of a peer-to-peer node network will be considered to replace the Clinicoin-hosted message queue for user to user chat. These nodes will be able to earn Clinicoin (CLIN) tokens for the work they perform helping keep the network alive and functional.

In-app search databases, identities, and verification signatures may also be moved to these nodes, allowing for further removal of any centralized APIs.

Technology

3. Rewards Engine

The Rewards Engine is the token distribution mechanism, enabling engagement transactions between users, developers, and providers.

Health and wellness can and should be fun, whenever possible. Clinicoin's Rewards Engine adds incentives and gamification to the experience. There is plenty of evidence showing the value of rewards and games in improving one's health, but they mostly happen in "walled garden" environments through a single system.

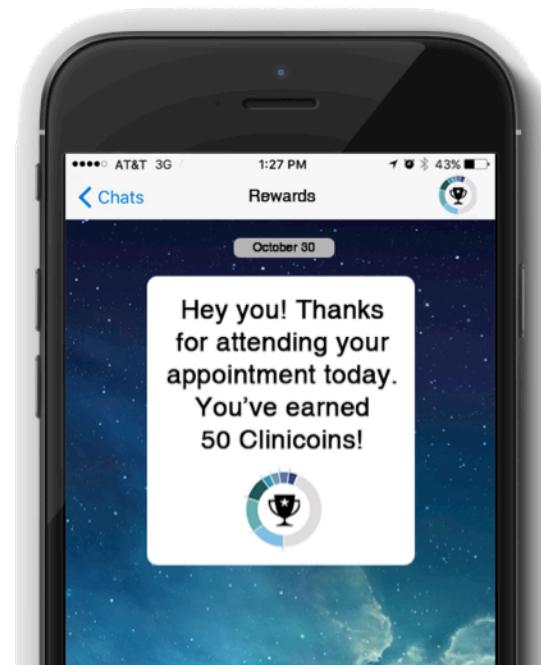
For them to truly be effective, rewards programs should be experienced more holistically, encouraging healthy behaviors in self-management as well as complying with and adhering to the plans of providers and healthcare organizations.

This means rewarding users for being proactive in their health and wellness as well as for being engaged with providers and developers in the community.

The Clinicoin Rewards Engine utilizes tokens and Token Distribution Events (TDEs) defined by providers and developers so users can earn rewards in all aspects of their journey, whether they're feeling sick or in great health.

How Clinicoin Users Earn Tokens

- Engaging in healthy activities (exercising, logging health data, meditating, healthy eating)
- Participating in surveys, clinical studies, reading premium messages from healthcare organizations.
- Completing desired tasks from physicians, researchers, insurance providers, pharmacies, etc. (appointments, medication adherence, data entry, studies).
- Community participation and spreading the word about Clinicoin to improve the usefulness of the platform and network.



Technology

3. Rewards Engine

The Rewards Engine is built into the Clinicoin platform and enables the frictionless distribution of CLIN tokens as rewards to be used for incentives, services, premium content, and ClinApps.

There are two main ways the Rewards Engine works, offering benefits to every player in the Clinicoin ecosystem: Engagement Activities and Token Distribution Events (TDEs).

3.1 Engagement Activities

The core mission of Clinicoin is to improve the health and wellness of people all over the world. This is achieved through engaging people in their own health, whether through self-managed healthy activities, as part of a group, or following the requests of providers.

The Clinicoin platform rewards community members for taking part in engagement activities. These include, but are not limited to, jogging, meditating, eating healthy meals, yoga, playing sports, tracking pregnancy to do lists, etc.

There are two methods of tracking engagement activities:

- a. **Manual Tracking** - Users log in to the Clinicoin app and enter the activities they've completed.
- b. **Proof of Engagement (PoE)** - Users connect mHealth mobile apps they use to the Clinicoin platform and engage in activities determined by those apps to deliver tokens. Users wishing to be IRL Validators can create Activity Events (think a running club), then confirm the activity of participants.

In order to connect an external app to the Clinicoin platform, the owners of the app become approved Validators. Validators earn tokens for validating the engagement activities within their apps. They also benefit from increased promotion of their apps as a Validator and improved app engagement from their users.

See section 4. Proof of Engagement (PoE) for more specific details on how it works.

Technology

3.2 Token Distribution Events (TDEs)

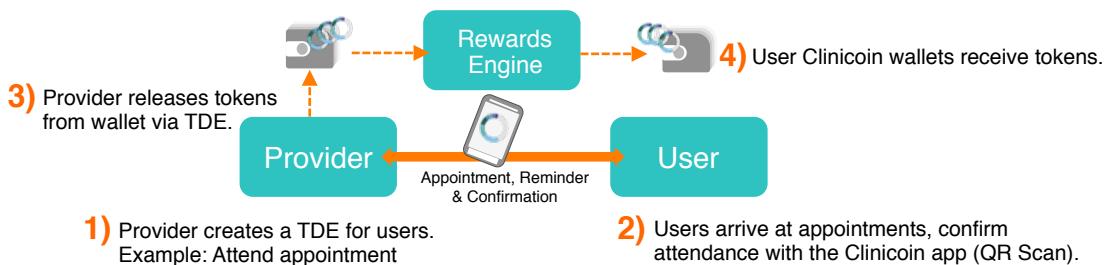
Token Distribution Events let each party get something they want: providers and developers get desired actions from users. Users receive CLIN tokens for their actions.

Providers (healthcare orgs, researchers, etc.) often have expectations of users as part of their relationship together. For a physician or clinic, it may be that you show up on time for an appointment, prepared for your visit. For a research team, it may be the expectation that you'll complete journals, remember to take medicines, or stay in the study through to completion.

Tokens can be sent manually within the Clinicoin platform from one user to another. Token Distribution Events give Providers the ability to program the sending of tokens automatically after confirming activity completion.

TDEs specify a number of tokens to be distributed to users after a completed action or date. There are dozens of ways TDEs can be used, the example below shows a TDE used to improve appointment attendance.

Token Distribution Event Process



Technology

4. Proof of Engagement (PoE) and Validators

Another way users earn tokens by participating in self-managed healthy activities such as exercising, meditating, tracking personal health data, etc.

Confirmation of the self-management of healthy activities is done through Clinicoin's Proof of Engagement (PoE) algorithm. The PoE system is powered by two different kinds of Validators, Technical and IRL (In Real Life). Technical Validators run nodes through external health applications to confirm user engagement activities. They are compensated with tokens for their involvement in the transaction.

Technical Validator (Health App Developers)

Users connect external applications that have been approved as PoE Apps to their Clinicoin Account. They then participate in healthy activities within the PoE App and earn CLIN tokens, distributed to their CLIN wallet after confirmation by Validators.

Validators provide signed messages, presented as proof of engagement by the user to the Clinicoin Rewards Engine.

For example, a user can indicate she or he ran a certain distance on her or his afternoon run, as recorded by a PoE App called Let's Go Exercise. The Validator (the developer managing Let's Go Exercise) confirms the engagement activity with Clinicoin, then CLIN tokens are distributed to both the user and the Validator's wallets. Clinicoin then posts a hash of the confirmed transactions to the blockchain via smart contract.

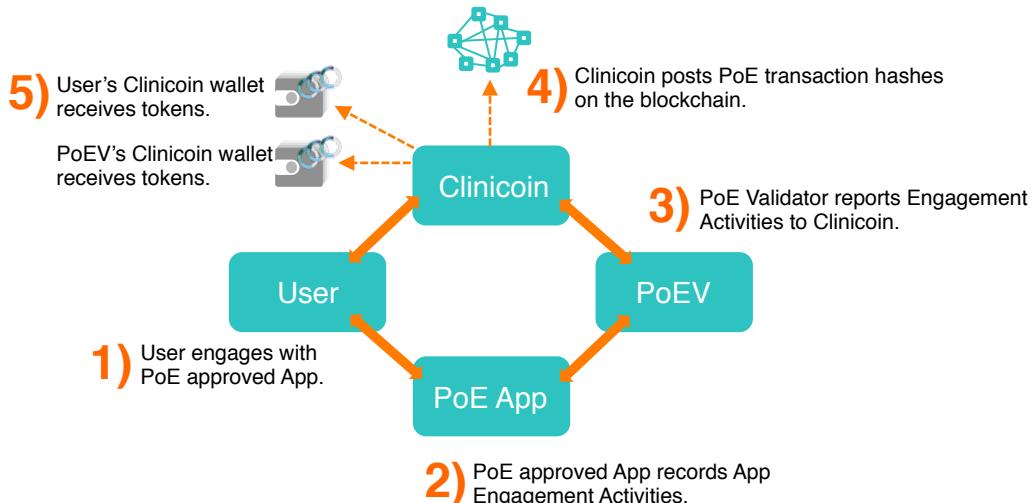
If confirmation data does not reconcile (user IDs do not match, do not exist in the system, etc.), the Validator receives an error message. Validators are rewarded tokens only for confirmed transactions, which will be posted via smart contract to the blockchain.

Technology

Proof of Engagement Process

The PoE algorithm handles the processing of validating Engagement Activities and distribution of tokens to users and developers upon confirmation, then posts transaction details to the blockchain.

Proof of Engagement Validation Process

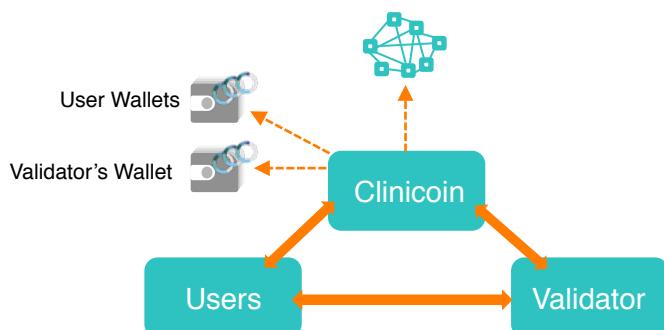


IRL Validators (Activity Leaders)

IRL Validators can be an exercise class instructor, personal trainer, team coach, or manager of any health or wellness group activity (like a running club or meditation group). Using Clinicoin, they create an Activity Event which generates a QR code on their smartphone. Everyone who participated in the activity scans the code with their phones to get credit for the healthy activity to earn CLIN tokens. The IRL Validator earns CLIN tokens as well.

Team Activity Process

- A group of people participates in a healthy activity together with one person acting as a Validator.
- After the activity, they scan the Validator's QR code.
- Everyone receives CLIN credits from the community rewards pool, including the Validator.



7 <http://www.aafp.org/news/family-medicine-americas-health/20161207hip-patientengage.html>

8 <https://hackernoon.com/gamifying-the-delivery-of-money-c55c25cecaee>

Technology

Distribution

Users interacting with the Clinicoin app are engaged in their own health and wellness. Engaged people are healthy people. They create a better world for themselves and for healthcare and research, producing more benefits to providers.⁷

We believe users should be rewarded for their engagement. An engagement algorithm determines the total number of CLIN to be distributed to users based on PoE activities as well as usage and interaction with the platform as a component of gamifying the delivery of CLIN tokens.⁸

PoE Rewards Distribution

There are two methods of PoE token rewards distribution to engaged users and developers, defined by an Open Activity List and a Secret Rewards List. Open Activities will be defined so Users know which activities generate tokens. The Secret Rewards will be defined by the Clinicoin team.

Both PoE rewards will be pulled from the Rewards Pool, generated by a privately held factorization table and algorithm defining how they are distributed.

Community Rewards Pool

CLIN tokens are distributed to and from a rewards pool, reserved at 600,000,000 CLIN. The Clinicoin system distributes them as health and wellness rewards to the community for engagement activities.

Base Level Algorithm for PoE

$$\text{Reward} = a_{e1}(w_{t1}) + a_{e2}(w_{t2}) + a_{e3}(w_{t3}) + \dots \dots \dots a_{en}(w_n)$$

where

a_e = engagement activity

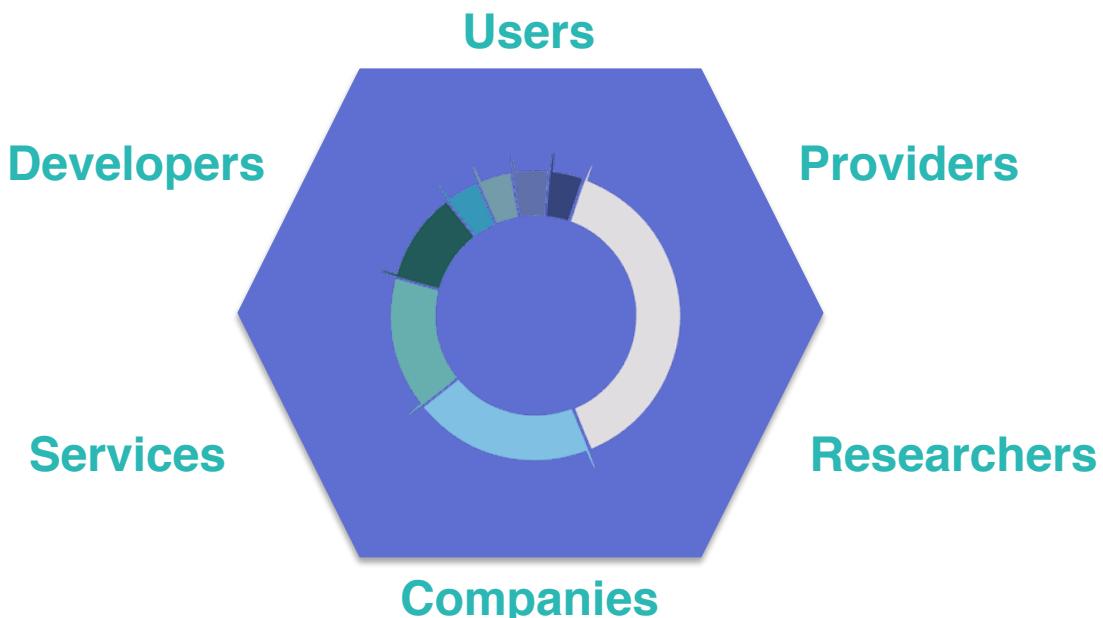
w_t = weightage associated with the activity

Technology

5. Marketplace

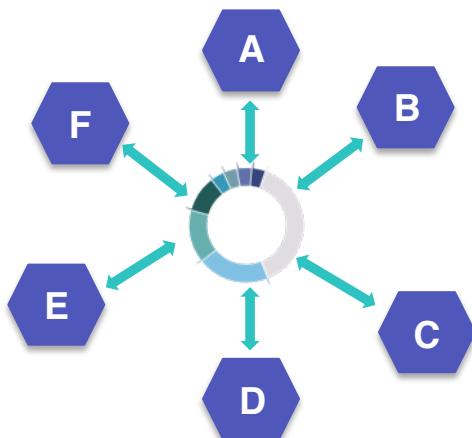
Points, rewards, and loyalty programs are natural components of a marketplace. Most are set up with users playing one of two roles: buyer or seller. In order to maintain a healthy ecosystem, a marketplace needs to exist where participants can both earn and spend.

Clinicoin's Marketplace will enable multi-faceted transactions, with the goal and purpose of providing a thriving ecosystem where every community member can play both roles.



Move Towards Decentralization

Marketplace decentralization provides the community with the ability to have access to more products and services.



Technology

Decentralized and Open Marketplace

The marketplace will start off centralized with the goal of decentralization, offering an easy way for buyers and sellers to connect to exchange CLIN for goods, services, and access to enhanced experiences on the platform.

External Marketplaces

Encouraging CLIN token usage in as many places as possible makes it a more useful tool to Clinicoin community members. This will be achieved by making external marketplaces accessible via ClinApps, giving community members an “in app” window to those marketplaces for a better experience.

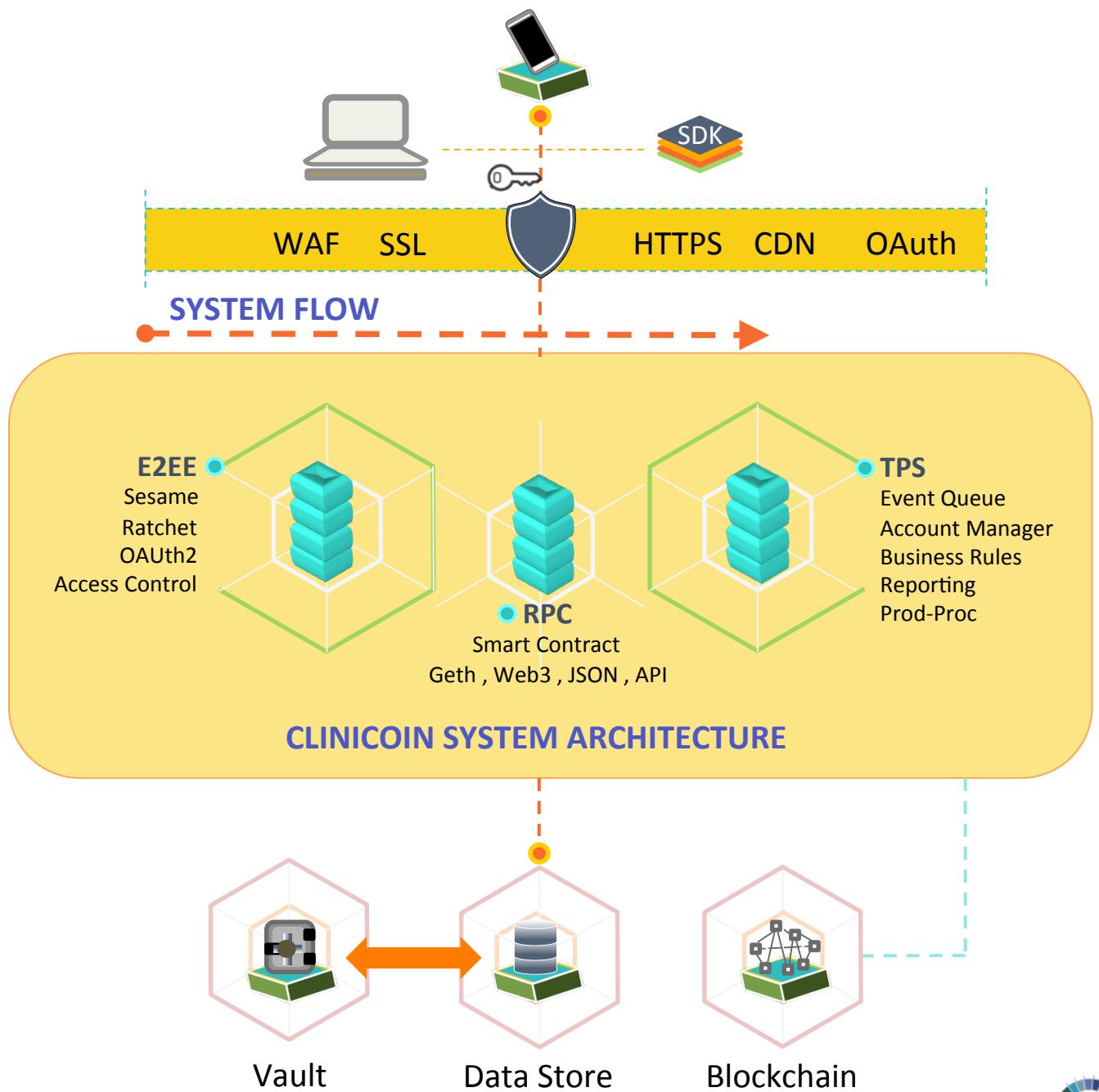
A grid of 10 items from a decentralized marketplace, each with a 'Get it' button:

- Athleta Gift Code (\$25)**
Active clothing for women and girls.
Vendor: Clinicoin
1,000 Q
Get it
- Clinicoins Stainless Steel Water Bottle**
Stainless Steel Water Bottle 0.6L with Clinicoin logo.
Vendor: Clinicoin
750 Q
Get it
- Clinicoins T-Shirt (Men's)**
Men's cotton t-shirt with Clinicoin logo.
Vendor: Clinicoin
750 Q
Get it
- Medibot**
Medibot helps you remember to take your medicine. He'll send you a friendly reminder every day to ensure you stay healthy and adherent.
Vendor: Clinicoin
250 Q
Get it
- Meditation Alerts**
Whether its for 1 minute or 1 hour, you should make time to meditate every day. Meditation Alerts give you the gentle nudge to take some time to free your mind.
Vendor: Clinicoin
250 Q
Get it
- Clinicoins T-Shirt (Women's)**
Women's cotton t-shirt with Clinicoin logo.
Vendor: Clinicoin
750 Q
Get it
- Breatheminder**
Breathing mindfully is ridiculously good for you. Subscribe to this daily reminder message encouraging you to take a moment to breathe.
Vendor: Clinicoin
250 Q
Get it
- Clinicoins Men's Zip Hoodie**
Men's Zip Hoodie with Clinicoin logo.
Vendor: Clinicoin
900 Q
Get it
- Smile**
Did you know that genuine smiles not only boost your immune system, they decrease cortisol in your body? Smile every day, this ClinApp will help you.
Vendor: Clinicoin
250 Q
Get it

Technology

Architecture

Clinicoins comprises three different systems integrated to provide an automated end-to-end solution interacting with the Ethereum blockchain: a native application with End to End Encryption Messaging (E2EE), a Transaction Processing System (TPS), and an Automated Smart Contract System (RPC). A more detailed description can be found in the Clinicoin Yellow Paper.



Technology

End to End Encryption (E2EE) Messenger

Clinicoin's native application is an asynchronous mobile messaging application which utilizes the open whisper system (OWS), which is the leading end-to-end encryption messaging system in the industry. OWS provides users with secure channels of communication which are encrypted, while offering the additional compliance requirements for healthcare (HIPAA) and clinical trials (21 CFR 11). Clinicoin's messaging service uses a combination of asynchronous key agreement protocols like X3DH which enables one party to create a message encrypted session and use that session to encrypt the subsequent messages even if the recipient is offline.

The asynchronous system is then combined with ratcheting algorithms like Double-Ratchet, which allows the sender and the receiver to keep communication channels open between two parties without compromising their messages. The combination of these two protocols is called the Sesame algorithm which uses sessions to support the end-to-end encryption between the sender and the recipient. This allows for users to be added at any point in the communication channel without losing its encryption functionality.

The X3DH algorithm uses the following parameters to create its secret key:

Curve : X25519 or X448

Hash : 256-bit or 512-bit hash function (e.g. SHA-256 or SHA-512)

Info : ASCII string identifier

IKA = Identity Key A

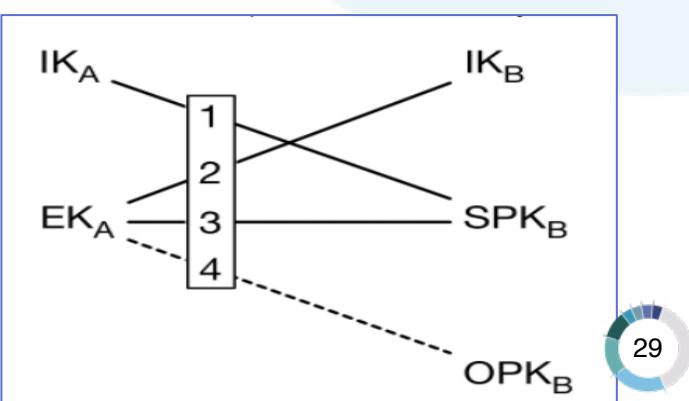
IKB = Identity Key B

EKA = Ephemeral Key A

SPKB = Signed preKey B

OPKB = One-time preKey B

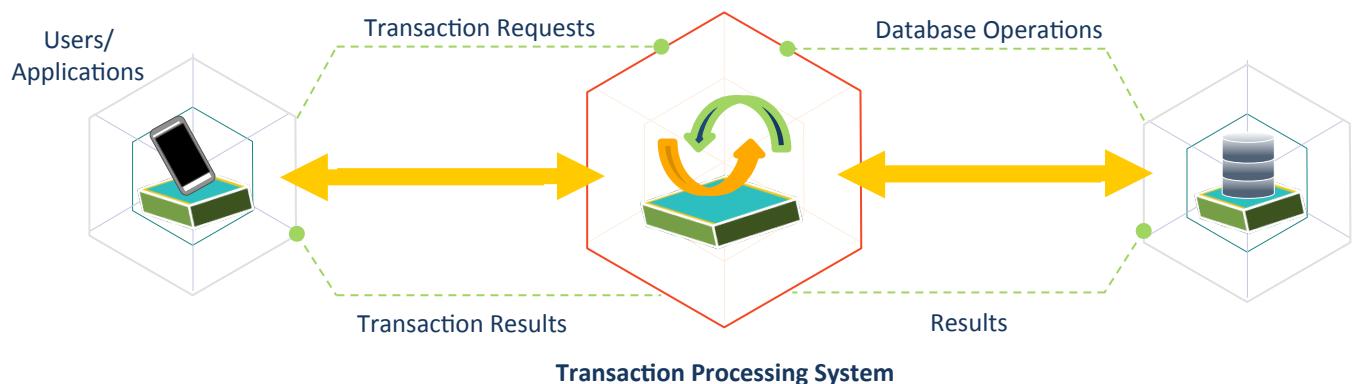
This diagram shows the relationship between the key parameters required for the X3DH algorithm to initiate. In order to provide replay protection and avoid key usage, a combination of ratcheting protocols is to be used to generate a freshly generated **DH** output to make sure key generation are randomized and no key reuse occurs.



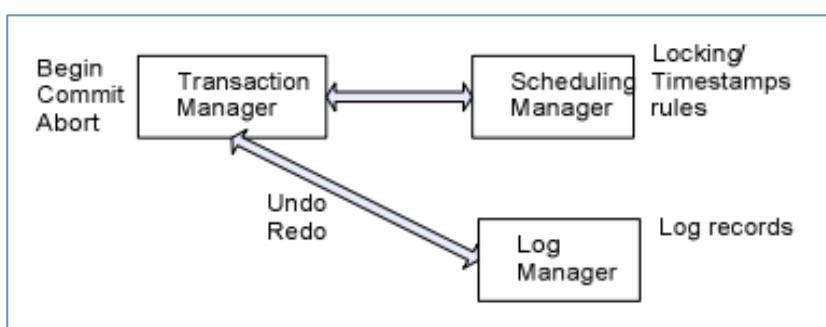
Technology

Transaction Processing System (TPS)

Clinicoin uses the Transaction Processing System (TPS) to handle events related to all transactions (Token Distribution Events, Licenses, etc.) on the platform. The system is built to optimize concurrency in its distributed client/server system. This architecture allows Clinicoin's application to perform transactions without being subjected to any geographical constraints while at the same time allowing instantaneous transactions to take place on its application with low latency and high volumes. The application also utilizes different transaction management schemes (concurrency control, database recovery, query processing), logging, and caching schemes to allow for execution and updates to take place without affecting dependent systems. The TPS performs events management for all transactions, including handling of billing and reporting.



It also uses a mobile transaction processing system to improve concurrency. A Mobile Database System (MDS) in a distributed client/server system enables processing of all transactional activities to take place in different modes when the client is connected, disconnected or intermittently connected. This mechanism allows for the mobile TPS system to handle sharing of partial states and status among transactions while also customizing isolation properties of transaction for error handling.



Technology

Automatic Smart Contract System (RCP)

Clinicoin's automated smart contract system is an extension of the TPS system's billing module where withdrawal functions are automated for external transfers to wallets. The withdrawal module within the billing system integrates the **hot storage** vault to the Ethereum blockchain via a web3js library by making system calls on a transfer function. Ethereum creates a smart contract using a compiler to turn source codes into binary through an **Application Binary Interface (ABI)**, which allows standard web applications to make calls to the blockchain through the HTTP protocol via API's.

In order to invoke a transfer function of Clinicoin's smart contract, the API must send a transaction call to the network.

The transaction object being sent must contain the following parameters:

From (string|number). Sending account address using web3.eth.defaultAccount property or a wallet address index of the hot storage wallet in web3.eth.accounts.wallet.

To (string|number). The destination address of the message or transaction.

Value (number|BigNumber). The value for the transaction, if Ether is to be transferred the value will be in wei unit.

Gas (number). The amount of gas to be used for the transaction. The value selected can be optional or default depending on the requirements and all unused gas is refunded to the From account.

gasPrice (number|BigNumber). The price of gas for the transaction in wei, defaults to web3.eth.gasPrice.

data (string). An optional parameter either in ABI byte string containing the data of the function call on a contract or its initialization code.

Nonce (number). This parameter is optional and is an integer of a nonce which allows the overwriting of a pending transaction that uses the same nonce.

Callback (function). An optional callback function that returns an error object as first parameter and the result as second.

Technology

Automatic Smart Contract System (RCP)

Once the transaction function call is made, it returns a callback with a 32 byte transaction hash with a **promise combined event emitter** which will then be resolved to generate a transaction receipt with the transaction hash, receipt, confirmation and error (in the event an error is generated from the function call).

Callback promise events help web3 integrate into different web applications over the http protocol due to the nature of the call being asynchronous. Most objects allow some sort of callback as a parameter to handle promises and resolve the promise. The **promiEvent** function in web3 handles the promises combined with an event emitter to handle the different stages of actions required to interact with the blockchain.

Initiating a transaction over web3js:

```
Web.  
 3eth.sendTransaction ({  
    from:  
    to:  
    value:  
  })  
  .then (function(receipt){  
    ....  
  })
```

Once the transaction promise has been resolved, it will return a receipt object:

```
Function receipt  
(web3.eth.getTransactionReceipt)  
{
```

```
  transactionHash  
  transactionIndex  
  blockHash  
  blockNumber  
  contactAddress  
  cumulativeGasUsed  
  gasUsed  
}
```

Benefits

Why Clinicoin?

It's time for a health and wellness technology platform making it easier for users, providers, and developers to accomplish their respective goals. Providing a simple, secure mobile application rewarding users for managing their own health and wellness, as well as incentivizing them to follow healthcare and research protocols, Clinicoin tackles mHealth app overload and engagement problems through a single, open source solution on a blockchain backbone.

Clinicoins encourages collaboration, providing a secure platform for innovation, laying the groundwork for the future of health and wellness.

User Focused

Most users don't need to know the underlying technologies powering their favorite apps, they just want to interact and achieve the desired result. The Clinicoin team focuses on what motivates, incentivizes, and excites people about managing their health goals, and supports it with a technology stack helping to deliver those goals.

Developer Friendly

The success of the Clinicoin project depends on the involvement of the development community, whether it be one programmer or a team within a large company. The platform enables them to integrate mobile apps and software they currently manage or provide them with the ability to build from scratch. In either case, they will be rewarded for their work.

Provider Driven

We've worked with organizations in health and research for over seven years, helping them to solve recruitment, retention, and data collection challenges on mobile phones. Clinicoin answers the need to make communications more efficient, secure, and rewarding for providers and users.

Benefits

Build Ready

Clinicoins is a platform removing the complexities of developing and managing a secure mobile app with easy integration of existing third party apps into its interface. Further, it enables providers to utilize the app immediately to communicate with and engage users.

Connect Seamlessly and Securely

Connections are created via contacts in the app's address book, by searching public usernames, clicking links, or scanning QR codes. Once connected, secure communications can take place using end to end encryption.

External App Friendly

Developers with live apps benefit from incentivizing users to connect their apps to the Clinicoins Rewards Engine, increasing the stickiness of their apps while earning tokens for being Proof of Engagement (PoE) Validators.

Third Party Integrations

External software and systems can plug into the Clinicoins system through ClinApps, offering their services to customers and users on a secure platform through their existing infrastructure.

Community Rewards

Users and developers benefit from being able to earn and utilize Clinicoins (CLIN) tokens for their involvement in the community.

When we engage in our health and wellness, everybody wins.

When people are engaged in their wellness, they do more than improve their personal health. They help the healthcare and research industry as a whole, driving down costs and inefficiencies.

Use Cases

The Clinicoin team has experience in providing mobile solutions to the following use cases:

Healthcare Providers

Providers can offer secure, two-way mobile messaging communications between people and providers. They can schedule appointment reminders or announcements of events or useful information.

Clinical Trials

Low engagement is a top reason for problems in clinical trials, 85% of clinical studies fail to retain enough participants.¹⁰ Clinicoin can improve recruitment, retention, and adherence, helping to find the best participants for a trial, then keeping them engaged through study completion.

Health Services and Hotlines

People are calling hotlines and helplines less and less, making mobile messaging a more popular way to communicate. Health education and support helplines can engage in secure, two-way communications and use pre or post-experience surveys to gather data.

Pharmaceutical and Pharmacies

Pharmacies are an important part of a person's healthcare plan. They can leverage Clinicoin to improve adherence, set prescription refill reminders, offer one-on-one support, or allow patients to schedule an appointment with their pharmacist.

Support, Motivation, and Coaching

Support communities or health coaches can mobilize by creating specific groups within the platform without the need to create their own mobile app.

The Clinicoin Token (CLIN)

The Clinicoin Token (CLIN)

The Clinicoin token (CLIN) is the platform's key utility token, used for entry into the community and exchanged for access, licenses, digital goods, services, rewards, and incentives. It is the primary accounting unit for the Rewards Engine, Proof of Engagement, and the Marketplace.

ERC20 (Ethereum) Protocol

Clinicoins has been developed as a transferable ERC20 token, implemented on the Ethereum blockchain, the current industry standard for digital assets, smart contracts, and custom cryptocurrencies.

It is the in-application currency powering the smart contracts of the platform. Due to the usable functionality that Ethereum is able to deliver in its protocol, after due diligence from the Mosio Development team, ERC20 was selected as the best solution for the Clinicoin Project.

Circulation

The total supply of CLIN tokens in circulation will be 3 billion at genesis. 600 million will be reserved in a community rewards pool, delivered to members for their activities and contributions.

Immediate Use

Bloomberg reports* 9 out of 10 tokens are not usable directly after a public sale.¹¹ CLIN tokens will be usable on the platform immediately upon post-discount sale distribution. Further, as one of Clinicoin's first ClinApp developers, Mosio is promoting and selling Clinicoin-integrated services to company clients and partners. These efforts will provide real world use in research and health, helping to drive early adoption of the platform and tokens.

The CLIN token will be usable on the Clinicoin platform upon delivery to sale participants.

¹¹ <https://www.bloomberg.com/news/articles/2017-10-23/only-one-in-10-tokens-is-in-use-following-initial-coin-offerings>

The Clinicoin Token (CLIN)

Token Uses

The Clinicoin token provides value to every member in the Clinicoin community. As an in-app currency, users, providers, and developers can exchange it for a variety of things in the Clinicoin ecosystem, uses are listed below.

Access to Premium Content and Features

Users can earn and spend CLIN on the platform for access to digital tools, features, and areas of the platform not available to everyone.

Rewards and Incentives

All members in the community have the ability to send Clinicoins to each other. Providers or developers can send them to users for completing desired health or research related tasks, to improve recruitment, and engagement.

Marketplace

Tokens can be spent within the Marketplace for goods, services, and access to health-related offerings.

Premium Membership

Users can buy premium memberships for themselves and others, giving them VIP access to functions and features within the platform.

Token Sale

Token Discount Sale

We will begin selling tokens for use on the platform February 21, 2018. To kick things off, tokens will be sold through early buying bonuses.

No Pre-Sale, No Whitelists, No Minimums

We believe token sales should be aligned with the principles, philosophies, and “egalitarian spirit of crypto” that makes it special.¹² We believe they should be inclusive and shouldn’t stack the deck against others who may not fit a financial or social profile for early exclusivity.

For these reasons we are not offering pre-sale or whitelist programs. We feel everyone should be able to participate equally in the Clinicoin community. Further, we will have no minimum contribution.

By removing these barriers, we accomplish three things:

- We ensure more individuals can participate in the token discount sale.
- We are able to keep the inclusive nature of Clinicoin philosophies.
- We provide a level playing field for all participants.

This format enables us to offer a time-based bonus structure and create a Children’s Health Fund component to the token sale, details on the next page.

Bonuses

Everyone participating in the token discount sale has access to every bonus level, based on timing.

Early buying bonuses include:

- Days 1-14: 50% Bonus (1 CLIN = \$.02 USD)
- Days 15-30: 25% Bonus

15M+ CLIN Bonus
Days 1-4 Only
Purchase of 15M CLIN or more: 15% additional (65% Bonus Total)
10 Slots Available

Token Sale Dates

Open: 9AM (Pacific) on February 21, 2018 (5pm GMT, Feb 21, 2018)
Close: 6PM (Pacific) on May 31, 2018 (2am GMT, May 31, 2018)

Token Sale

Circulation and Price

3 billion Clinicoin tokens (CLIN) will be created at the genesis.

1 CLIN = \$.03 (before bonuses)

Caps

Soft Cap: \$2M / Hard Cap: \$26M

Registration and KYC/AML

On January 23, 2018, user registration will begin. Users will be able to register on the site and complete their KYC/AML verification process.

Children's Health Fund

When the hard cap is met, it will unlock up to 200,000,000 additional CLIN which will be \$.03 each. Every dollar in the round will be donated to global children's health charities, voted upon via smart contract by the Clinicoin token sale participants.

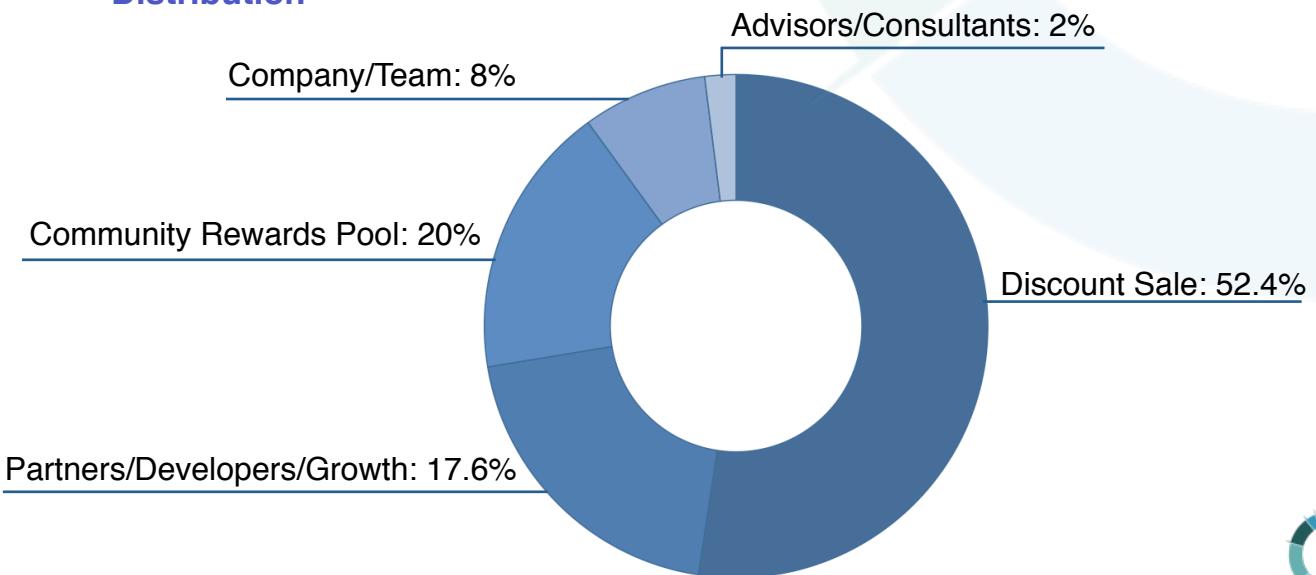
Further, the amount of CLIN purchased in the Children's Health Fund will be matched and distributed to token sale participants as bonuses.

Example:

If you buy 100,000 CLIN and the CHF sells 200M CLIN:

You'll receive about a 14.6% bonus, or 14,600 additional CLIN.

Distribution



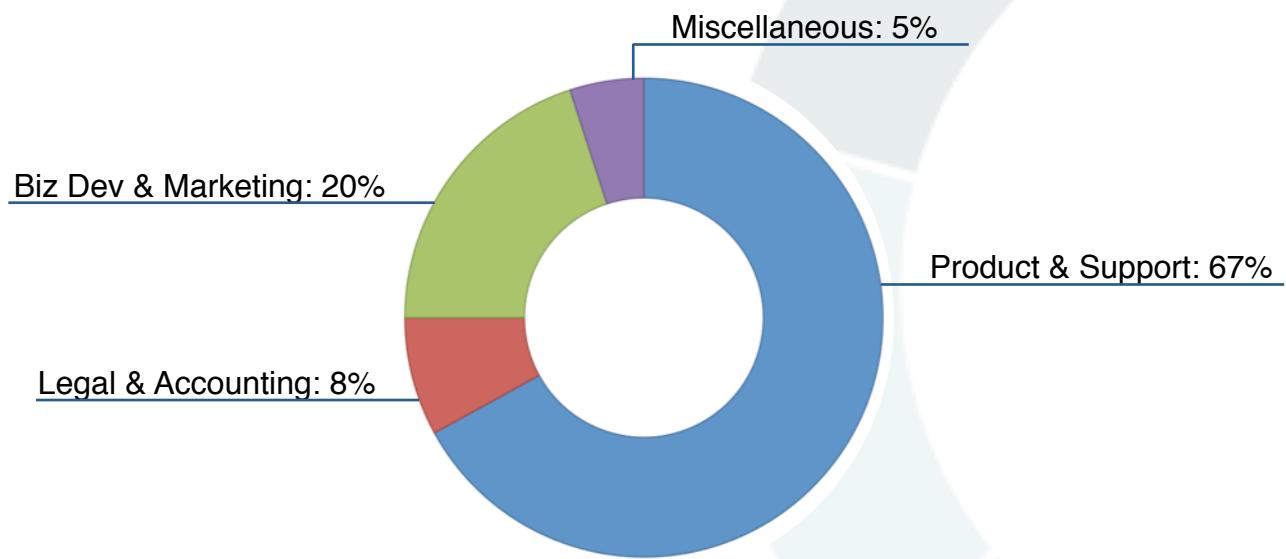
Token Sale

Vesting for Clinicoin Team / Mosio Employees

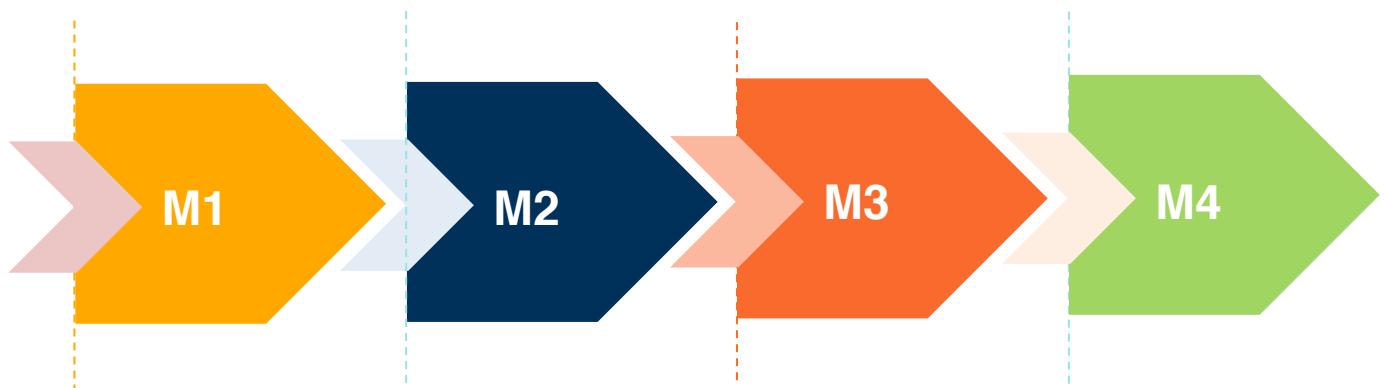
Tokens for team members will vest over a 24 month vesting period with a 6 month cliff. If, for any reason, a founder or employee leaves the company before the end of the vesting period, all unvested tokens for that individual will be returned to the pool.

Business Operations

Normal operations budgeting for Mosio, Inc. is as follows:



Roadmap



The Roadmap is made up of 4 Milestones. Each is anchored by a Clinicoin Stack component, but may have work being performed on other platform elements congruently. Security, system, and process checks are done regularly as part of the SDLC for both HIPAA and 21 CFR Part 11 compliance. Many core functions of the platform are currently workable and in use.

Milestone .5 – Patient Engagement and Mobile Messaging

2011 – 2017

- Active Use of Mosio's two-way mobile messaging platform in health services, healthcare, and research.
- Eli Lilly Patient Engagement App Challenge Winner
- Modules and Programs system for solutions configuration.
 - Alerts, Reminders, TextChat, Incentives, Mobile Photos, Appointments
- Clients: Memorial Sloan Kettering Cancer Center, QuintilesIMS, PPD, MD Anderson Cancer Center, Johns Hopkins University, Cornell Medical School, Cedars-Sinai Hospital, UPENN Medical School, Samueli Institute, Geneva Foundation, UCONN CHIP, ICF International, Children's Hospital of Manitoba, Worldwide Clinical Trials, CareWire, National Disaster and Distress Hotline, Covance, NYU Langone Medical Center, Profil Institute, Coordinated Care Network, SARRC, etc.
- Initial development of Clinicoin app (Messenger, Rewards Engine).
- Further development of gamification and incentives functions.
- Smart contract development.
- White paper and presentation deck completion.

Roadmap

M1

Milestone 1 – Secure Messenger

Q1 2018

Product Development

- Clinicoin app (iOS and Android)
 - E2EE Messaging (Chat)
 - Engagement Activity Logging
 - Token Rewards Distribution
- CLIN token genesis
- Token sales begin
- Distribution and initial use of CLIN tokens on the platform.
- Rewards Engine live for self-reported Engagement Activities.
- Existing client integration into the Clinicoin platform.
- Beta Launch





M2

Roadmap

Milestone 2 – Rewards Engine

Q2 2018

Product Development

- WhisperETH/Smart Contract Processing for PoE
- Transaction Processing System (TPS)
- REST API features included for Rewards Engine
- PoE system beta tester confirmations
- Token Distribution Events
- Smart contracts (PoE and hot wallet transactions)
- In App Clinicoin Integration (ClinApp alpha)
- Configuration of Vaults
- Billing Admin Upgrade (semi-automated process)
- PoE Validator Terms and Conditions



M3

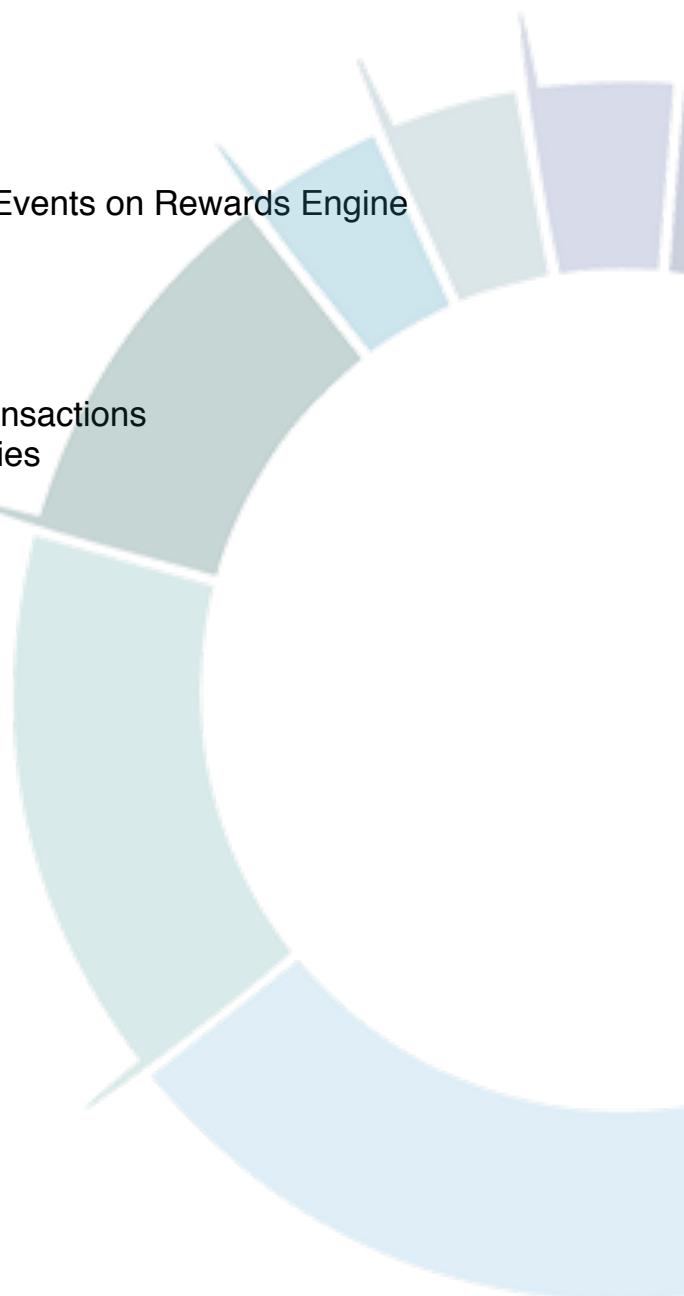
Roadmap

Milestone 3 – Proof of Engagement

Q3 2018

Product Development

- Live Release
- GUI updates for Token Distribution Events on Rewards Engine
- Distribution Algorithm
- PoE APIs and Validator Processing
- IRL Validator functions
- System mechanics and verification
- Smart contract functions for PoE transactions
- Finalization of Marketplace Categories
- Marketplace Terms and Conditions





M4

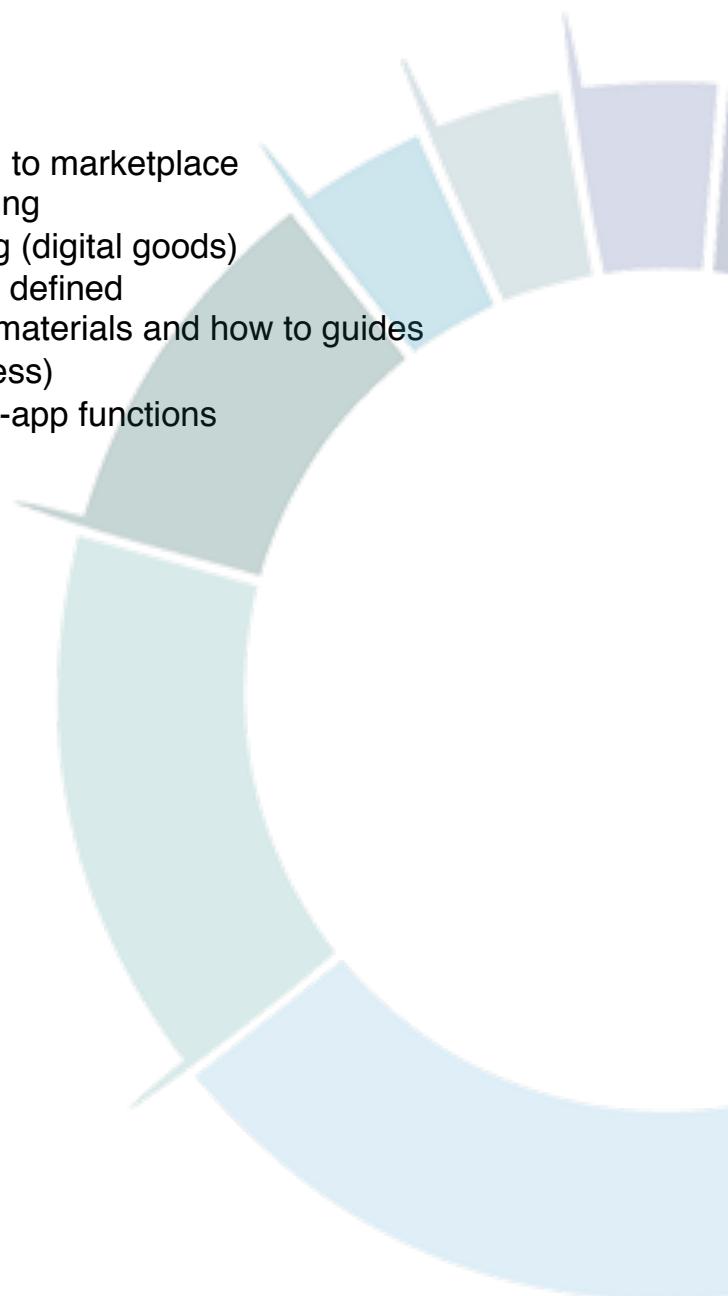
Roadmap

Milestone 4 – Marketplace

Q4 2018

Product Development

- Initial PoEVs and partners added to marketplace
- Marketplace transaction processing
- Build of beta marketplace offering (digital goods)
- Marketplace vendors onboarding defined
- Marketplace vendor onboarding materials and how to guides
- Enterprise solution (ClinApp access)
- REST API library for additional in-app functions



Executive Summary

Mobile Technology for Good

Mosio has been a mobile messaging innovator since 2007 and in 2008, was the Mobile Winner at South by Southwest Interactive. Since 2011, the company has been solving patient engagement challenges for clients in healthcare, health services, and research. In 2014, the company was a winner in Eli Lilly's Patient Engagement App Challenge.

Relevant Experience and Success

The Mosio team has a proven track record providing mobile health and blockchain solutions to top organizations and companies. The company's mobile messaging platform has been utilized to assist, alert, remind, and manage survey data from millions of users.

Global Messaging Platform

With global two-way mobile messaging reach, Mosio's platform improves patient engagement through a suite of "modules" configured to help our clients enroll patients faster, remind them to take their medicine or attend clinic visits, collect survey responses for study data, and deliver incentives.

Capitalizing on Industry Insights

In 2014, we saw that rewards, incentives, and gamification elements can improve patient engagement, but that many healthcare and research organizations were hesitant to use it because it:

- Is difficult to understand and explain to decision makers.
- Lacks a core set of principle functions.
- Needs a central point of agreement to build upon in order to increase adoption.

We created Clinicoin to utilize the power of open source technologies, leverage the usefulness of mobile messaging as a communication tool, and deliver the power of rewards in health.

Executive Summary

The following healthcare organizations are current Mosio clients and have expressed interest in the Clinicoin project.



Clinicoin Partners



The Team



Noel Chandler

Co-Founder and CEO



Jay Sachdev

Co-Founder and CTO



Daaron Dwyer

Senior Software Engineer



Carl Inniss

Senior Software Engineer



Charlotte Justice

Director, Customer Success



Mary Beth Shields

Client Services Manager



Harry Antibus

Strategy and Market Development



Proshonjit Das

Blockchain Developer



Gil Bindelglas

Blockchain Consultant



Jamie Seymour

Account Executive



Mark Schwartz

Legal Counsel



Ahmad Tahhan

Front End Developer



The Team



Matthew Fuller

Digital Marketing Manager

in



Issey Morito

Marketing Manager, Japan

in



Andrea "AJ" Jones

Community and Social Media

in



Mobeen Muzzammil

UI/UX Designer

in

Advisory Board



Anne Zielinski

VP of Partnerships (BioClinica, Medidata)



Patrick Crane

CMO (LinkedIn)



Kai Gradert

UX (Google, Adobe, AngelList)



Adam Piandes

Leadership and Growth Expert



Jamieson Chandler

Community and Content, GRAMMYS



Ed Stevens

Healthcare Communications Strategy



James Maskell

Author of Evolution of Medicine and CEO
kNew Health



Eric Stromberg

Blockchain Compliance Alliance



Max Kobernik

Play2Live, CryptoBazar



Join Us



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Web: www.clinicooin.io

Twitter: <http://www.twitter.com/clinooin>

Telegram: <https://t.me/clinooin>

Telegram (Japan): https://t.me/Clinicooin_Japan