Using Blockchain and Artificial Intelligence to save lives and create efficiencies

FarmaTrust

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This white paper replaces and substitutes all previous white papers issued prior to this version and date

Table of Contents

The FarmaTrust Revolution

Safe and Simple
Installation for manufacturers, distributers, logistic companies and retailers

Immutable
Our system creates permanant records for users and the general public

Artificial Intelligence
Our system ensures that supplies are provided at just the right time in the right place, for the right patients

Future Proof
System is hardware and software neutral and designed IoT applications

International
FarmaTrust works with any hardware or software

Big Data
Significant data collection allowing data applications and anlaysis

Introduction

The purpose of this whitepaper is to provide information regarding the FarmaTrust project, its core conceptual ideas, business model, competitive advantages, team, token distribution event ('TDE') details and roadmap towards the full commercialization of the MVP (demo is available). A more technical description of the platform, core architecture and APIs will follow in the subsequent chapters.

FarmaTrust is a is a web-based, peer to peer platform designed to keep an immutable record of every legitimate drug ever produced. Using the Blockchain technology, it is at the forefront of preventing counterfeit drugs getting into the supply chain therefore preventing death and suffering of patients, be it in the developed or the developing world. Further, the use of AI and machine learning technologies also benefit commercial operations of the pharmaceutical industry, increasing efficiency and revenue.

> **Secure the Pharmaceutical Supply Chain by removing inefficiencies and fake drugs with a Blockchain and AI enabled FarmaTrust platform – code named Zoi**

Platorm Strengths

Our platform Zoi is a web based, peer to peer platfrom designed to keep an immutable record of every legitimate drug produced.

FarmaTrust is a true use case for blockchain technolgy in respect of its abilty to create immutable records therby satisfying regulators' requirement of incorruptable data as well as track and trace obligations. Using blockchain as a foundation allows FarmaTrust to create commercially viable products for the pharmaceutical industry.

Executive Summary

The pharmaceutical industry is critical for the preservation of life and health of society. It is a US$1 trillion industry, and generates some of the highest profits among all the commercial sectors. Despite the importance of this industry, it is currently struggling with numerous challenges as a result of criminal enterprises, ineffective stock control and lack of visibility of its supply chain.

Major challenges for the pharmaceutical industry are currently:

- Proliferation of Counterfeit Drugs : Fake drugs result in the death of hundreds of thousands of individuals each year. As shown in this paper, organised crime has infiltrated the pharmaceutical supply chain because of high profits and lenient sentencing.
- Increase of Online/Digital Prescriptions : The increase in on-line purchases and the growing acceptability of "virtual prescriptions" have made it far easier for counterfeiters to set up fake online pharmacies, with law enforcement agencies struggling to permanently shut them down.
- The Regulatory Environment : As threats to pharmaceutical company profitability are increasing, the regulatory burden is increasing as well, and the patent cliff is becoming more dangerous: The most profitable drugs will soon be produced by lower margin generic producers. Such dynamics affect the most vulnerable members of society – sick people fighting against cancer, HIV, malaria and other life-threatening diseases.
- Supply Chain Inefficiencies : Such inefficiencies distort the price of medicines as well as reduce the R&D budgets of many pharmaceutical companies. Inefficient supply chain also means there are shortages in some countries and oversupply in others.
- Growing demand for 'personalized' medicines : The growing demand for "personalized" medicines requires a secure, transparent and permission-less solution which is accepted globally.

Such dynamics affect the most vulnerable members of society – sick people fighting against cancer, HIV, malaria, and other life-threatening diseases.

AS A RESULT, FarmaTrust firmly believes and is confident in its ability to provide a uniform approach to solve these challenges faced by the pharma industry. Blockchain technology has the potential to fundamentally transform this industry, and will significantly help address these challenges.

The advances in technology, the increase in the regulatory burden, and the need to reduce costs means that the industry is looking for a commercially sensible, global, regulatory and system neutral solution to the problems plaguing the industry.

The FarmaTrust solution will revolutionize the pharmaceutical industry both in terms of costs and assurance. The customers will be provided with the guarantee that the vital medicines are genuine and, therefore, effective.

With the advancement of Blockchain technologies as well as the developments in AI and encryption, FarmaTrust believes there is an international, cost effective, co-operative solution to solve the problems affecting the pharmaceutical industry.

The Regulatory Environment

By 2018, most major pharmaceutical companies and their distributors will be under significant pressure to serialize and provide a more rigorous level of track and trace for the distribution of their supply. As a result, such companies must now significantly invest in solutions that enable serialization and the exertion of better control over their supply chain.

What makes this such a complex challenge is that regulatory requirements for serialization and track and trace significantly differ from region to region and country to country. What complicates attaining visibility is the fact that few tracking and reporting standards are in place; each participant within the supply chain has different systems and processes. This is contributing to high overhead costs and a high-level of coordination needed to maintain records for individual package tracing.

> **THIS IS A WORLDWIDE PROBLEM WE ARE FACING**

For those falling under United States regulatory regimes, according to the 2015 Drug Supply Chain Security Act (DSCSA), manufacturers will be required to "mark packages with a product identifier, serial number, lot number and expiration date by November 2017" and by November 2018 all repackages will be required to serialize.[1]

Those companies who manufacture, sell or dispense pharmaceuticals within the European Union must comply with track and trace regulations as of February 2019 under the Falsified Medicines Directive (FDM).

Given the above and the fact that most of pharmaceuticals are sold to one of these two locations and are distributed in countries covered under different regulatory conditions, pharmaceutical companies are eager to address their serialization and track and trace needs.

Proliferation of Counterfeit Drugs

The counterfeit drug industry is massive. It is worth an estimated $200BN. "We have more fakes than real drugs in the market," said Christophe Zimmermann, the WCO's anti-counterfeiting and piracy coordinator. " In 2007-2008 alone, it rose 596 percent".[2]

The significance of the fake drugs problem is shown in the following statistics:

(i) Up to 30% of medicines sold in developing countries are counterfeit.
(ii) The value of the counterfeit drug market is estimated at $200 billion annually.
(iii) In 2015, it is estimated these criminal products cause the death of between 100,000 and 1,000,000 people each year.[3]
(iv) A ten-day crackdown against counterfeit drugs coordinated by Interpol in May 11-21, 2014, led to 8.4 million doses of counterfeit drugs being confiscated.
(v) In 2009, 20 million pills, bottles and sachets of counterfeit and illegal medicines were seized in a five-month operation coordinated by Interpol across China and seven of its south-east Asian neighbours; 33 people were arrested, and 100 retail outlets closed.[4]

The Scale of the Problem

The scale of the counterfeit drug problem is difficult to assess because in many circumstances people and authorities have no real way of knowing whether a drug is fake or not.

Usually counterfeits are detected after a fatality, sometimes in large scales or through international co-operation. However, through various recent studies over the last decade, the significance of the problem has become evident, and it is a global issue affecting everyone in the East and the West.

In 2013, for example, according to statistics released by state media, security services in China arrested nearly 60,000 people for violating intellectual properties to fake pharmaceuticals.

The total estimated value of the counterfeits and fakes seized by China was $28 billion (173 billion Yuan). Over 90 million tons of counterfeit goods were seized by security services across China in 2013. Included were 300 million counterfeit drug pills worth $360 million. 1,260 organized crime gangs who were involved in counterfeiting were also broken up during the year.[5]

> **It is a global issue, affecting everyone in the East and West**

A Pfizer-sponsored study, one of the largest investigations conducted in 14 European countries, estimated that western Europeans spend more than US$ 14 billion a year on illicitly-sourced drugs, many of them counterfeit (including so called "life-style" drugs). One European study found that out of 370 seized Viagra samples, only 10 were genuine.[6]

In 2009, a series of raids in Egypt found counterfeit medicines worth hundreds of millions of dollars and exposed a criminal network feeding consumers across the Middle East. And in Europe, customs officers seized 34 million counterfeit pills in just two months in 2009, a haul that the European Union's industry commissioner Guenter Verheugen said "exceeded our worst fears".[7]

The consequences of taking counterfeit drugs can be fatal. Each year, it is estimated these criminal products cause the death of between 100,000 and one million people. A new UC San Diego School of Medicine report confirms the full scope and prevalence of this global problem is poorly understood.[8]

In Africa, fake antimalarial medication has been threatening efforts to control malaria. According to the World Health Organization (WHO), in 2011, 64% of Nigeria's imported antimalarial drugs were fake. Nigeria is Africa's largest drugs market, and over 70% of its drugs are imported from India and China, considered the "biggest source of fake".[9] There have been approximately 100,000 deaths relating to fake malaria drugs in Africa alone.[10]

In Pakistan, over 100 heart patients died after administration of adulterated drugs by the Punjab Institute of Cardiology. Pakistan did not have any regulatory enforcement on production of medicines until this crisis occurred. In response to the crisis, a regulatory body was finally set up in February 2012.

Even western markets are affected. In Boston, the New England Compounding Center meningitis outbreak took place in 2012; 64 people were killed, and 750 were infected by fungal meningitis.[11] Between 2007 and 2008, 149 Americans were killed after taking counterfeit heparin, a blood thinning drug.[12]

In another case, in the USA, vials of the cancer medicine Avastin were found to contain no active ingredients. The vials were sourced in Turkey, shipped to Switzerland, then Denmark, finally to the United Kingdom from where they were exported to U.S. wholesale distributors.[13]

Online Pharmacies

With the increase in use of online services and preference of smart mobile communications, patients are generally turning to "virtual pharmacies". In many respects this is a bigger problem than physical pharmacies, because of the ease of establishing a website or on-line portal. Further, since they exist merely in the virtual world, they are in many cases difficult to regulate. The problem is further increased by the availability of prescription drugs on the dark web, which has little visibility to law enforcement personnel.

It is estimated that in 2016, 40 million doses of medicines in the developed countries were counterfeit, many of whose were sold in online pharmacies.

It is estimated that 97% of online drug sellers are not legitimate, and that 62% of medicines purchased online are fake or substandard.[14]

According to the EAASM (European Alliance for Access to Safe Medicines) 6 times out of 10, medicines bought online turned to out be fakes.[15]

In 2012 raids in Operation Pangea (an international police campaign against illegal online pharmacies) involved 100 countries and shut down more than 18,000 online pill-pushers.[16]

The trend to seek medical aid online has made it easy for bogus medicines - containing anything from paint and antifreeze to brick dust and floor wax - to be mailed around the world. The Alliance for Safe Online Pharmacy in the EU (ASOP EU) warns that 130 million people in Europe are risking their health by ordering from the 30,000 illegal pharmacy websites that have flooded the Internet .[17]

Supply Chain Inefficiencies

Due to the variety of ways in which drugs are sold, because of the global outsourcing function, and because of the significant number of participants in the pharmaceutical supply chain mechanism, with each participant using different IT systems and Enterprise Resource Management Systems (ERMS), there are significant supply chain inefficiencies leading to distortions in price, because of shortages in one area and over-supply in another.

Furthermore, because pharmaceuticals are required globally, and due to the differences in distribution systems in developed and emerging market countries, there are market and supply distortions. In some territories paper documentation and ordering systems are used whereas in other areas ERMS systems and ineffective supply projections do not allow for drugs to go to territories which most need them.[18]

Executive Management Acknowledgement and Tax Implications

It is estimated that 94% of pharmaceutical executives are concerned about counterfeit drugs, and that 30% of drugs in the market are counterfeit. In circumstances where there are drug shortages, counterfeiters can increase the prices as much as 600%.[19]

Criminal gangs are increasingly interested in the pharmaceutical sector. This not only affects the profits of pharmaceutical companies but also tax revenues for whole national economies. For instance, a pill of ecstasy costs between €0.20 and €0.30, and it is generally sold at €5. A Viagra pill costs around €0.15, and it is sold via an illicit website at around €8 to €10. A kilo of counterfeit Viagra pills (1,700 units) costs €255, and the retail value is from €13,600 to €17,000.[20]

The director of the Colombian Tax and Customs enforcement agency stated that the profit margin for criminals selling counterfeit drugs is between 500 to 1,000 percent. Forexample, a fake Viagra pill that costs $1 to manufacture can be sold for $5 to $10.[21]

The effect of these various issues has a significant impact, not only loss of life but also loss of jobs for the legitimate industry and reduction in tax revenues for the government.

Lower profits resulting from substitution by counterfeit drugs means pharmaceutical companies have less to spend on R&D. This is ultimately hurting patients in need of efficient cures.

For these reasons, regulators are increasing requirements to track and trace drugs, both regarding pharmaceutical companies and distributors.

We believe that the FarmaTrust solution, with its simplicity, platform-neutral approach and mobile-first background will considerably alter the effectiveness of the pharmaceutical supply chain. Our simple apps, which can be used on a smartphone or through SMS, mean that the FarmaTrust system can be used with legacy systems and ensures that pharmaceutical distributors are always aware of the stock levels in each territory.

Zoi provides cross-platform capabilities, will work in any jurisdiction, optimizes distribution routes based on ML algorithms, and operates globally to benefit both developing and developed countries.

The FarmaTrust Platform

To combat fake pharmaceuticals, a robust solution needs to be employed that will stop counterfeits from contaminating the supply chain. As shown above, the problem is getting worse. Current technologies such as tamper-proof and/or holographic labels and unique serial numbers are not sufficiently effective.

The solution is to track pharmaceuticals through a supply chain that links digital systems to pharmaceuticals moving in the physical world. This is important because when you add a unique digital reference to a drug and a physical copy of that drug, it is much harder to erase or duplicate one without the other and therefore enables accurate tracking through the supply chain.

With a unique ID combined to a digital supply chain the FarmaTrust solution will reduce or eliminate copies or undocumented drugs getting into the supply system. When you have a unique digital identity and the physical item moving through the supply chain it is easier to spot any potential fakes or compromised items entering the supply chain.

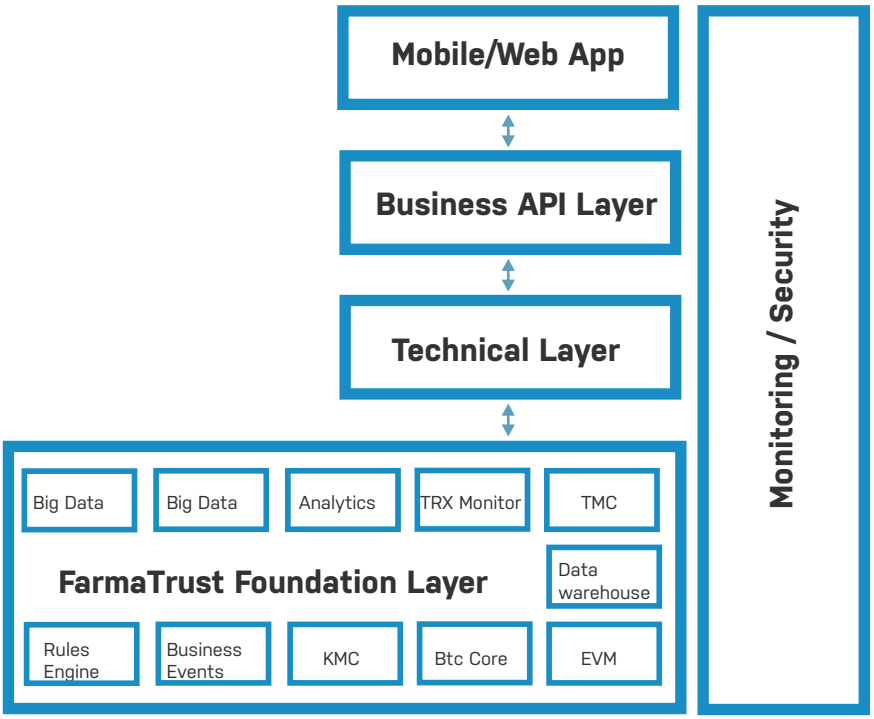
Our platform Zoi is a distributed and interoperable pharmaceutical supply chain exchange (SCE) to realise the above solution with Blockchain as the underlying technology. The platform will:

- Provide pharmaceuticals companies, their packagers, distributors, pharmacies and regulators the visibility needed to make critical decisions that can greatly reduce supply chain costs;
- Identify gaps across varying compliance regimes, recoup costs lost through counterfeits; and
- Protect consumers and brand through reduction of fake pharmaceuticals that find their way into the supply chain.

The platform will create a network of pharmaceutical brands, contract manufacturers and suppliers, logistics and shipping companies, wholesalers and distributors as well as pharmacies and hospitals. This network will then become a trusted system to ensure that medicines and related products are indeed the genuine product.

Target Architecture

The FarmaTrust architecture for the target state will be microservice-driven, componentized with plug-and-play capability to create robust, scalable and highly performant solutions. The core is built with a future-proof approach to enable our system to become integral part of IoT applications. This architecture guarantees business agility by providing flexibility and reduction in time-to-market.



The architectural layers of FarmaTrust:

1. Native App and Web App: Wallet creation and KYC-like authentication and authorisation to track FTC tokens. During the registration, our Know Your Customer process will ensure a valid identity and background to meet regulatory and compliance requirements.

2. Business API Layer: Any client will be able to connect to our ecosystem, exposed via our endpoints that will consume JSON data and respond with JSON data. Minimum data is required to call our technical layer.

3. Technical Layer: With minimum data from the business layer our microservices in form of a RESTful API will enrich the data and orchestrate proper calls to the technical components that form our foundation. Smart contracts and AI agents process the packet flow here. Due to the nature of supply chain we require both synchronous and asynchronous calls to the foundation layer.

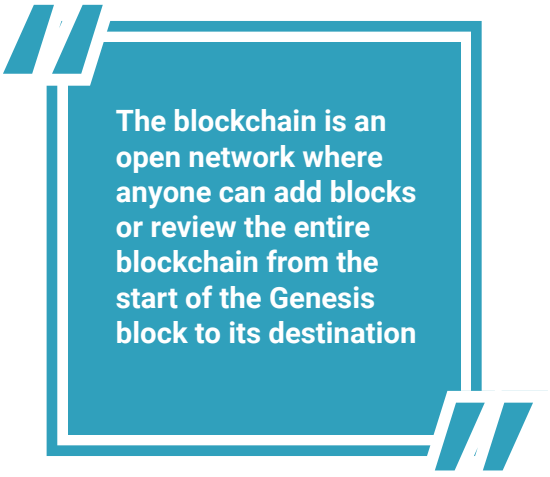
4. Foundation Layer: Core processing components to build the foundation resides here. Data from social, mobile apps, cloud and other side Blockchains and private Blockchains are extracted, loaded and transformed for analytics. APIs from the technical layer communicates with various resource in this foundation layer to solve problems at hand.

5. Monitoring and Security: Business monitoring, application monitoring and infrastructure monitoring occurs here to ensure the health of platform and business. At the same time security measures are taken at every level.

Blockchain

The technology behind Bitcoin, referred to as Blockchain, was established as a shared ledger of transactions across disparate business without the need for control by any single central entity. This "distributed ledger" ultimately reduces and in some cases, obviates the need for intricate and expensive relationships and system integrations required to provide integrity-verification and trust for transactions that cross business entities that traditionally have required third-party intermediaries.

It is a shared immutable ledger between all parties in a business network. Immutability prevents disputes in transactions and is achieved through cryptography. "Smart Contracting" enable two or more parties to sign an immutable contract which can be automatically fulfilled. A smart contract details the asset exchange terms (including but not limited to the fees). The immutable nature of the contract prevents later denial of the agreement (much as a paper contract signed by lawyers and witnessed, stamped, etc.).



Blockchains are difficult to hack, their data is cryptographically secured such that the costs associated with brute-force attacks are so excessive that such attacks are simply not worthwhile. They also guard data against losses as they are distributed and constantly verified to preserve their integrity. Access and changes can also be monitored and perpetually stored so that changes made to a Blockchain can be forever tracked in the Blockchain itself. We believe the Blockchain will have a profound impact on pharmaceutical industry, including:

(a) Access: The blockchain is an open network where anyone can add blocks or review the entire blockchain from the start of the Genesis block to its destination.

(b) Trust: Individuals and pharmaceutical companies alike can trust each to transfer valuable information such as serial numbers knowing that the Blockchain keeps the information cryptic using cryptography.

(c) Redundancy: The blockchain is a like a ledger where information is replicated on servers across the globe, so there is no single point of failure.

(d) Anonymity: People and companies can exchange information anonymously.

(e) Real Time Capability: Blocks can be verified and added to the Blockchain in near real time.

(f) Security: Strong cryptographic algorithms keep the information secure.

(g) Decentralization: With blockchain there is no central authority managing the data; everyone is keeping a copy of the information.

Blockchain Application to the Pharma Supply Chain

We attempt to disrupt the value chain in the pharma industry by causing disruption in the manufacturing platform and distribution services. The journey for us starts at the manufacturer chain.

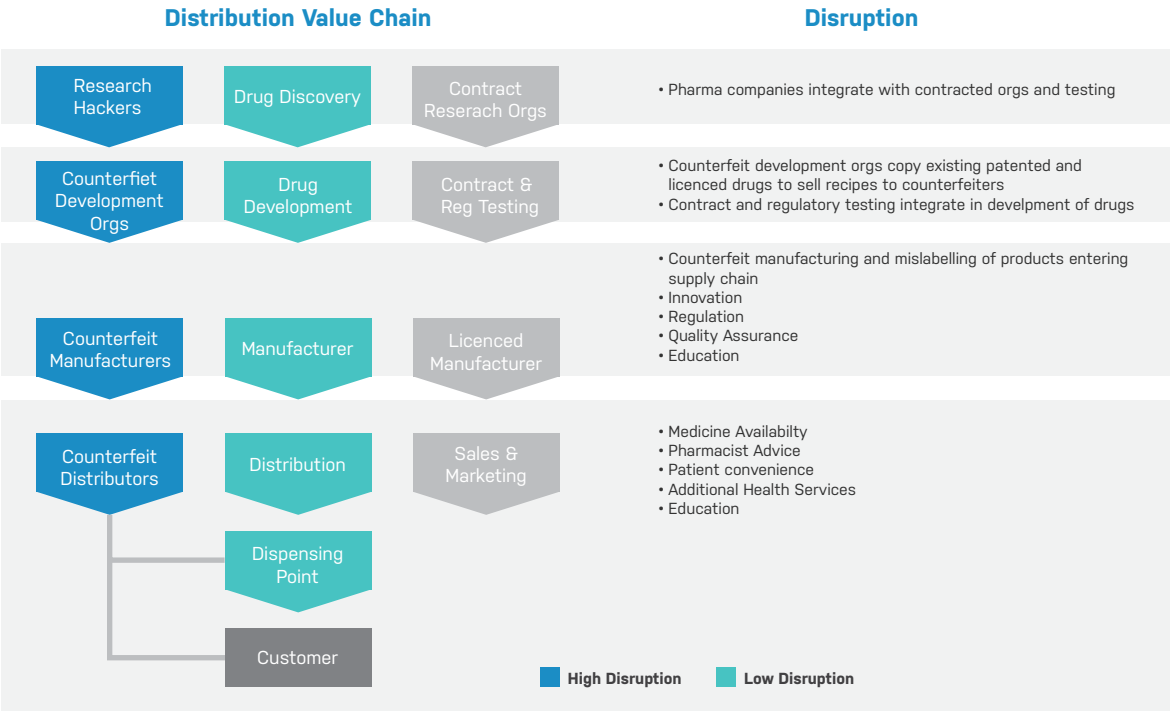


Figure 2 - Value Chain Disruption

Current Supply Chain

As shown below in the diagram, the tracking of packets throughout becomes a challenge because of the complexities and numerous actors involved in the pharma supply chain.

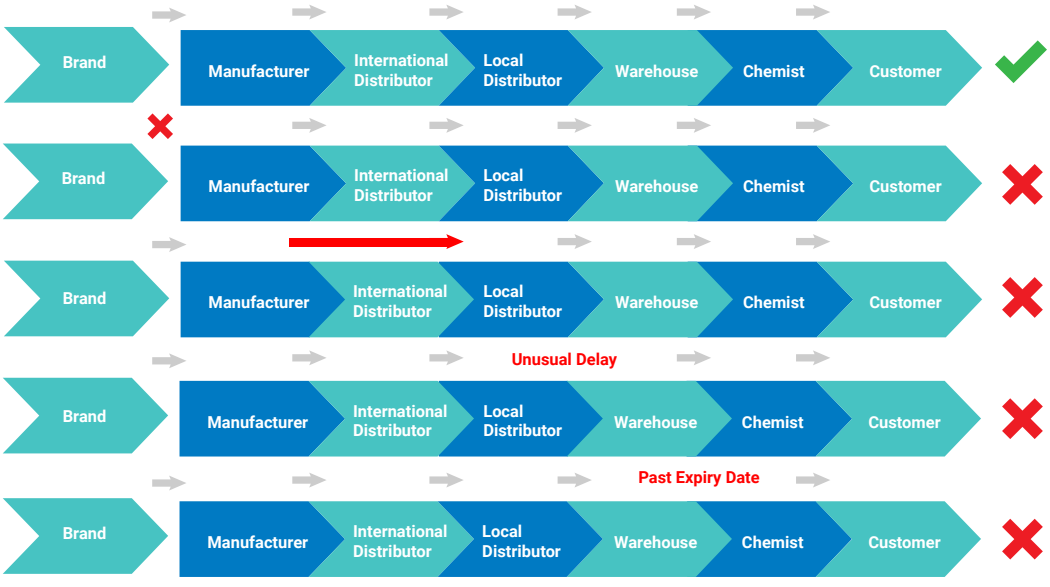


Figure 3. Variations of Issues

The logistics of integrating all supply chain management systems, ensuring common data standards and processes is an almost unthinkable and costly undertaking that requires a high level of coordination across the various entities within the entire supply chain.

The challenge in the pharma supply chain is that the supply chain exchange visibility breaks down the further the packet gets from the manufacturer.

For example, it may be manufactured by a pharma company based in the United Kingdom whose primary distributor passes it onto a local distributor in Nigeria.

In turn the Nigerian distributor may decide to pass some locally within Nigeria but may decide to send some to a local supplier in Indonesia. Routing of packets downstream becomes unclear upstream.

What makes it more challenging, even if cooperation existed amongst all parties, is integration between each party's supply chain management systems. This gets even more challenging the further down the supply chain the drug packet goes. Getting thousands of parties within the supply chain to integrate systems is next to impossible.

You therefore need a mechanism that considers the following:

• Existing supply chain management systems – there should be minimal changes to legacy systems.

• Existing supply chain processes for each participant should remain unchanged.

• Minimal involvement required from IT departments.

The FarmaTrust Supply Chain Exchange

The FarmaTrust platform is easy to integrate for companies with a large and highly competent IT department as well as those who do not have such resources, for example small non-chain pharmacies in developing countries with no point-of-sale (PoS) system.

It provides the ability for all parts of the supply chain to access the Blockchain and the pedigree of the drug packet. If there is any issue, the platform will flag the packet as suspicious.

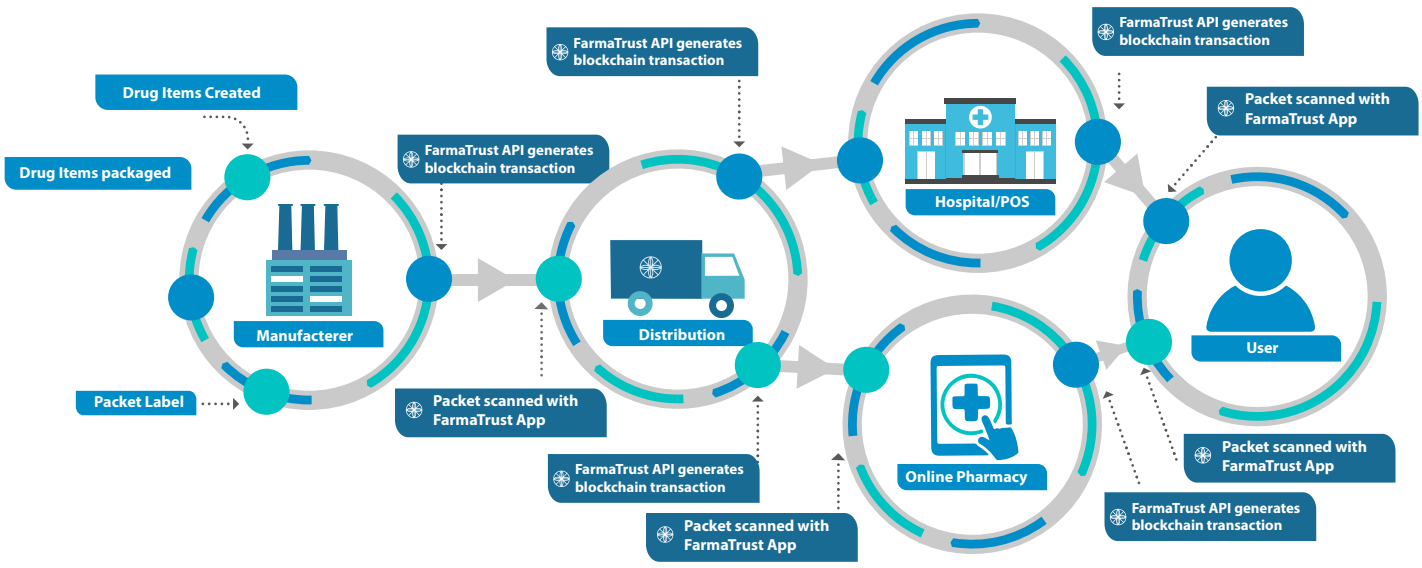


Figure 4 - FarmaTrust SCE process

To achieve the goal of maintaining a pedigree for each drug packet, the serialization is written to the blockchain. This is done in a very lightweight approach ensuring each actor in the supply chain does not have to change internal processes and systems.

1. The process begins with the manufacturer. After the drugs are packed, they are serialized and written to the manufacturer's supply chain system with the relevant and appropriate data.

2. At this point, drug packets are packed into lots and prepared for shipment.

3. The next downstream distributor is designated in the SCM system with the shipping logistics company. This designation along with the lot is written to the blockchain by the smart contract. This means the only one who can take ownership of this lot is the intended receiver.

4. When the lot gets received by the next distributor, they will scan the packets into their SCM system, which in turn will take ownership, via the smart contract on the Blockchain, designating it as the current owner of the lot and the packets within that lot.

Currently, each of the above points of the supply chain maintain their own supply chain management system, processes and levels of compliance. To add to the complexity, the pharma company is often unable to plan or predict the route the drugs will take.

It may start off with a primary distributor in the United Kingdom as one batch, and real-time inventory needs require batches to be split and distributed across multiple secondary distributors in different countries and compliance regimes.

Functional View

Utilizing blockchain technology, each entity within the supply chain merely needs to interface their supply chain management system into the FarmaTrust platform to authorize and communicate ownership transfer of pharmaceutical packets without the need for the various entities of the supply chain to coordinate or communicate directly or even know about each other.

Of course, two adjacent entities would need to authorize and accept packets from each other. The diagram below illustrates the blockchain application to FarmaTrust Supply Chain Exchange from a functional standpoint.

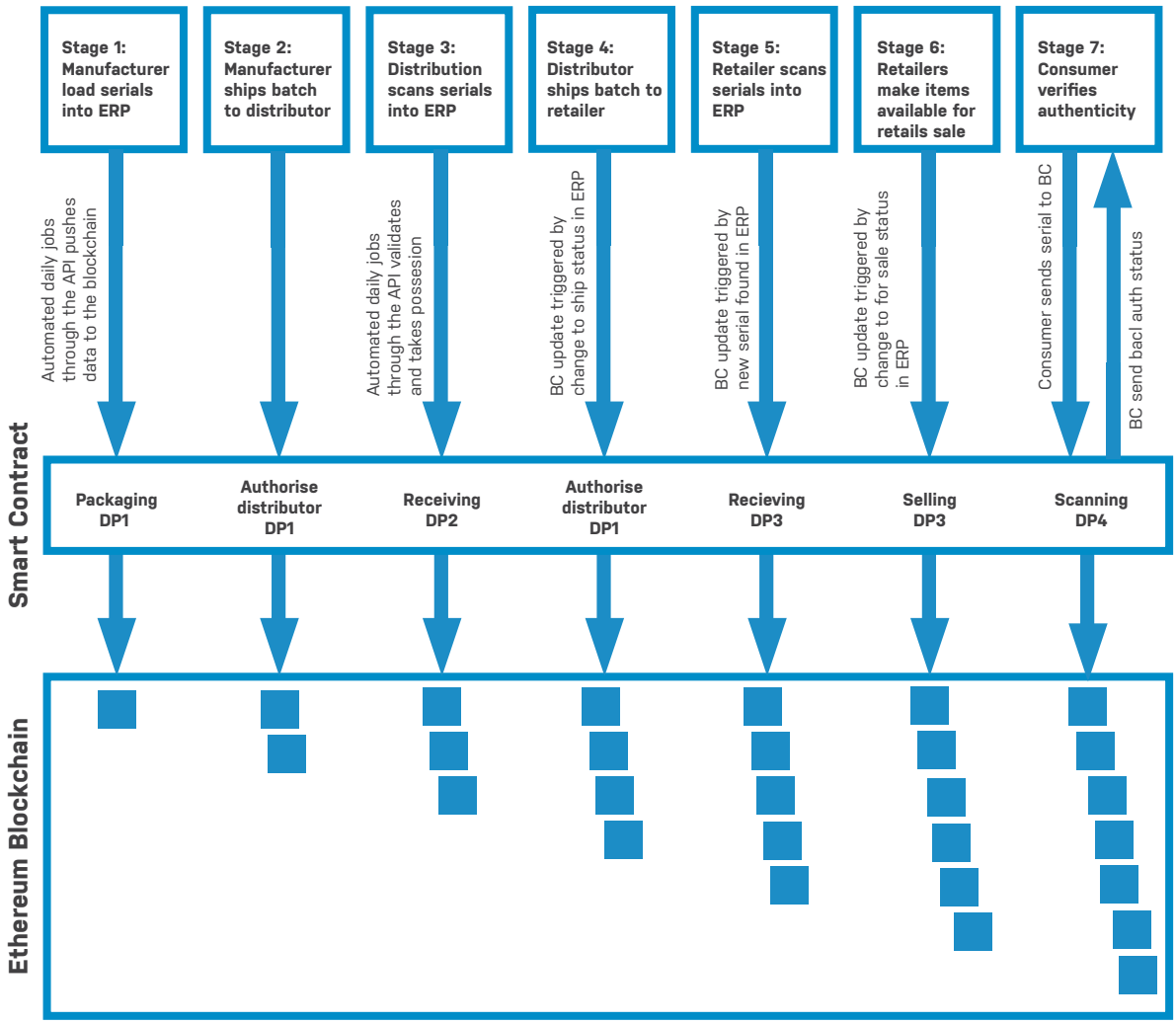


Figure 5 - Blockchain Transactions

FarmaTrust Architecture

In the FarmaTrust platform, user registers for access to a multi-signature (multisig) wallet with KYC characteristics. The user creates a shared account for multiple party access. Each user has a private key to authorize a transaction, 7 of 9 multi-sig capability will allow FarmaTrust platform to track the flow of tokens.

For example, Pharmacutical Company has the Holder token and provides a Utility token to each of the parties involved in the FarmaTrust Supply Chain Exchange (See FTC Token section). Our Zoi API is installed and hosted on our client's infrastructure. This API monitors the token flow and the transfer of ownership. This exchange is realized via API integration to the actor's ERP system which is used to record despatch and/or receipt of product from upstream and/or downstream partners.

The final step in the process is to allow the consumer to use our mobile app with a QR code scanner to verify the authenticity of the product.

Tracking of the packet is possible via a serialization process, and at its beginning the utility token is linked. At the end of the packet journey it expires. The diagram below illustrates the flow. Our packet tracking node monitors the inbound and outbound transaction during the token journey. Transactions are verified before being stored in DHT or IPFS and submitted to the Blockchain of any type.

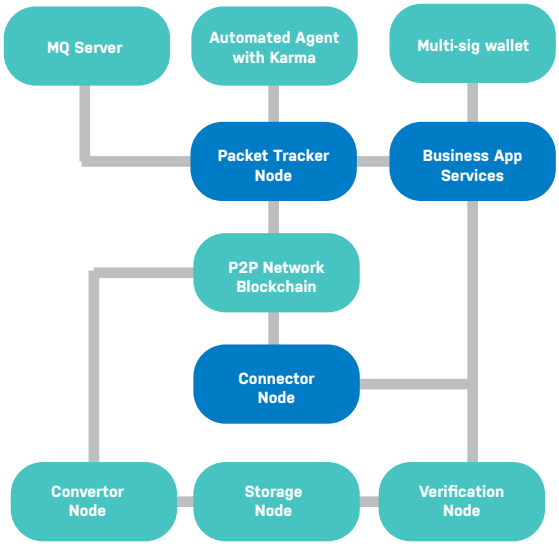


Figure 6 - FarmaTrust Architecture

Connector node and converter nodes enable interoperability with other blockchains. Automated apps used ML algorithms to optimize the distribution route and learn from the data insights to make dynamic decisions. We will use ML algorithms such as shortest path in various flavours to optimise routing paths and time, ensuring minimum cost for the route.

In Phase II, automated agents (with their own wallets) and developers can use tokens from these wallets for many different purposes. We have message queuing to provide scalable components and guaranteed data delivery. In Packet Tracker node, location of the asset is determined by data stored in blockchain and asset contract.

Benefits and Risks

The Benefits

FarmaTrust is a web-based, peer to peer platform designed to keep an immutable record of every legitimate drug ever produced. Using the Blockchain technology, it is at the forefront of preventing counterfeit drugs getting into the supply and therefore preventing death and suffering of patients, be it in the developed or the developing world. Further the use of AI and machine learning technologies also benefit commercial operations of the pharmaceutical industry, increasing efficiency and revenues.

(i) Product Benefits

FarmaTrust is a platform that is compatible with legacy systems, and can be configured to ensure compliance with a multitude of different regulatory regimes. It is hardware and software agnostic, and is available globally.

FarmaTrust:
- saves lives by providing a pedigree of the drug and trust in the manufacturer.
- saves lives by freeing previously locked-in data of users of a drug for R&D use.
- significantly reduces development costs (it uses existing technology).
- provides infrastructure infallibility - there is no central database.
- provides immutability - there is no central database and decentralized ledger.
- provides record integrity, and cannot be corrupted.
- provides potential for personalized medicine.
- is regulatory agnostic - multitude of configurations.
- increases efficiencies with artificial intelligence in the supply chain.
- facilitates on-line demand - goods can be check whether they are genuine.
- is global – this system works anywhere there is a connection to the internet either through landlines or 3G/4G/5G availability or through satellite technology.

(ii) Data Lead

FarmaTrust creates an immutable record of every drug that is created at the manufacturing stage. It then tracks the record through the supply cycle using current supply chain logistics.

The records are kept on a distributed ledger and certain details are encrypted therefore only available to FarmaTrust or the manufacturer/pharmaceutical company. Such immense and accurate data is enormously useful to pharmaceutical and industry logistics companies. FarmaTrust can utilize such data to assist in making the supply chain more efficient.

(iii) Ease of Use - SMS/ Voice Verification

A customer at a pharmacy has many options for checking whether a drug is genuine or not. We have looked at the developing countries, and although smartphone use is increasing, because of the costs involved, most people use the older type phones in the emerging markets.

If a user has a traditional phone, then she will be able to send a text with the label code to FarmaTrust short codes. She would then get an instantaneous reply confirming whether the drugs are genuine or not. As an alternative, we will also integrate voice support into our product, thereby ensuring that those with limited eyesight or education challenges (being illiterate) are also able to use the system.

For those with a smartphone, the user will simply use the FarmaTrust app, or take a picture of the label, and will receive an instantaneous reply as to the authenticity of the product.

(iv) Online Purchases

For those that are making purchases on-line, a similar process can be applied. However, since online stores can themselves be fake, we believe that a customer should be presented with the label of the product that he receives.

This can be done during the shipping process. AI will also assist in monitoring how many labels are checked at a given moment to ensure that the same label is not being used to sell counterfeit drugs.

When the customer receives the shipment, he can then check the product again by either using SMS or scanning the label to the FarmaTrust app.

(v) Artificial Intelligence

The FarmaTrust solution shall in time develop Artificial Intelligence (AI) capabilities which will be utilized by its customers. AI can analyze data to search for increasing efficiencies. We also believe that there are various additional modules which can be used for automatic re-routing of pharma supplies, automatic regulatory reporting and automatic audit requirements.

Automated apps with one or more machine learning algorithms and chatbots will assist our customers to make the right decisions when faced with unforeseen situations. The AI algorithms will utilised various forms of supervised and unsupervised machine learning techniques and will be designed to learn patterns over time.

Risks

Although we are aware of several traditional supply chain companies attempting to use cloud-based systems to solve the pharmaceutical SCM problems, we are not aware of any that are experimenting or implementing a system to the scale and sophistication of the system that we have.

There are also other Blockchain companies which are looking at proof-of-providence concepts, but none focus solely on the pharmaceutical industry in the way in which FarmaTrust is solving the problem. There are number of risks to the proposed system, but we have spent significant time developing solutions to counter them.

(i) Private or Public Blockchain?

There is a wide range of opinions in various industries as to how to implement Blockchains. Some participants, e.g. banks, have a preference for private blockchains, due to concerns about security of data and other related regulatory issues.

We believe that being clear about what data to collect and using 256-bit encryption for various elements of the datasets means that we can overcome any concerns about security and related issues.

(ii) Ethereum Price Fluctuations

Currently the price of Ethereum and the gas required for transaction on the Blockchain has significant fluctuations. As crypto-currencies become more mainstream and speculators reduce participation in the industry, prices may stabilize, and the Ethereum Foundation may also develop solutions to this problem. In any case, this is an issue which affects the whole industry and therefore, we believe in due course a proper solution will emerge.

(iii) Lack of Adoption by the Industry

The pharmaceutical industry is conservative. However, it needs to change just as the music or film industry; otherwise they will be disrupted by companies that embrace the new tech, as has been shown by iTunes, Amazon and eBay etc.

We believe the increase in number of pharmaceutical manufacturers and the abundance of Internet pharmacies means that there are more participants which will want to embrace new technologies which are more efficient and reduce costs.

Recent moves into the prescription industry by Amazon also demonstrate the need of solutions like the one provided by FarmaTrust.

FTC TOKEN

FarmaTrust requires utility tokens which are used to track the various items and drug packets through our platform as well as pay for tools and services provided by FarmaTrust.

FarmaTrust will also issue holder tokens whose symbol will be FTC.

FTC tokens are based on Ethereum ERC223 token standard. A total of 600 million FTC tokens out of 1 billion in total, will be available for sale. Each FTC creates utility tokens which are required to use the FarmaTrust platform and services.

Each FTC Holder token shall be priced as set out below. The purpose of this issuance is to finance the extension of the already working FarmaTrust blockchain system.

Proceeds of the FTC token distribution event will be used to fund FarmaTrust operations including development phases as set out in the roadmap.

The Token Distribution Event ('TDE') of FTC tokens and the corresponding token creation process is organized around smart contracts running on Ethereum. Participants willing to support the development of the FarmaTrust platform can do so by sending Ether to the designated address.

The supply of FTC tokens is fixed and therefore limited and non-inflationary. It is fractionally divisible. As described below, only a portion of the FTC supply will become liquid soon.

FTC units are fungible and transferable, and we expect to trade on a variety of cryptocurrency exchanges in exchange for Bitcoin, Ethereum and other coins.

Upon conclusion of the sale, the distributed FTC and the FTC withheld for the purposes of facilitating ongoing transactions will constitute the entirety of the available liquid supply. Therefore the supply of FTC tokens will be limited to the pool of tokens created during the token distribution event.

There is no token creation, minting or mining after this period.

Tokens will be transferable once the entire TDE is successfully completed. The TDE will follow a private pre-sale. The funds raised during the pre-sale will be used to expand the IT and development team as well as cover operational expenses for the main token distribution event, which will be completed by March/April 2018 unless otherwise extended or brought forward by the management.

Our cold storage solution ensures that we can recover all our tokens in case of any mishaps.

FarmaTrust Token Policy

Our token design is based on a Holder-Utility token model. We will issue Holder tokens (FTC) on the ERC223 token standard. Each FTC will operate as follows:

(i) The individual FTC Holder token will generate or mint 500 utility tokens per week upon creation and issuance. The number of utility tokens generated will increase by 10% from the initial quarter, and such increase in utility tokens continues for the period of 6.5 years.

(ii) Each utility token is required to track an individual medicine packet through the supply chain life cycle (there are billions of medicinal packets flowing through the supply chain).

(iii) The utility tokens will be "burnt" at the end of the route of the particular item, when it has reached its destination. The data created during the journey, will be stored on the blockchain available for those that wish to verify it. By doing so, the supply of the utility token depletes as the usage of the system increases. Therefore the minting process is required to maintain adequate supply.

(iv) On expiry after 6.5 years, the FTC Holder token will cease to generate new utility tokens (but will remain valid) until the FTC Holder token is either sold, or transferred to another wallet (this prevents hoarding and keeps liquidity in the system);

(v)The utility token generation is capped across all FTC Holder tokens to a full one year supply of generated utility tokens, if minting at the highest value which in this case would be 91,000 utility tokens.

(vi) On sale or transfer of the FTC Holder token, it resets and begins the process generating utility tokens again for tracking packets through the supply chain.

As noted above, since billions of packets flow through the supply chain, there needs to be sufficient supply of utility tokens to provide access to our platform and therefore require enough active FTC Holder tokens minting or generating such utility tokens.

As the popularity of our system grows, the demand for FTC Holder tokens increases, although the supply of FTC Holder tokens is limited to those made available during the TDE.

In addition to access the system, FTC tokens may be used to purchase FarmaTrust services including AI, machine learning, automated payments and regulatory reporting as well as other future services which are developed.

FarmaTrust TDE Plan

FarmaTrust plan to offer FTC tokens in various phases to ensure the most efficient distribution in the view of the management at the time of the TDE and having regard to the market conditions. With this in mind, the FarmaTrust management have decided to make tokens available in two phases.

Pre-Sale

Pre-sale will open on 15th of December 2017 and closes once all offered tokens are sold, or on a date before the TDE as determined and announced by FarmaTrust.

During the pre-sale, there will be a limited amount of tokens offered, the amount of tokens offered is 66,666,667 FTC.
The price of the token during pre-sale is set at ETH 0.00006522 per token, this is approximately a 40% discount on the price that is set for the TDE.

During the pre-sale only ETH is accepted. Upon application we will sent you a contribution address. There is a minimum contribution level set at ETH 25.

Those who wish to participate in the private pre-sale must email presale@farmatrust.com with their name, address and ETH amount. You will then be given instructions on how to participate.

Main TDE

Following the completion of the Pre-Sale, FarmaTrust, intend to hold a TDE commencing in the first week of March 2018. You will have to enter details on a whitelist as set out below.

The price of the token during the TDE is set at ETH 0.00010870 per token.

Only ETH is accepted. For the purpose of the TDE, FarmaTrust will first issue a Simple token, which will be convertible into a Holder token as described above. This is likely to be in Q4 2018, or such other time depending on the platform development and client base.

WhiteList

We have decided to create a whitelist to make the token sale a more fair process for those of you who believe in our vision the most.

Successful acceptance to the whitelist will guarantee you the ability to contribute a specific amount of ETH in the FTC sale. Whitelist approved participants will be able to contribute their specified amount of ETH during the whitelist contribution period.

Whitelist Application Process

The whitelist application process will run from 15th January 2018 12:00 UTC to 23rd February 2018 12:00 UTC (These dates are not final, but may be adjusted to the actual period as announced by FarmaTrust). The way it will work is as follows: To apply, you must fill in the whitelist form, which will ask for your email, address, ETH contribution address, and desired ETH contribution amount as well as any other relevant details.

Note: you will only be able to whitelist a specific amount; if you attempt to send a transaction with less Ether during the whitelist submission period, your transaction will be rejected.

Whitelist Submission Process

The whitelist submission process, as stated previously, will run before the token sale: from 15th January 2018 12:00 UTC to 23rd February 2018 12:00 UTC (unless otherwise amended by FarmaTrust). During this period, if you were a successful whitelist applicant, you will be able to send in the amount you specified in exchange for FTC. Please note the following:

1. There will be no gas amount or price limits for sending transactions; we do not want to spam the Ethereum network.

2. If you do not send the amount of ETH you specified in your application (e.g. you send too little or too much), your transaction may be rejected by the management (at their complete discretion).

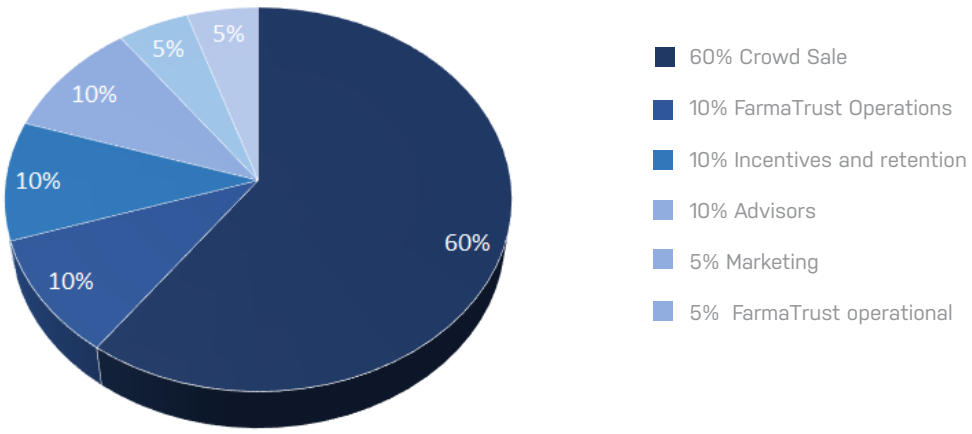
The contribution address will be available at https://farmatrust.com/wallet when the whitelist submission period starts. It will also be posted in announcement channel on slack and will be registered on Ethereum Naming Service. Please make sure you type in the link address yourself to avoid any kind of phishing attacks and validate the address from MULTIPLE sources.

The whitelist submission process, as stated previously, will run before the token sale: from 15th January 2018.* Please note that participation in the FarmaTrust token generation event means you are sponsoring the development of the FarmaTrust exchange platform. FarmaTrust does not and cannot promise any guaranteed returns for TDE participants.

* FTC token is not a security since it does not reflect the ownership of FarmaTrust holding legal entity. There are no fixed or reserved revenue payments by owning FarmaTrust tokens.

Token Distribution

Tokens will be distributed as follows:



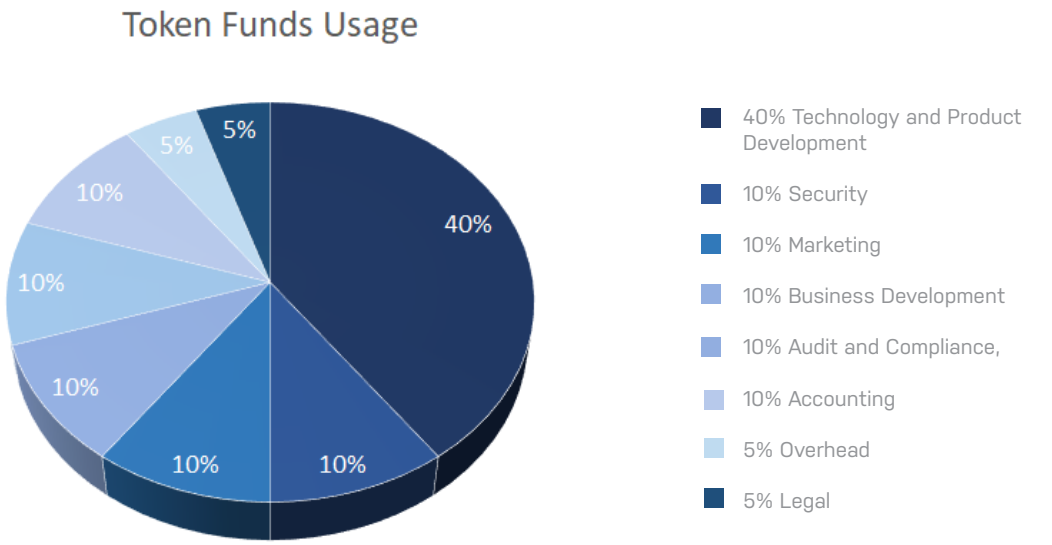
Farmatrust recognises that there is a high demand for developers, particularly in the blockchain and Artificial Intelligence sectors and therefore have decided to implement an incentive and retention policy.

Note: Management tokens will have **Lock In** periods. Management will only be able to access 5 % of the tokens after six months from the TDE and a further 5 % after 12 months from the TDE.

Any unsold tokens will be locked for a period of at least 1 year, with an annual release of 10% (of the initial value) to be offered via FarmaTrust. The tokens will be offered on a market rate +5% to prevent market value decrease. If the tokens are not bought at the offered price, they will return into the lock, upon the release of the next 10%.

Token Funds Usage

In terms of Token Funds Usage, all funds received from the token distribution event will be used for the development of the FarmaTrust platform to verify the authenticity and validity of the platform within pharmaceuticals and as well as purchases of AI and other services.



Conclusion

FarmaTrust is at the cusp of solving a huge problem that is affecting the international pharmaceutical industry. The FarmaTrust solution will make the world a safer, healthier and economically better place for everyone. FarmaTrust solves the problem in an optimal way that minimizes a burden on the industry and is easy to use.

The FarmaTrust solution currently has a working prototype. We are now at a point where we need to take it out of prototype and into trials and the wider public. Our next phase is to move to implementing the solution and working which pharmaceutical companies, the public and regulators.

We do not underestimate the effort required to work with regulators, the pharmaceutical industry and NGOs to ensure that our product will be widely adopted. Our goal is to make the supply chain more efficient, and thereby helping people, improving the quality of life as well as saving lives.

> **FarmaTrust solution will make the worlda safer, healthier and economically better place for everyone**

References

1. https://www.fda.gov/downloads/Drugs/DrugSafety/DrugIntegrityandSupplyChainSecurity/DrugSupplyChainSecurityAct/UCM464907.pdf)

2. https://www.reuters.com/article/us-customs-drugs/customs-group-to-fight-200-bln-bogus-drug-industry-idUSTRE65961U20100610

3. http://www.medicaldaily.com/global-problem-counterfeit-drugs-affects-even-legitimate-sources-such-hospitals-and-329914 April 2015

4. http://www.medicaldaily.com/global-problem-counterfeit-drugs-affects-even-legitimate-sources-such-hospitals-and-329914 April 2015

5. Associated Press, "China Seized 60,000 Piracy Suspects Last Year," ABC News, January 21, 2014

6.Dutch study International Journal of Clinical Practice http://www.who.int/bulletin/volumes/88/4/10-020410/en/

7. http://www.who.int/bulletin/volumes/88/4/10-020410/en

8. http://www.medicaldaily.com/global-problem-counterfeit-drugs-affects-even-legitimate-sources-such-hospitals-and-329914 April 2015

9. Bad Medicine", The Economist, Oct. 13, 2012

10. http://www.un.org/africarenewal/magazine/may-2013/counterfeit-drugs-raise-africa%E2%80%99s-temperature

11. https://en.wikipedia.org/wiki/Counterfeit_medications

12. https://en.wikipedia.org/wiki/Drug_Quality_and_Security_Act

13. https://www.fda.gov/downloads/regulatoryinformation/lawsenforcedbyfda/significantamendmentstothefdcact/fdasia/ucm363524.pdf

14. https://www.lilly.com/products/anti-counterfeiting

15. EAASM (2011), When is a medicine not a medicine?, online at http://www.eaasm.eu

16. http://www.economist.com/node/21564546 Bad Medicine

17. http://www.pmlive.com/pharma_news/the_global_scourge_of_counterfeit_medicines_1145731

18. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278171/

19. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4105729/

20. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4105729/

21. https://en.wikipedia.org/wiki/Counterfeit_medicines_online