The Compliance of Everything Network(COEN)

Using distributed ledgers to create a new standard of transparency

Version 1.4

EX FIDA BONA
The Compliance of Everything Network

Abstract

Regulations and their complexities are growing exponentially. While the internet and technology have made many things in life easier, regulatory compliance has not been one of them. One reason is that a few large companies control the information needed to achieve compliance, and these companies build paywalls to make it expensive to access this data.

What we are proposing is an incentive-based marketplace that connects those that need information to be compliant directly with the owners of that information to cut out the information broker as the middleman. This marketplace will be known as *The Compliance of Everything Network* (COEN)*.*

In this new technological world, the owner of information, such as a small business, can profit by publicly releasing information that others need instead of having to pay a large information bureau to update it for them.

On the other side of the marketplace an information inquirer, such as a large company performing due diligence on a supplier, can set a reward for information to be publicly released that it otherwise would not be able to access. This is all possible because of the advent of the blockchain.

Ex Fida Bona introduces a new cryptocurrency, Verit, that will be used to set the rewards and then pay marketplace participants who help provide new information.

In this whitepaper we will:

1. Introduce the proposed marketplace and its participants.
2. Discuss data structures that will help solve compliance complexity problems.

Note: COEN is using The P2P Marketplace Project as a framework to build this application. For a deeper understanding of the underlying technology please visit https://github.com/exfidabona/p2p-marketplace. Active research is under way, and new versions of this paper will appear at http://coen.io. For comments and suggestions, please email us at research@coen.io.

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Introduction

The Growing Regulatory Compliance Problem

Between 1949 and 2016, The U.S. Code of Federal Regulations grew from 19,335[1] to 178,277[2] pages -- not to mention the additional requirements imposed by third-party/NGO standards writers (ISO, UN, sustainability movements, etc.) and internally by corporations.

The accumulation of these regulations and the ever-growing cost to comply, has been quietly draining US GDP growth. A study by The Mercatus Center at George Mason University estimates that federal regulations have slowed economic growth by an average of 0.8% per year since 1980. Over that period of time the US economy would have grown 25% larger than we have today.[3]

With no end in sight to the expansion of regulations by state, federal, international and non-governmental agencies, we must rely on technology to help decrease the cost of compliance and continue to raise productivity and living standards.

The Compliance Industry Needs Blockchain

As technology has improved throughout the 20th and 21st centuries, tasks have become automated and we have been able to slowly eliminate human error in certain aspects of our lives. However, oversight has not been one of them, largely because technology remains centralized and controlled by corporations run by humans. That is until Satoshi Nakamoto invented a cryptographically secure peer-to-peer ledger called a blockchain, in order to create a completely decentralized and borderless currency called Bitcoin. The advent of this new technology allows for decentralized marketplaces for digital information to be developed.

What is a Blockchain?

A blockchain is an implementation of a distributed ledger that is built to maximize security of the data added to the ledger. It uses sequences of blocks linked together cryptographically to connect and secure the data in the network. By design it is very hard to edit a record once it is chained to the ledger.

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[1] http://www4.ncsu.edu/~jjseater/regulationandgrowth.pdf
[2] https://regulatorystudies.columbian.gwu.edu/reg-stats
[3] https://www.mercatus.org/publication/cumulative-cost-regulations

Security is enhanced by the requirement of a consensus agreement from a majority of the existing nodes to determine the order of blocks written to the blockchain. This majority consensus helps prevent rogue nodes from creating alternate states of the blockchain, which could lead to discrepancies on the data stored such as ledger balances. Consensus also helps prevent the blockchain from being hacked or fraudulently edited. In order to remove a block from the chain you must first remove every block added after it and reach consensus from the majority of nodes to approve your new chain.

Blockchains are a great data storage model for preserving digital data over time, as in the case of storing financial transaction records. In fact, the first use of a blockchain was for the ledger of the digital currency Bitcoin. Bitcoin uses a democratized consensus algorithm as described above.

Private and permissioned blockchains, called consortiums, have alternative algorithmic ways to come to consensus. When the blockchain writers are restricted only to trusted nodes, all that must be achieved is a simple majority vote by this subset of blockchain participants.

The Compliance Industry Should Move Toward Blockchains

It has become clear with a number of data breaches by Equifax, Target, and other corporations, that the opaque data models of old are no longer truly secure. However, storing business information remains a multi-billion dollar industry. So, why are we paying large information bureaus like Equifax to control it for us?

The answer is because they make us think they are necessary as trusted third parties. Maybe they used to be necessary as a protector of data accuracy. However, now with the proven ability of blockchain technologies to store data immutably, shouldn't we begin to embrace decentralization?

An Information Marketplace: The Compliance of Everything Network

COEN will be a decentralized peer-to-peer network, much like bitcoin, that relies on a series of hosts connected together in order to operate. Unlike the bitcoin network, COEN will not just be a ledger recording exchange of value transactions. It will be a fully operational information marketplace that has multiple players with multiple roles.

The native currency on the network will be the Verit Token. Verit will be the only currency accepted to initiate new compliance results on the network.

The Marketplace Participants

The Information Inquirer

The demand side of the marketplace within the network is the need for updated compliance results. Whether it is part of a due-diligence process or because of regulatory monitoring requirements, companies and regulators need new and up-to-date information.

As modeled in the P2P Marketplace Place, an information inquirer submits a request or bounty for information to the bidding system smart contract along with a bid amount they are willing to pay for that information. The bid price needs to be higher than the minimum amount set for the network or an error will be thrown.
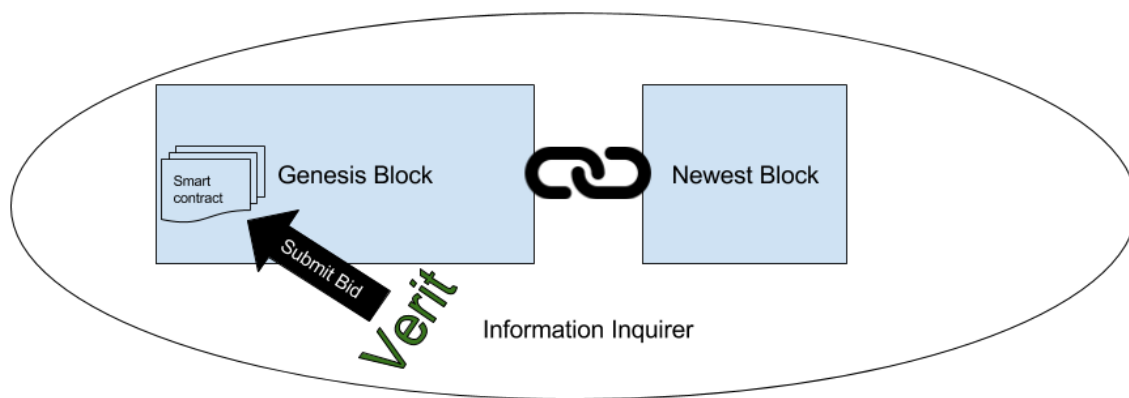

Figure 1: Submitting a Bid for New Information

The Information Provider

On the supply side of the marketplace will be users watching for information bids and responding with information when they can provide it. They will package the information along with a digital proof-of-existence from a third party service such as Factom[4] and send a response transaction back to the bidding system smart contract on the network.

The information provider will have the original bid deposited in their wallet once the consensus process is completed and the transaction is written onto the blockchain. The model COEN will be using for consensus is called proof-of-merit and is detailed in the P2P Marketplace Project white paper[5].

The information providers are anonymous and could theoretically be anyone ranging from a company wanting to monetize its own information, to internet investigators who uncover information.

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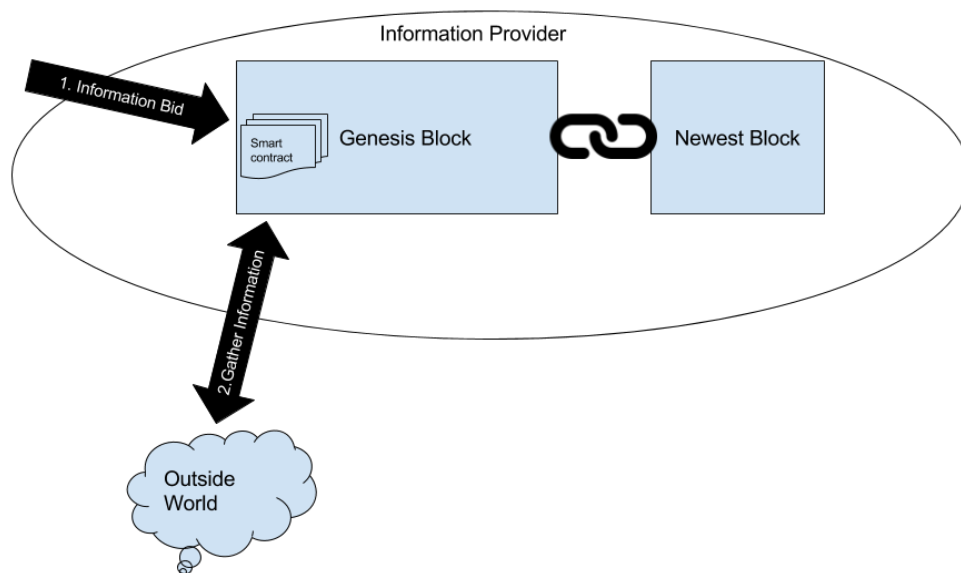
[4] https://www.factom.com/about/faqs
[5]
https://github.com/exfidabona/p2p-marketplace-docs/blob/master/P2P_Marketplace_Project_Whitepaper_v0.1.pdf

Figure 2: Gathering the Information

Information Authenticators

In the P2P Marketplace Project Framework, the special nodes charged with authenticating the information coming through the network are called Validators. On Coen, Validators will be non-anonymous corporations tasked with making sure all data being used in the system by the compliance checklists is truthful, accurate and is verifiable.

Validator nodes access keys will be granted special privileges to vote in the proof-of-merit consensus process.

The validators' main job within the network is to independently verify and authenticate the data, that gets submitted by information providers. In order to do this, validators are tasked with verifying the proof-of-existence information provided by the information provider along with their submission.

Validators also participate in the voting process to decide which block will be the next added to the chain. Once all the transactions inside a block are validated, and a majority of the Validators vote their approval for the block, then the block gets written to the blockchain and the rest of the peers on the network get updated as well. Upon creation of the new block, the Validator will receive the mining reward that gets created along with the block creation.
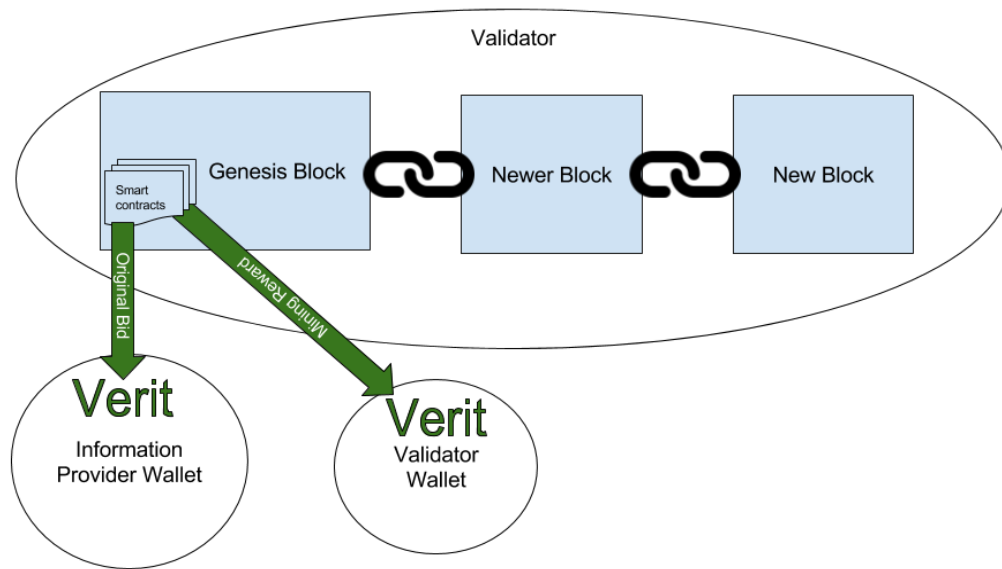
Figure 4: Paying the Bid and Mining Reward After Block Creation

Adding and Recruiting Validators

Initially we will invite all existing and trusted information companies to participate as non-anonymous validators. As the network grows, it is our goal to allow any global corporation to participate as a validator, as long as they agree to follow the transparent processes put in place.

The Peer-to-Peer(P2P) Network Hosts

All decentralized peer-to-peer networks rely on hosts from all over the world to download the software and run the network on their own computers or servers. All of the participants defined will be peer-to-peer hosts and hold their own local copy of the network data. Similar to other peer-to-peer networks like BitTorrent and Bitcoin, the communication between all of the nodes will make up the network, and there will be no central repository. Downloading a local copy of the network and running it will be open to anyone who wants to participate. These users can choose to participate in the bidding system or just be an observer of the network. Network observers are helpful such that

they can be a watchdog for network integrity by the other plays and they also add more data redundancy which strengthens the network as a whole.

The Network Steward

In this new world of decentralization, we face a unique challenge of enforcing law and order solely through incentive instead of through dictum. This model has proven to work so far in other blockchain networks, but blockchain use cases are still in their infancy, and we do not know if they will be able to survive the test of time if network incentives stop aligning with an efficient and operational network. Some threats to network performance are:

1. Finite limit to the obtainable rewards from the system by setting a hard cap on the token supply.

2. Inflation of the utility of the given reward such that it no longer holds economic incentive to participate.

3. Hostile takeover of the network that destroys the integrity of the utility.

Our solution to these potential problems is to create a market-incentivized entity whose scope of power is limited, and which has a mandate to configure and adjust the incentives on the network in order to maintain a competitive and efficient market.

We call this entity a network steward. The steward will be required to provide transparency, and the mandate will be written into the laws of governance upon the formation of the entity. The network steward will have defined parameter ranges from which it can configure network variables, with the set goal to minimize human influence.

The network steward's cryptographic signature will be granted special configuration adjustment capabilities within the network's application chaincode contracts. The identity of the network steward will be established in the genesis block (first block) of the blockchain by defining the public portion of their cryptographic key.

The Steward's Mandate

The steward's governance mandate will state that it must act only to maintain a competitive and efficient network marketplace for all the necessary participants in the system as well as remain free from participating in other profitable roles on the network.

In order to align with the overall ethos of the network's governance, the steward will be given a profit incentive to ensure a highly functioning network.

We can achieve this by granting the steward a 3% transaction fee of all profits earned on the network by other participants. The share of profits from each contributor properly incentivizes the steward to ensure that all parties remain profitable, without necessitating giving preferential treatment to certain players.

A Solution to The Compliance Complexity Problem

An information inquirer may just want a single piece of information, but in the real world an inquirer usually needs multiple pieces of information that tie together to be provided when going through their due diligence process. Ideally this added complexity can be logically ordered and combined such that it can output a single binary result.

Our solution to this complexity problem is to order the information into a multi-layered checklist and give each layer a logical AND or OR designation such that the entire checklist can output a binary result. Under the hood, these checklists will be represented in a data structure called a tree[6].

Checklists: The Logical Formatting of Data

The checklist object will be a configurable and definable set of logic rules. A checklist gives a binary compliance output when data in the system is applied to it. The other objects described below are either data points or connections to the data that are used to fill in a given checklist.

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[6] https://en.wikipedia.org/wiki/Tree_(data_structure)

Checklist About Company ABC

Event A happened in last 24 months

AND

Event B has not happened in the past 6 months

OR

TRUE

Event C happened in last 7 days
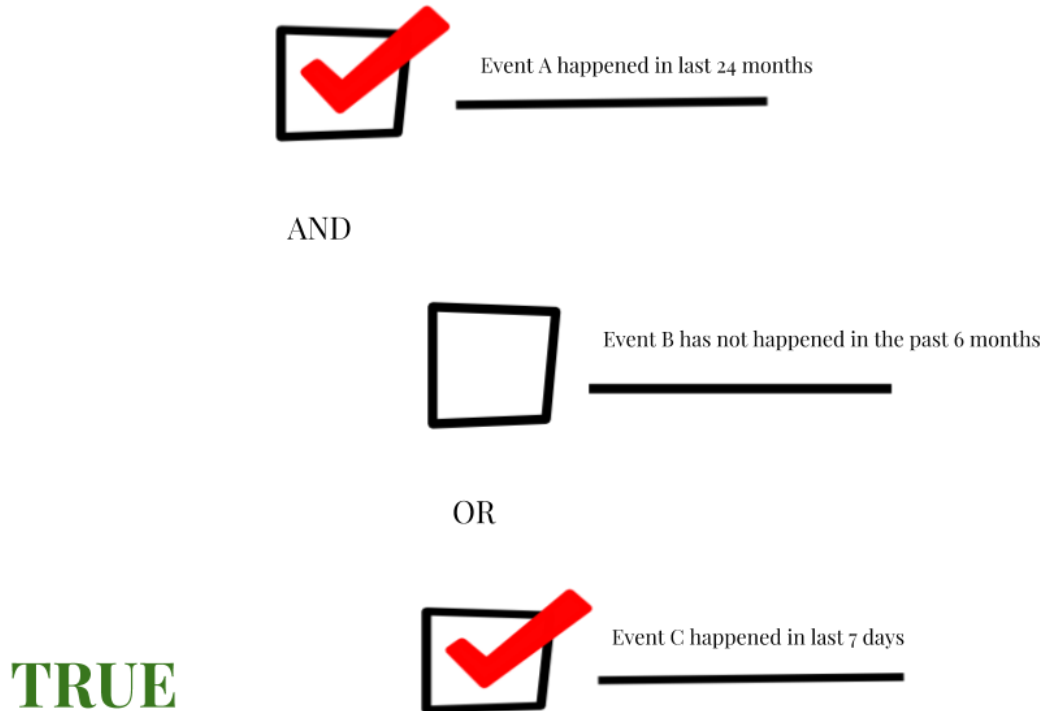
Figure 5: Example of a Checklist Applied to Company ABC

The Tree Data Structure

A checklist is a set of logically formatted compliance rules. These checklist rules are stored in a tree structure. The logic stored in the tree works as follows:

- Each node in the tree holds either other nodes or a single boolean equation.
- Every node is designated with a logical AND or an OR
- Every node must eventually descend to a boolean equation.
- When each boolean equation in the tree is evaluated, the tree logic can then be walked back up to the root, which will hold the overall boolean result.
- Each boolean equation is connected to a finite piece of information called an event.
- The query returns a count number, and that number is then compared to a predefined number using an operator (greater than, less than, equal to).
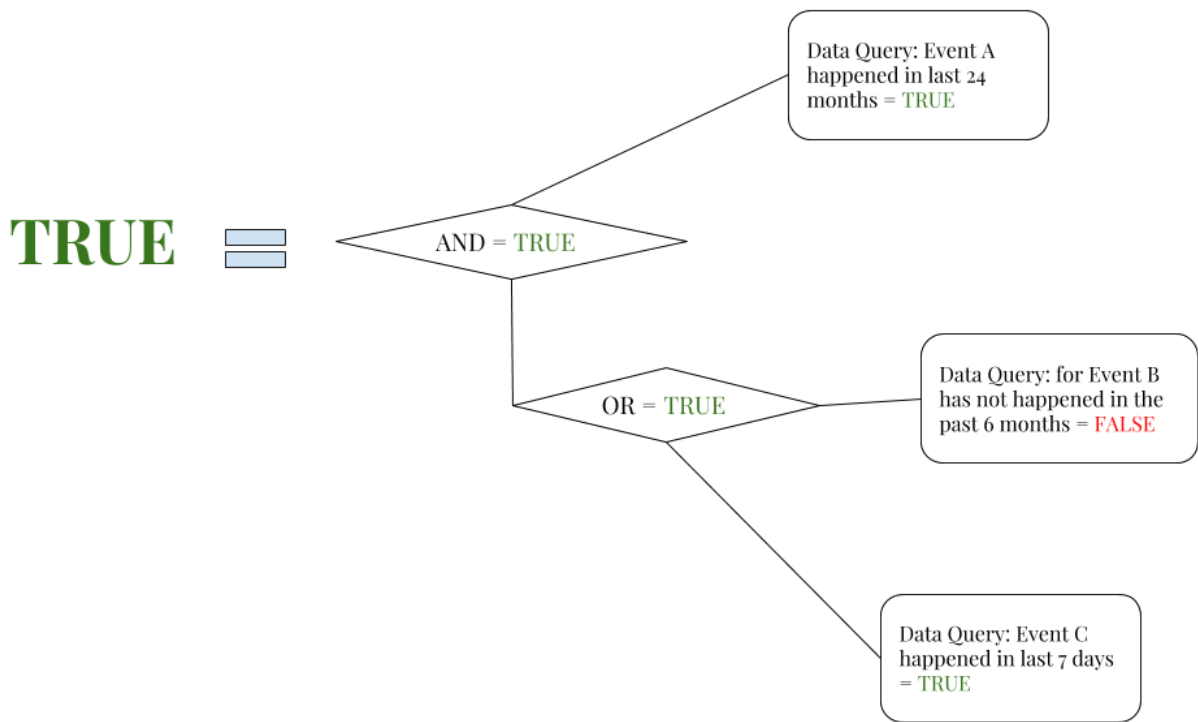
Figure 6: Tree Representation of Checklist

The Verit Token

The Verit Token and its economy will be different from the mined tokens that have preceded it, such as bitcoin and ether. First and foremost, the velocity and supply of the token will be adjustable by a third party with a mandate to keep the incentive system functional. Secondly, the mining of Verit is closely tied to the verification of information, so the validation process is more complex and requires a separate role from the peer-to-peer hosts.

Token Usage

The inherent utility of Verit is that it is both the currency used to bid on information in the marketplace and the reward that gets mined and earned by the Validators that make the network operational.

Gas Cost

Gas costs were first introduced by Ethereum in order to compensate their network hosts for the energy they expend to execute contracts and add new blocks to their chain. The general idea is that the hosts of the network can at least break even on their costs to run the network even when they do not win the mining reward.

COEN will also have gas costs, but there will be some subtle differences in how they work compared to Ethereum. COEN gas costs will have an additional cost added to the ethereum byte cost calculation to account for the manual labor necessary for information authentication on the network. This additional cost will be variable and set by price controls instead of through bids in the market. A special participant in the network, called the Network Steward, will be charged with adjusting the system wide cost control variables in order to incentivize and maintain good behavior by all participants.

The gas cost price control variable that can be adjusted will be designed to loosely represent global median labor costs. Current global labor costs will be used as a gauge for the Steward to make adjustments to the coefficient variable.

$$Normal\ Gas\ Cost\ =\ Bytes\ *\ Gas\ Price$$
$$Labor\ Based\ Gas\ Cost\ =\ Labor\ Coefficient\ *\ Number\ of\ Verifications\ Required$$
$$Total\ Gas\ Cost\ =\ Normal\ Gas\ Cost\ +\ Labor\ Based\ Gas\ Cost$$

Recommended Bid Price

New compliance results on the network will be dependent upon bringing fresh data into the network. In order to acquire up-to-date checklist data, a buyer must pay Verit into the network for the information to be gathered and used to calculate the new result. This will happen through a bidding marketplace, with a buyer who submits a bid price and data creators who accept the bids offered and then go out and find the information. Each bid has to at a minimum be higher than the total gas cost it will take to complete the full transaction. The network will keep track of accepted bid prices and set a recommended bid price in the main contract for the buyer to use as a price gauge before submitting a new bid of their own.

Token Supply

- An initial supply of **30,000,000** coins will be created in the genesis block by the steward.
- **25%** or 7,500,000 will be pre-sold through a SAFT agreement[7] with accredited investors to fund the development of COEN.

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[7] SAFT Whitepaper - http://www.saft-project.com/static/SAFT-Project-Whitepaper.pdf

- **15%** or 4,500,000 will be held by the steward for future token supply and velocity purposes.
- **60%** or 18,000,000 will be sold upon the launch of the network to the general public in order to begin creating bounties for new information.

The Mining Reward

Similar to mining in ethereum Validators will receive a mining reward every time a new block is generated. The amount of the reward for any given block is a variable set and controlled by the steward as a means to keep the network competitive.

Inflation and Deflation Prevention

Similar to ether, and unlike bitcoin there will not be a cap on the number of total coins created. The most important goal of the token supply is to make sure that there are always enough tokens in circulation to meet the request demands of the network.

Therefore velocity of the tokens (similar to velocity of money in economics) and current spendable token supply in circulation (similar to m0 and m1 money supplies with government controlled currencies) will have to be measured and published by the network steward as performance stats.

We envision the incentive system to be the key driver of network productivity. Therefore we aim to never cap our reward system. However, to ensure that the price of Verit remains high enough to be a valuable incentive, as well as a preventive measure against runaway inflation, it will be the job of the steward to buy back or take a portion of the tokens out of supply and put them into cold storage. They can then be sold back into the market or used to boost demand when velocity and token supply drop again.

Ex Fida Bona Software

The company charged with bringing this public ledger into existence will be Ex Fida Bona Software. Ex Fida Bona, meaning "in good faith" in Latin, will become operational and begin development of COEN upon completion of the pre-sale phase of the Verit Initial Coin Offering

(ICO). Ex Fida Bona will be dually charged with bringing the network to life and then playing the role of network steward upon network launch.

Role As Network Steward

The network is a sum of its participants. Each role must be filled, in order for the network to remain healthy and operational. The critical role of network steward, whose responsibilities are described in detail in the Players section above, will be filled by Ex Fida Bona. A key responsibility of Ex Fida Bona as steward will be to adjust compensation factors in order to incentivize network participation, which is essential for all roles in the network to flourish.

In COEN, the need for updated compliance results is the demand driver, and the new token offered during our ICO, Verit, is the medium of exchange. With Verit as the energy source that drives the gamification of the network, fair Verit compensation of each role is essential to maintain network viability.

Ex Fida Bona's job as steward will be to find the optimum amount of Verit for all participants to fill the roles with qualified, efficient, competitive players who feel rewarded and want to continue to contribute.

In order to ensure that each role is properly compensated, Ex Fida Bona as steward must operate as an independent entity overseeing fair, market-oriented compensation on the network. Every action taken by the steward will be published publicly, ensuring complete transparency and accountability. The steward itself must be incentivized to act impartially with the overall health of the network as its primary goal.

Ex Bona Fida as Network Steward: For-Profit vs. Nonprofit

As a traditional 501(c) non-profit organization, the network steward would be required to solicit outside fundraising every year in order to remain operationally solvent and take operational direction from a board of directors.

A better model is to create a *low profit limited liability company*(L3C)[8] or *benefit corporation*(B-Corp)[9], whose mission statement is to create and steward a decentralized network to optimize for the operational efficiency, promulgation, and transparency of the network.

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[8] https://en.wikipedia.org/wiki/Low-profit_limited_liability_company
[9] https://en.wikipedia.org/wiki/Benefit_corporation

This special designation would require a higher standard of accountability and transparency than a normal for-profit corporation. It would also ensure that the steward's interests remain focused on profiting from the health of the system and its participants' performance. Profit motive built into the network through gamification, combined with an altruistic mission, is a more powerful and sustainable force against corruption than pure altruism alone.

Team Members

- **Ed James, CEO**
  Ed is a graduate of Pennsylvania State University with a Bachelor of Science in Computer Science. Ed is currently the CTO of Trust Exchange, which is a B2B information social network that uses its information to automate compliance regulatory burdens. In the past Ed has worked in the financial sector, for Citigroup, specializing in foreign payments, communication protocols, and outside vendor systems risk analysis.
  https://www.linkedin.com/in/edthefifth/

Responsibilities as Steward

Play market maker and adjust the values of network variables. The network variables will be defined and set in a smart contract. The configurable network variables will be gas cost, recommended bid price, mining reward and an array of active validator public keys. Change requests to the smart contract variables will only be accepted if signed by the network steward and the parameters are within the predefined minimum and maximum values.

Monitor network performance and active members. Making sure the system is functionally operational is an explicit duty of the steward's mandate. This can be achieved by monitoring the number of host nodes, validation nodes, total token supply, and velocity of token usage. There will also be metrics that can be extracted directly from the blockchain data. For instance the accuracy of a validator can be determined by retroactively inspecting and independently rerunning all of the the verifications that a validator has ever signed.

Gatekeeper for Validators. The steward can be the second signatory in the proof-of-merit consensus process, but cannot be the original validator of data and earn that portion of the mining reward. The steward will also be the only node permissible to approve and create new validator nodes for the network.

Control the Data Formats. Data submitted for Subjects and events about Subjects will be submitted by data creators. However, which "things" are permitted, as well which event types for each Subject and the structure of those event types will need to be updated by the steward. A

similar process will be in place for checklists and the structure of each checklist. Eventually, this process will be streamlined and open-sourced, but in the introductory phase, all of this data pertaining to system structure will be stored off of the blockchain, and participants will not be rewarded for updating it.

Create a user friendly experience. Interacting with a blockchain directly can be a confusing experience for non-technical users who are not used to interacting with computer terminals. Therefore the steward will need to create an abstraction layer between the blockchain network and the users so that the system is easier to use. The first step in the process will be to create a cache of the data and a web application.

The Ex Fida Bona Web Application

The web application will be a dynamic internet application that uses the data from the ledgers as its models focus around "things", its events and instantiated checklists. "Things" will be individually indexed by elasticsearch for added usability. The ledger data will be cached in the application in order to optimize read performance.

All of the pages will be completely public, however there will be an option to sign in so that users can easily attach their Verit wallet and make bids directly.

Publishing of Network Stats

In addition to the ledger data, there will also be a metrics monitoring database that stores and observes the network performance. This will help the development and operations teams to ensure a working network. This also provides an opportunity for public transparency of performance by including the real time performance metrics on a dashboard within the web application.

Caching Ledger Data for Faster Consumption

Ex Fida Bona, will use mongodb to recreate a cached version of the blockchain and periodically poll the network for new data.

A User Friendly Experience

Distributed Ledger Technology provides us with a lot of new distributed security features that have never been possible before. However, the interfaces for the technology are simple and not very user friendly. In order to help everyone of all technical skillsets access our app data, it is paramount that we create a modern display experience for our users to consume and interact with the network.

Potential for Additional Incentives

Outside of the network, the steward will keep track of validator accuracy stores. In the future they may pay out special accuracy bonuses to high performers if it is necessary to help better create a competitive equilibrium.

Roadmap

Throughout the development process, Ex Fida Bona will take every precaution to ensure a successful and error free deployment. Currently smart contracts are not safeguarded nor are they easy to re-deploy if mistakes are made. Without an existing best practice for a deployment protocol of decentralized projects, we will create our own standard to follow.

First, all contracts and ledgers will be tested and run through a simulation. The simulation will be recorded and published on our blog. Secondly we will run security tests and have the network and contracts audited for potential vulnerabilities. Once both checkpoints have been met, the phase can be deployed in the non-test production environment.

Phase 1A: Begin Development on The P2P Marketplace Project

Before COEN can exist, the Ex Fida Bona team must develop the framework. This framework won't only aid the release and ICO of COEN, it will also aid the company to release future products in the information space and launch new coin offerings. The goal of the framework is to make creating an cryptocurrency driven marketplace plug and play.

Phase 1B: Raise Seed Funding

While building the framework we aim to secure the funding necessary to hire a team to accelerate develop the network, as well a cover administrative costs such as legal and accounting. This could either done be through a SAFT future token sale agreement or a traditional SAFE future equity sale agreement.

Phase 2: Recruit Data Partners

Before any part of the network can go live we will need validators and data creators lined up to help seed the network with data. We will need to launch a partnership campaign in order to achieve this.

Phase 3: Launch the Network

Once the blockchain is ready to be deployed, the first thing to happen will be the creation of a genesis block with the smart contracts defining the consensus, currency and business logic rules. This genesis block will also define the network steward accounts and deposit in them the initial supply of tokens. The steward can then begin transacting the promised tokens to all of the SAFT holders and then will take the rest of the coins out of circulation and put in it cold storage.

Phase 5: Seeding the Network with an Initial Set of Data

In this phase the network will only be to initial validators helping us test and seed the network with relevant data.

During this phase we will also need a first version of the metric monitoring tools and interface.

Phase 6: Launch of the Full Network and the ICO

This phase will launch the network to the public. The steward will turn on marketplace bidding and allow Validators to begin authenticating information being submitted. This phase will also coincide with a public offering of Verit to be used to submit bids on the network.

Phase 7: Release Ex Fida Bona Web Application

Once the data is in place and the network is fully operational, we can begin building the web application that will cache the data in a normal database and present it in a more user friendly format.

Offering

- Ex Fida Bona will be looking to raise between $2-$5 million in SAFT agreements and see funding from accredited investors.
- Additionally Ex Fida Bona will be targeting between $100-$200 million dollars in proceeds from the sale of functional utility tokens to the public that will come soon after the official launch of the network.

Use of Funds

- **70% Ex Fida Bona Team.** This will account for the salaries of the team, which will need new engineers a project manager on the development side. Plus two business development hires and marketing director to help build and manage partner relationships necessary for the operation of the network.
- **10% Administrative Costs.** This includes legal, accounting and security costs related to the offering as well other related administrative costs. This also includes an estimate of office space costs.
- **7% Contractors.** This includes outsourcing visual creative work to publish simulations of our network progress, as well as hiring a PR firm for public and media relations.
- **13% Contingency.** This portion will be held by the company to account for unexpected costs. Similar to social networks, we expect a time period between the launch of the network and the point of usefulness. During this time period we will need extra funds to make sure we can seed the network until it is fully functioning to maximize the success of a token sale.