The Compliance of Everything Network(COEN)

Using distributed ledgers to create a new standard of transparency

Ex Fida Bona

Version 1.3

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 in the middle. 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 have access too. 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.
2. Discuss data structures that will help solve compliance complexity problems.
3. Propose a new cryptocurrency that builds upon existing ideas.

Note: COEN is a work in progress. Active research is under way, and new versions of this paper will appear at https://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.

Blockchains and Distributed Ledgers

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 such as COEN 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 in the 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 reaches 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 in order to reach consensus is to validate the identity and permissions of the node that wrote the new entry.

Smart Contracts

A smart contract is a computer protocol that functions as a self-enforcing agreement, executed as computer code to aid in the exchange of tangible objects in a very transparent manner.

The first implementation of smart contracts is on the Ethereum Network, which is a blockchain network with a currency similar to Bitcoin. However, the Ethereum blockchain nodes have the additional capability of executing code. This allows for the logic for a contract to be coded into a block and executed when the conditions are met.

A smart contract can also function as an entry point for requests to initiate tasks on a network.

An Information Marketplace: The Compliance of Everything Network

We are at the dawn of a new technological era, where security can no longer be an excuse for lack of transparency. In fact, it has become clear with countless data breaches by Equifax, Target, and others, that very lack of transparency and single point of failure of the old models creates the very opportunity for hackers and other nefarious actors along with an extremely high

cost of compliance efforts. Transparency itself creates redundancy and resiliency, and will become the center of risk management in the 21st century. Building upon distributed ledger technologies originally developed for Bitcoin, the COEN network described in this white paper brings us to a new phase in democratizing information, by engaging everyone in adding compliance data of any type to a public ledger, and enabling anyone to verify and exchange this data.

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

The Marketplace Participants

The Peer-to-Peer(P2P) 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. Our software will be downloadable from our github page upon its release and will be configurable just by enabling a Verit wallet. 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. Unlike those other peer-to-peer networks, COEN will have special nodes that have special permissioned functions within the network, controlled in the network smart contracts.

The node holders who do not have special permissions will function as the peer-to-peer hosts. It will be their job to run a node of the network which enables them to accept bid requests, communicate with others on the network and execute smart contracts.

The hosts will be compensated by receiving gas costs for the requests they accept, as well as receiving a portion of the mining reward for new data that they help verify and write to the blockchain.

The Compliance Information Bidders

The demand side of the marketplace within the network is the need for updated compliance results and the process of refreshing the data upon which the results are built. 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.

An external compliance request will start by having a user send a bid amount as a request, similar to an API call, asking for the update of a specific compliance result. These results are to be calculated by querying data about an object and combining the results into a logical checklist. This checklist will be designed to represent an orderly way for solving a compliance problem. These objects as referred to as “things”, and they are any object that can be evaluated by a checklist. Some examples of these “things” would be companies, buildings and transportation vehicles.

A recommended bid price, calculated from recent bid prices on the network, is stored as a variable on the network and is available upon request for users as a measuring stick for their bids. This price will always be higher than the cost required by other participants to perform the transactional tasks on the network. The difference between the accepted bid and that network cost, also referred to as a gas cost, will be set as the reward amount for the acquisition of new data necessary for the updated information.

If any updated data differs from the most recent result written on the blockchain, then the network host will pass the request on to a validator for verification of the new data. Alternatively, If the data is unchanged and no new information is found, only the mining gas cost will be lost. The rest will be refunded back to the bidder. When no new compliance results are found, nothing will be written to the blockchain and therefore the reward will go unearned.

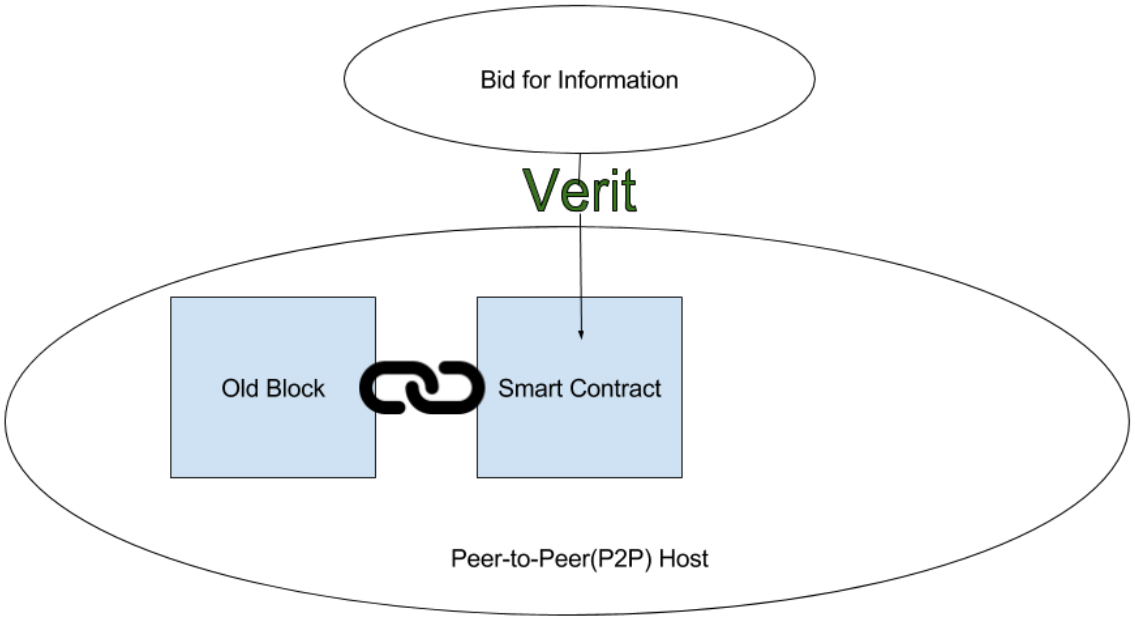

Figure 1: Sending a Request for New Information

The Data Creators

On the supply end of the marketplace will be users submitting data that make the checklists actionable. This task will be charged to a separate group of users called data creators. The job of a data creator is to send a request with new data into the system.

The data will only be accepted if it is relevant to checklists on the network. For every piece of data that is submitted, accepted and verified, the submitter receives a reward in Verit from the network mining process. Additionally, if there is a bounty for the piece of information provided, the user will receive additional funds allocated from a request.

Event creators who submit data to the network miners have to pay a gas cost in Verit along with it. If that data is verified and written to a ledger, then that event creator receives this gas cost back plus a percentage of the mining reward from the newly created tokens. This pay-to-win model is designed to reinforce that the system only wants accurate data that can be verified.

Data creators will be anonymous and could theoretically be anyone ranging from a company wanting to monetize its own information, to internet investigators who uncover information.

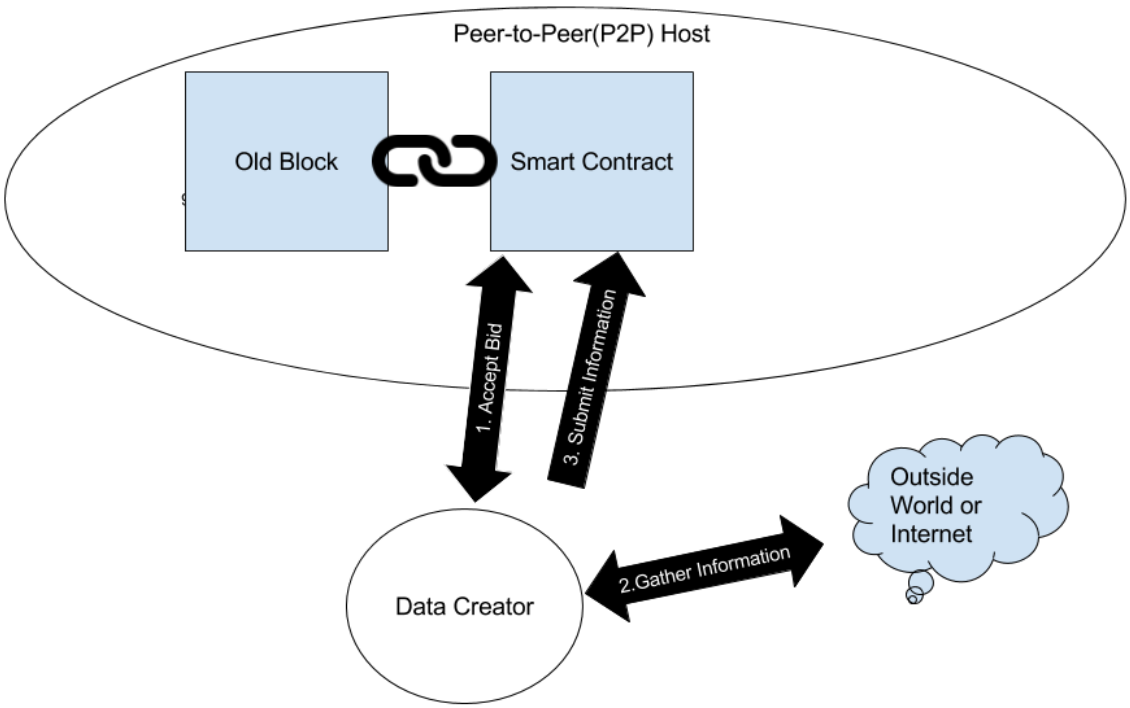

Figure 2: Accepting a Bid and Gathering the Information

The Validators

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 can also be re-verified by others.

Validators will be provided with special nodes that they will be required to host and also have an authorized set of cryptographic keys. Once a validator is up and running, they will be able to work on data queued for verification.

The validators' main job within the network is to independently verify the data, which will be submitted to the network by the data-creator participants. In order to properly verify the data, the validator will need to follow a specifically designed transparent and purposely repeatable validation process. Once the validator verifies and puts its cryptographic stamp of approval on the data via our proof of merit algorithm (see the full explanation below in the token section), it will be written into the transaction and the repeatable verification steps will be appended to the body of the message. When the validator's block is written onto the blockchain, they will receive the largest portion of the mining reward.

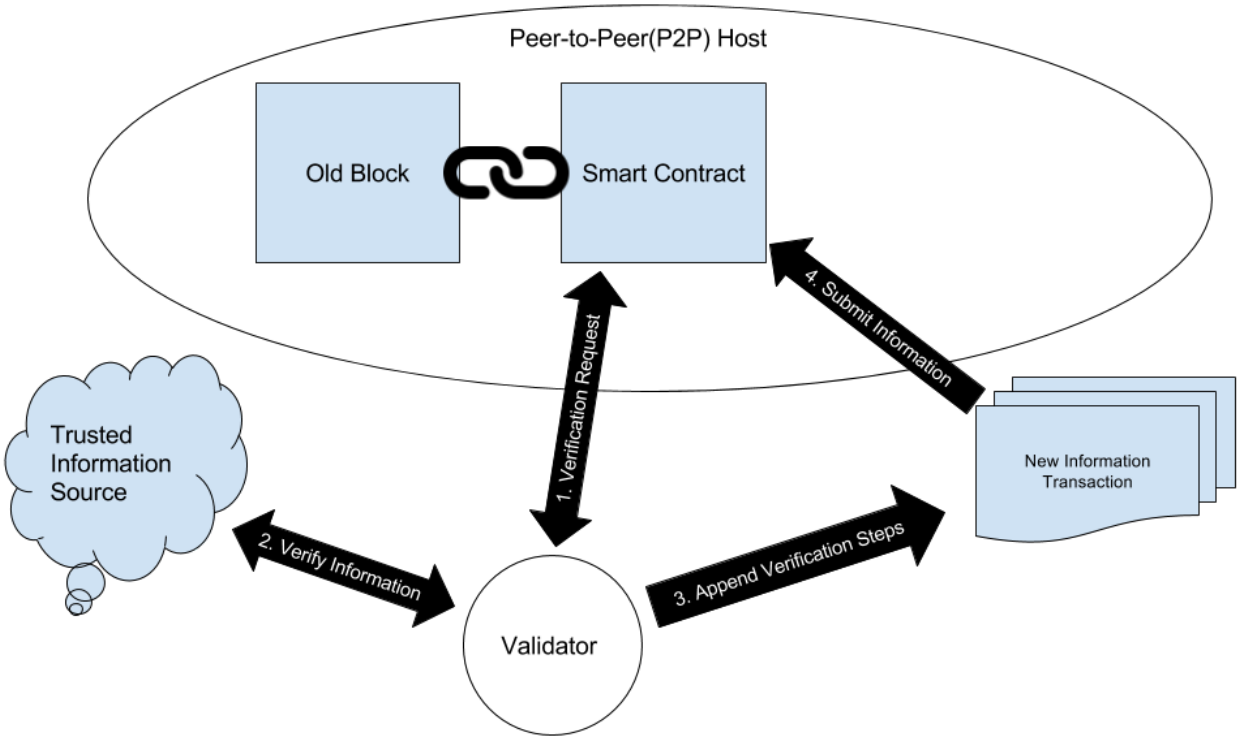

Figure 3: Verifying the Information

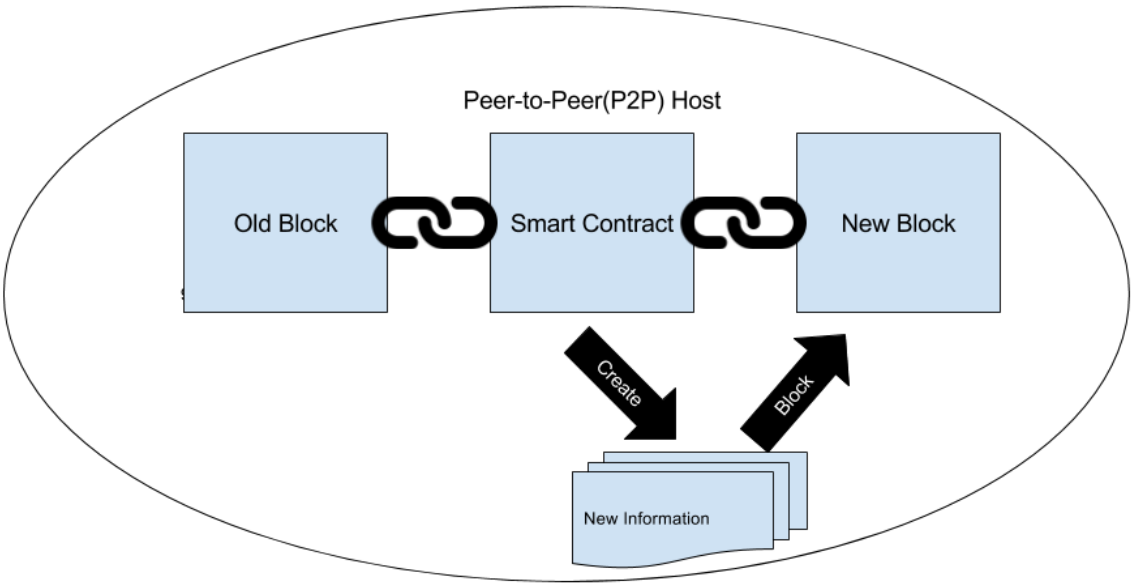

Figure 4: Peer-to-Peer Host Creating a New Block with Verified Information

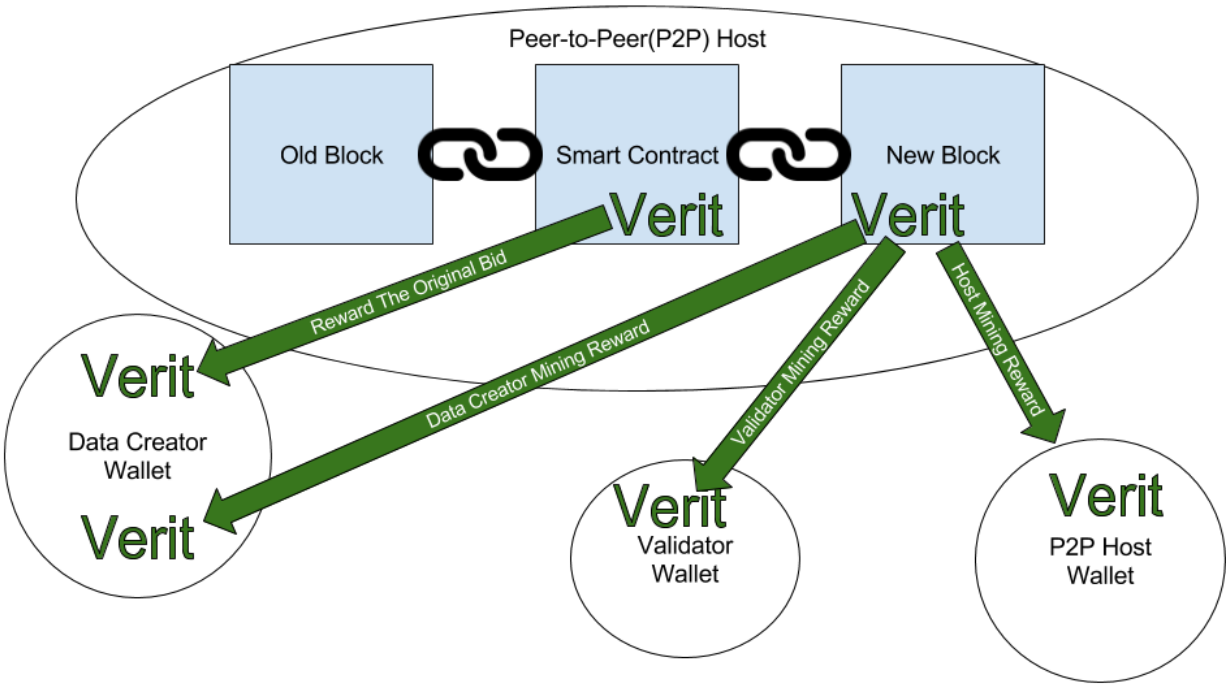

Figure 5: Paying the Creator the Bid Amount and Splitting the Mining Reward

The Validator Verification Process

The verification process will start when a host node accepts a request and adds it to the peer-to-peer validation queue for validation. When a validator takes a request off the queue, it sends an acknowledgement back to the host who submitted it. The first validation response received will be attached to the block request. However, if the validation process exceeds the minimum time set in the request, than the host can remove the validator from the queued block and put it back fresh on the queue.

The validator must verify that the information is true and record the step-by-step process such that it can be repeated by anyone else who looks at it. These steps will be appended to the body of the transaction in the block. Once the steps are appended, another validator will need to repeat the steps and sign off on the validity as well Once there are two validator signatures, consensus is reached, and the block can be written to the chain by the host.

If the data cannot be verified then it can be put back on the queue to be taken by another validator. The initial request will include an integer indicating the number of times to retry an attempt. Once that number is reached, the block will be retired and will not be written to the blockchain.

Validator Gas Cost Appropriation

The validator that responds fastest to a host request on the queue will receive the validator portion of the gas cost. If the minimum request time is exceeded, then the miner can request another validator to attempt verification, and the new validator will be granted the rights to the gas money. In other words, if a validator can't accomplish the validation quickly enough, another validator can jump in and steal it. As a starting point, 24 hours will be the recommended request time, but this will adjustable in body of the request to the network.

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 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.

How Do We Incentivize The Network Steward Beyond A Mandate?

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 1-5% stake of all profits earned on the network. A network profit is defined as the reward earned for each participant minus the gas cost earned to cover the execution costs. 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.

Use Cases

Privacy will always remain an important part of the information industry. COEN will have data that is 100% consumable by the public in publicly shared ledgers. Data that must remain private will not be allowed on the ledgers or be included in any of the checklist logic. However information that is currently not public remains private because there is no market incentive to release it. Our expectation is that COEN changes the industry standard, through incentivization, for companies to publicly release more of their own data. Companies that do will be viewed as more transparent and trustworthy than those that do not, which will become an incentive for their clients and partners to do business with them over opaque competitors.

- **Department of Transportation License and Violation Monitoring.** Citizens and/or Corporations want to make sure that vehicles in use have not had their permission to operate suspended due to a failed inspection, so a checklist will be built using United State Department of Transportation Data in order to logically check whether vehicles are properly registered and verify that the driver of the vehicle does not have any violations.
- **Monitor Indicators of Financial Strength.** In the due diligence process, a company wants to make sure that all of its key vendors are financially stable. For this use case we would create a checklist that makes sure a company has not filed bankruptcy within the past 24 months nor had any large layoffs over the past 12 months.

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 its necessity to generate a new compliance result on the network. In order for a new result to be added to the blockchain, the compliance user must submit a bid for a new result. The smart contract will give back a recommended buy price. The bid amount will be debited from the requesting user's wallet and placed in escrow. This requires they have enough Verit in their digital wallet and have agreed to initiate the transaction. Otherwise the transaction will not go through.

Similar to miners in Ethereum[4], a platform driven by another cryptocurrency called ether, the peer-to-peer nodes that run the contracts and hosts the ledgers will be compensated for their time and energy expended. They will receive a preset amount of Verit every time they agree to accept a request or run a smart contract. This preset amount of Verit is called a gas cost. Unlike Ethereum, the gas cost on COEN will be multidimensional because it doesn't just account for execution costs by the miner, but also the cost to verify the information by another participant in the network called a Validator.

The network will keep track of three variables at all times: the recommended buy price, the gas cost and the mining reward (see Mining Reward section for a description).

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. In Ethereum, gas costs are bid on in a marketplace. If a miner agrees to your gas cost price bid, they will execute the code for you.

COEN will also have gas costs, but there will be some subtle differences in how they work compared to Ethereum. COEN gas costs will be set by price controls instead of through bids in the market. A special participant in the network, called a steward, will be charged with adjusting the system wide cost control variables in order to incentivize and maintain good behavior by all participants. See the network players section below, for the full theory around player incentives.

[4] https://github.com/ethereum/wiki/wiki/White-Paper

The gas cost price control variables that can be adjusted will be designed to loosely represent the global median energy costs and global median labor costs. The reason energy costs are included is to estimate the cost it takes a host to run and execute code for the network. Similarly, labor costs are included in the algorithm to estimate the amount of human labor it will take to achieve verification of the data. Current estimates will be used to set the cost variables, and those variables will be run through a formula with two more system variables for the hosting portion of the gas cost as well as the validation portion of the gas cost. The sum of these two smaller gas costs will equal the network gas cost.

$$Energy\ Based\ Gas\ Cost\ =\ Energy\ Coefficient * Number\ of\ Data\ Queries\ in\ Checklist$$
$$Labor\ Based\ Gas\ Cost\ =\ Labor\ Coefficient\ *\ Number\ of\ Verifications\ in\ Checklist$$
$$Total\ Gas\ Cost\ =\ Energy\ Based\ Gas\ Cost\ +\ Labor\ Based\ Gas\ Cost$$

The network gas cost will be the most important variable set in the network. The value of the gas cost will function as the floor for all the other variables controlled in the network (e.g. the reward will need to be at least 8x the gas cost to ensure every participant profits).

This will ensure that the system rewards stay relatively constant across the globe in spite of price volatility up or down for Verit.

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 transaction will be 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[5] with accredited investors to fund the development of COEN.
- **15%** or 4,500,000 will be held by the steward for future token supply and velocity purposes.

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

- **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.

Proof of Merit Algorithm

Unlike with Bitcoin or Ether, Verit will not be mined through a proof of work or a proof of stake algorithm. These algorithms closely resemble a democratic process, as they require 51% of the majority to accept the submitted proof. In a permissionless system, the integrity of the network is reliant on this majority of the participants to act in good faith toward the network. To date, this model has worked because it is easier to earn rewards through positive behavior than malicious. However, the threat of an attack by 51% bad actors still remains.

Another algorithm that exists on non-democratic permissioned ledgers is called proof of authority. Permissioned networks do not require democratic consensus, only the approval of just one node with special authority to write new transactions to the ledger.

On COEN, we are combining parts of these existing algorithms into a new algorithm called proof of merit. Like other permissioned blockchains, there will be authority nodes. However, unlike traditional authority algorithms our special permissioned nodes will not own the network, but will be participants themselves.

These special node holders will be the validators of information. In order for new blocks to be written, the validator must provide a repeatable verification path for the data being written onto the blockchain as the means of proof for the the other nodes to accept this new block. Along with the data proof, each new data block must include an additional signature from a second validator node. This multiple signature requirement, adds additional protection from collusion between a data creator and a malicious validator.

Further protecting the network from bad validators will be the fact that these nodes will be non-anonymous corporations that have a corporate reputation to uphold. Their status on the network as a validator will controlled by the network steward, who does not have a stake in the verification proofs, but can grant and revoke validator node access.

The Mining Reward

Writing new events and data objects to the data ledgers will also produce a mining reward that will add new tokens to the total token supply. The mining reward will be dynamically configurable and set on the network in real-time to incentivize a faster network throughput by its participants. The mining reward will need a floor of at least 8x the current network gas cost, so

that all of the players remain properly incentivized for their participation. The reward will be distributed as follows:

- Before percentages are calculated, the gas cost for the data creator will be subtracted from the reward and refunded back to their wallet
- Additionally data creators will receive 14.29% of the net mined reward, which will guarantee they receive at least double the amount that they spent back. At the floor their total compensation would be 25% of the total reward, when the refunded gas cost is included. Plus they receive 100% of the bounty from the initial bid.
- Miners will receive 28.57% of the net mined reward. Their compensation at the floor would be 25% of the total reward.
- Validators will receive 57.14% of the net mined reward.Their compensation at the floor would be 50% of the total reward.

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.

The Data

Distributed Ledgers are the new databases in this decentralized, transparent world. COEN will use distributed ledgers wherever possible for our physical storage needs. The key piece of data on the network will be the compliance results generated through the bidding marketplace.

These results will be generated by itemizing the complexities of each compliance problem and logically storing them into a checklist format. In computer science, the best way to represent a checklist with multiple paths and different possible outcomes that all lead to one logical result is with 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 ordered into a hierarchical tree data structure. 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.

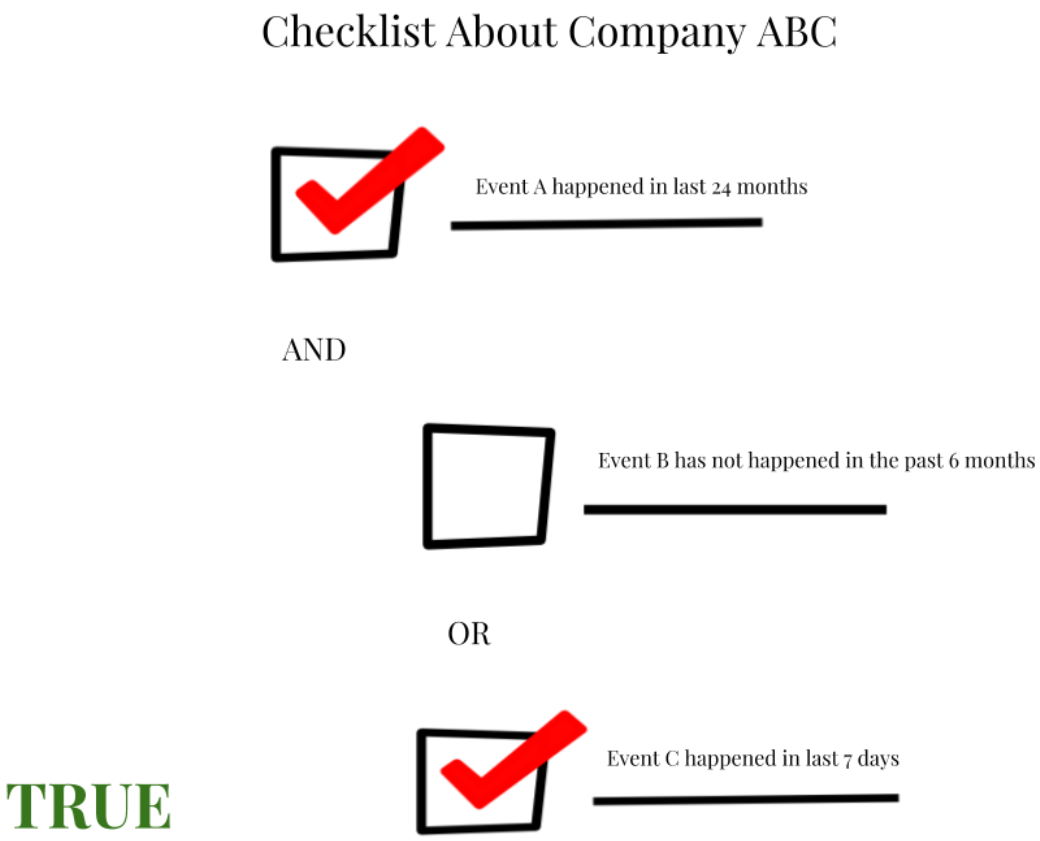

Figure: Example of a Checklist Applied to Company ABC

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

The Subjects

A Subject can be anything a user wants to match to a given set of compliance rules. These Subjects are then attached to a checklist to generate a compliance result. Some examples would be buildings or vehicles attached to inspection requirements, or individual employees attached to a checklist to monitor license renewals.

Every Subject object must have a universally unique identifier (uuid), and each type of Subject has a standard unique prefix that is prepended to all new uuid values upon creation of a new value.

The Events

An event is a piece of structured data that represents an action to or about a Subject object. The format of the data must be predefined as an event type, and a unique prefix must be created for every event type. The event stores a link to the event type uuid, the fields as defined in the event type, a link to the associated Subject(s) uuid(s) and the event's own uuid.

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 actually a predefined query to the events table.
- The parameters of the query are defined by the event type of the event and the "thing(s)" to which the checklist is being applied.
- 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).
- The process of adding the parameters to a checklist is called instantiating a checklist, and this checklist instance holds the full tree structure with the fully formed queries.

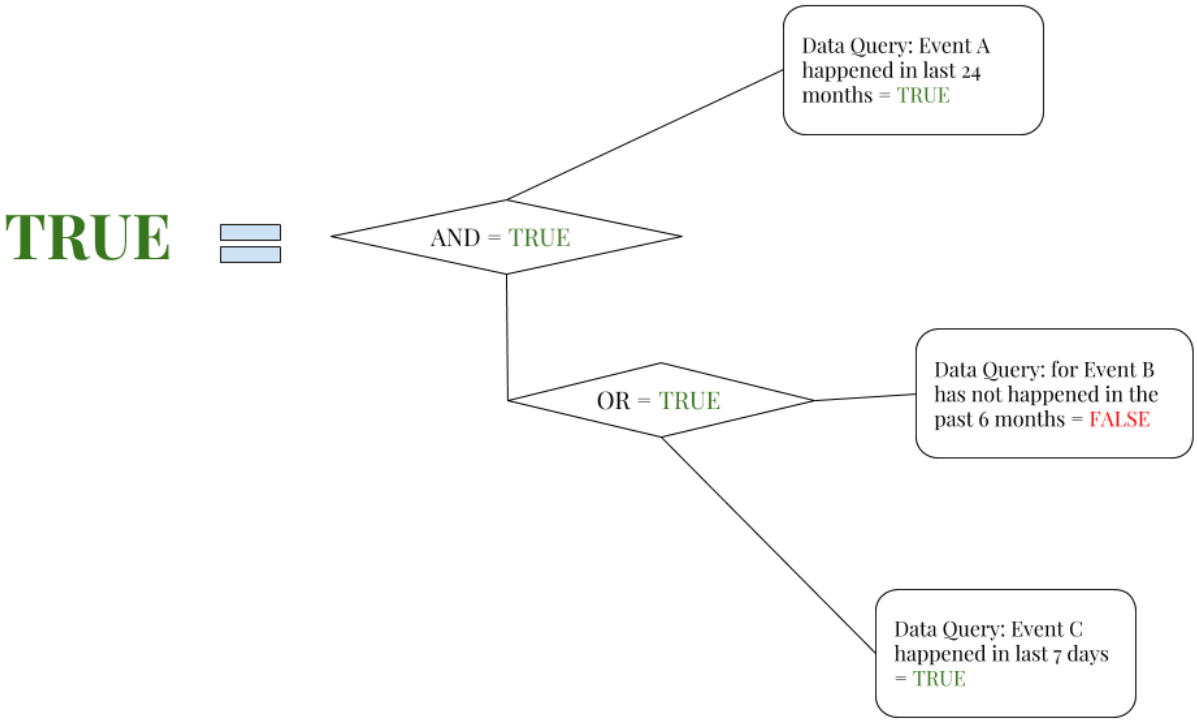

Figure 7: Tree Representation of Checklist

Compliance Results on a Blockchain

The network will have one immutable blockchain. The blocks in the blockchain will have four different types of transactions: application level smart contracts, Verit transactions, mining rewards generated from new data creation and new compliance results.

The compliance results on the blockchain will create an unchangeable audit log of all of the state changes as they happen over time.

Off-Chain Data

COEN will be a network that requires both a blockchain and off-chain data, which will be required so that changes to compliance audit trail within the blockchain can be updated.

Smart contracts will run the checklist logic and will require data to be provided to the smart contract in order for a new compliance result to be calculated. This data will be securely injected into the smart contracts by third party middleware objects called oracles. These oracles will not

be on the blockchain, but will be given proper cryptographic permission to provide the parameter data necessary for a smart contract on the chain to execute.

Oracles

Smart contracts, by design must be both self-executing and the end result must be repeatable on every node. A third party dependency called from within the smart contract could break this property. Therefore middleware, named oracles, are used to access third party data and push it back to the smart contracts almost as function parameters.

New companies are being created to help facilitate oracle connections to smart contracts. Two of these technologies include Oraclize (oraclize.it) data carriers and ChainLinks by SmartContract (smartcontract.com). The approaches of these two companies are slightly different. Oraclize was the first player in the market, and they solve the problem by being the data provider themselves. SmartContract wants to allow anyone to be a data provider, and they want to be the network that brings the data providers together. We will add the oracle service cost into the network gas cost.

Querying the Data

The queries will be built into the smart contracts and the data accessed through off-chain oracle middleware objects. Each query will be stored in a tree format and evaluated to create the output of a checklist.

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.

- Verit compensation will incentivize data creators to submit new and accurate data.
- Verit compensation will incentivize miners to host the network so that they can accept new requests and be rewarded for executing network code on their machines.
- Verit compensation will incentivize trust information companies to become validators on the network so they can use their data to properly verify information.

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)[7] or *benefit corporation*(B-Corp)[8], whose mission statement is to create and steward a decentralized network to optimizefor the operational efficiency, promulgation, and transparency of the network.

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/ed-sullivan-62637a11/

- **Susan Kamins, Advisor and Owner of Vested Green Consulting**

  Susan is a change leadership professional and corporate social responsibility (CSR) advocate who has spent the past 30 years serving organizations large and small, for-profit, nonprofit and governmental. In her work in the Central Texas Region, she leveraged multi-stakeholder public-private partnerships to drive sustainable development initiatives, engaging business as a key player in creating triple bottom line success. As CSR and sustainability reporting has become widespread, Susan believes it is essential to both publically disseminate this data and interpret it in light of the multiplicity of standards that are currently used to certify green and social good practices. Applying this more broadly, Susan is passionate about Freeing the Data to enhance transparency and allow all players to readily access, and meaningfully evaluate, high quality information.
  https://www.linkedin.com/in/susankamins/

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

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 data ledgers and periodically poll the ledgers to look at 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 1: Fundraise Through SAFT and Begin Development

The first phase of building COEN will be to secure the funding necessary to hire a team to develop the network, as well a cover administrative costs such as legal and accounting.

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: Create The Blockchain

Once the blockchain is ready to be deployed, the first thing to happen will be the creation of a genesis block. This genesis block will define the network steward and also create the initial supply of tokens. The steward then will 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 cold storage.

Phase 4: Deployment of the Network Smart Contracts

The smart contracts deployed on the blockchain by the steward will be the entry points to the system, as well as the controller of new verit. This phase will also require the implementation of the oracles for outside contract communication. The smart contract that controls the bidding marketplace will be left off until the public launch

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

In this phase the network will only be opened to miners and validators to be up and running on the network, and allow for mining reward transactions to begin. The first step in this phase will be to heavily rely on partners for both data creation and validation of their own data, as well as any other validators who are willing to pilot the system.

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 peer-to-peer hosts to begin accepting bids. 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 $5-$10 million in SAFT agreements from accredited investors
- Additionally Ex Fida Bona will be targeting between $100-$200 million dollars in proceeds from the secondary offering

Use of Proceeds

- **70% Ex Fida Bona Team.** This will account for the salaries of the existing team, as well as for hiring new engineers and a project manager to build both the network and the web application. It will also include the addition of both business development and marketing

teams to help build and manage partner relationships necessary for operation of the network.

- **10% Administrative Costs.** This includes legal, accounting and security costs related to the offering as well other related administrative costs.
- **20% Contingency.** This portion will be held by the company to account for unexpected costs, as well as aid Ex Fida Bona with future overhead costs of being the network steward.