CHOICE COIN

Table of Contents

Abstract

Choice Coin is a decentralized voting asset on the Algorand blockchain. The purpose of Choice Coin is to facilitate democratic participation and decentralized voting. First, this White Paper discusses assimilations of Choice Coin with Algogeneous Smart Contracts, which integrate artificial intelligence to sustain supply and distribute rewards. Next, the Choice Coin asset is defined, including the software code, intelligence infusions, and computational compliance. Finally, processes are provided for autonomous governance with Choice Coin to reward participants, secure software for voting, and decentralize decisions.

Introduction

Choice Coin is a digital asset, which is used to solve the decentralized governance problem. The decentralized governance problem refers to the complex process by which assets are allocated across decentralized networks. In other words, the decentralized governance problem refers to the lack of a system to facilitate autonomous decision making in a distributed manner using digital assets. Choice Coin solves the decentralized governance problem by providing a mechanism for secure voting using post-quantum cryptography. A voting token for autonomous organizations, Choice Coin is built on the Algorand blockchain as an Algorand Standard Asset.[1]

This White Paper proceeds in three parts. Part I discusses assimilations of Choice Coin with Algogeneous Smart Contracts, which integrate artificial intelligence to sustain supply and distribute rewards. Part II details the Choice Coin asset, including the software code, intelligence infusions, and computational compliance. Part III provides processes for autonomous governance with Choice Coin to reward participants, secure software, and decentralize decisions.

[1] Yossi Gilad, et al., Algorand: Scaling Byzantine Agreements for Cryptocurrencies, 53 (2017).

I. Algogeneous Assimilation

Choice Coin serves as the backbone and critical corpus for Algogeneous smart contract applications, developments, and transfers. The process by which Algogeneous smart contracts move Choice Coin on the Algorand Network, Algogeneous Assimilation, allows for transactions, strategic circulating supply supplementation, and reward mechanisms to incentivize proper participation. The Algorand Network uses standard blockchain logic.[2]

$$\begin{aligned} B^1 &= \left(1, P^1, Q^0, H(B^0)\right) \dots \\ B^2 &= \left(2, P^2, Q^1, H(B^1)\right) \dots \\ B^3 &= \left(3, P^3, Q^2, H(B^2)\right) \dots \\ B^n &= \left(n, P^n, Q^t, H(B^t)\right) \dots \end{aligned} \tag{1}$$

Algorand consists of blocks, in Equation (1) the blocks include hash values from the previous block, $H(B^t)$, a quantity Q^t, and a passing round P^n – defining the transaction metrics.

$$A_B = \overrightarrow{B^1}, \overrightarrow{B^2}, \dots, \overrightarrow{B^n} \tag{2}$$

Equation (2) depicts blocks $\overrightarrow{B^n}$ dynamically proven on the Algorand blockchain A_B.

$$A_B\rangle = \begin{cases} B^1\rangle = \left(1, P^1, Q^0, H(B^0)\right) \\ \dots \\ B^n\rangle = \left(1, P^n, Q^t, H(B^t)\right) \end{cases} \tag{3}$$

In Equation (3) the logic is expanded from a starting block to an arbitrary block. In short, Choice Coin utilizes smart contracts bundled in blocks for transfers on the Algorand Network.

A. Computable Contracts

Smart contracts are programs that automatically execute, transferring cryptocurrency between parties.[3] In other words, smart contracts are logically executed on a blockchain to transfer assets without any formalized oversight.[4] Algorand smart contracts (ASCs) allow for global transfers, with instantaneous processing and only marginal fees – usually less than $0.01 in total value. As typically described, there are three types of ASCs: (1) stateful smart contracts; (2) stateless smart contracts; and (3) Algogeneous smart contracts.

Stateful smart contracts are formal storage instructions for the blockchain. Stateful refers to the contract's ability to store information in a specific state on the network. For example, one type of stateful smart contract is a request payment function, allowing a user to request payment from

[2] Jing Chen, Silvio Micali, Algorand 13 (2017), arXiv:1607.01341.
[3] Fabrice Benhamouda, et al., Supporting Private Data on Hyperledger Fabric with Secure Multiparty Computation, IBM Journal of Research and Development (April 2019), DOI: 10.1147/JRD.2019.2913621.
[4] Massimo Bartoletti, A formal model of Algorand smart contracts, 1 (2021), https://arxiv.org/abs/2009.12140v3.

another user. Generally, stateful smart contracts are logical programs which store data on the blockchain.

Stateless Smart Contracts differ in that they validate transactions between parties, like an escrow account and more like a contract in the transactional sense. Stateless smart contracts on the Algorand Network also act as signature delegators[5] signing transactions, thus validating them on the main blockchain network. By analogy, many describe stateless smart contracts as essentially equivalent to escrow functions.[6] Indeed, the essential design purpose for stateless smart contracts is to approve or deny blockchain transactions.[7]

Representing a technical convergence of stateless and stateful smart contracts, Algogeneous smart contracts include an innovative integration with artificial intelligence.[8] Where previous ASCs must be stateful or stateless, Algogeneous contracts may be stateful, stateless, or both.

$$S_C = 0 \oplus 1 \tag{4}$$

$$H_C = 0 \otimes 1 \tag{5}$$

Equation (4) defines a stateless smart contract, which may be a Boolean. Equation (5) defines a Algogeneous smart contract, which instead operates with an inclusive OR function.

$$H_C \rightarrow A_N \tag{6}$$

Equation (6) defines the transition function for the Algogeneous smart contract to the Algorand Network.

The Algogeneous contract utilizes an embedded intelligence, a type of AI for contract analysis.[9] The AI checks to ensure the technical smart contract is valid according to traditional contract principles and otherwise secure.

$$ai = \sqrt[\sum_{j=1}^{n} w_j]{\prod_{i=1}^{n} {F_i}^{w_i}} \tag{7}$$

Equation (7), the AI Equation, defines a weighted average processing an array according to instructions from an embedded agent. The embedded agent formalizes knowledge for contractual analysis – assuring the contract is logically and transactionally valid.

---

5 Jing Chen, Silvio Micali, Algorand 8 (2017), arXiv:1607.01341.
6 An escrow is a contractual arrangement in which a third party receives and disburses money or property for transacting parties.
7 Silvio Micali, Efficient Smart Contracts at Scale: Algorand's Stateful Teal Contracts 1 (2020).
8 Archie Chaudhury and Brian Haney, Smart Contracts on Algorand, SSRN 3887719 (2021).
9 Archie Chaudhury and Brian Haney, Smart Contracts on Algorand (2021).

Algogeneous smart contracts allow multiple tasks to be efficiently integrated within one function, all on the Algorand Blockchain. In short, an Algogeneous smart contract is a smart contract that achieves the functionality of both a stateless and stateful smart contracts in a singular system, with added intelligent validation and verification features. The Algogeneous architecture views contracts within each block as consisting of four essential elements, validating a legal and logical contract.

$$B^n\rangle \begin{cases} A_0\left[s_f, s_s, a_i, e_k\right] \\ \quad \dots \\ A_n\left[s_f, s_s, a_i, e_k\right] \end{cases} \tag{8}$$

Each element may be comprised of additional elements and vary according to form. As depicted in Equation (8), the four basic elements for an Algogeneous Smart Contract A_n are: stateful functionality s_f, stateless functionality s_s, artificial intelligence a_i, and embedded knowledge e_k. The Choice Coin asset is fundamentally assimilated with the Algogeneous smart contract, to allow secure transfer, storage, and supply control on the Algorand Network.

B. Sustaining Supply

Choice Coin is a voting token that can power autonomous organizations and serves as the main participation token for both centralized and decentralized organizations. Thereby, Choice Coin is configured to ensure a finite supply, which will also be greater than its total circulating supply. Choice Coin supply metrics reflect a scalable strategy to ensure the asset may have vast use cases, while protecting price volatilities from market speculation. Critical to all functionality is security for both Choice Coin and the various smart contract mechanisms by which supply may be controlled and adjusted according to customer demand.

The total finite supply for Choice Coin is 1,000,000,000.00. Over time, Choice will be released to distribution into a circulating supply. The circulating supply is defined by variable interests to support the Choice Coin Network and add value to the community.

$$d^* = arg \max_{c_s} v\left(n_0, n_{\dots}, n_n(c_s)\right) \tag{9}$$

Equation (9) defines a general distribution equation for optimizing the circulating supply.

Choice Coin may have vast use cases, while protecting price volatilities from market speculation. As such, Choice Coin may be aggregated in various silos, for bundled purchases and applications development. The siloed storage approach supports secure and decentralized distributions for various purposes.

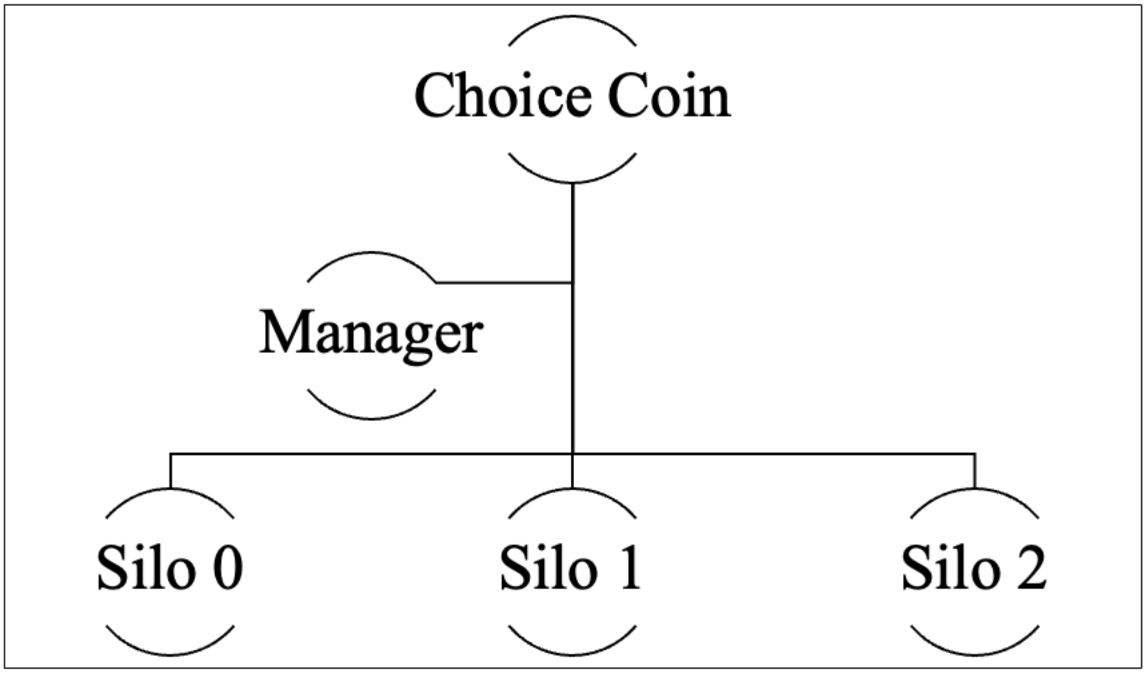

Figure 1

Figure 1 is a model showing the Manager's role as an intermediary between the Choice Coin creator account and several silos. In addition to several storage silos, Choice Coin will also be distributed on the Algorand Network and to the Choice Coin online community for multiple purposes, including to support a decentralized ecosystem.

C. Decentralized Distributions

A key feature for democratizing global finance over a borderless economy is incentive. Incentives allow for the distribution of wealth, resources, and assets across blockchain networks. Algorand differentiates itself from proof-of-work blockchains, such as Bitcoin and Ethereum, by distributing Algo to its entire Network using its pure-proof-of-stake technology, rather than just to miners with expensive computing resources. Moreover, Algorand leverages developer rewards and grant programs to ensure equitable distributions of Algo. In doing so, Algorand distances itself from other blockchains through asset allocation efficiency.

Decentralized programs motivating participation in building the Network through research, development, and intellectual property creation, continue to catalyze a professional, ethical, and collegial culture within the Algorand Network. Choice Coin will follow in Algorand's footsteps, focusing incentives on research, development, and open source software development. As such, Choice Coin will focus primary distribution initiatives toward inventing, writing, and programming. Moreover, secondary initiatives within the Choice Coin community will center around charity, compliance, and marketing.

There will be two main mechanisms by which participation and incentives may be distributed. The first will be manual distribution, which will involve direct transfer by a manager account to a participant account. The second is autonomous transfer, where a smart contract automatically transfers Choice Coin to a participant. As Choice Coin scales, more autonomy may be included in the distribution mechanism to optimize efficiency.

A critical component for Choice Coin is fostering an evolving global community across the decentralized ecosystem. As such, Choice Coin community participation may happen through various forums and online locations including Discord, GitHub, Twitter, and the Algorand Network. Creating an ethical and civic community to promote democratic discourse and consensus conversation, Choice Coin will empower a new generation toward globalizing decentralized democracy.

II. Asset Architecture

The Choice Coin asset architecture aggregates three keystone characteristics. First, Choice Coin harnesses Algogeneous smart contracts on the Algorand Blockchain. Second, Choice Coin utilizes artificial intelligence for optimizing user demand. Third, Choice Coin codifies compliance within its software structure.

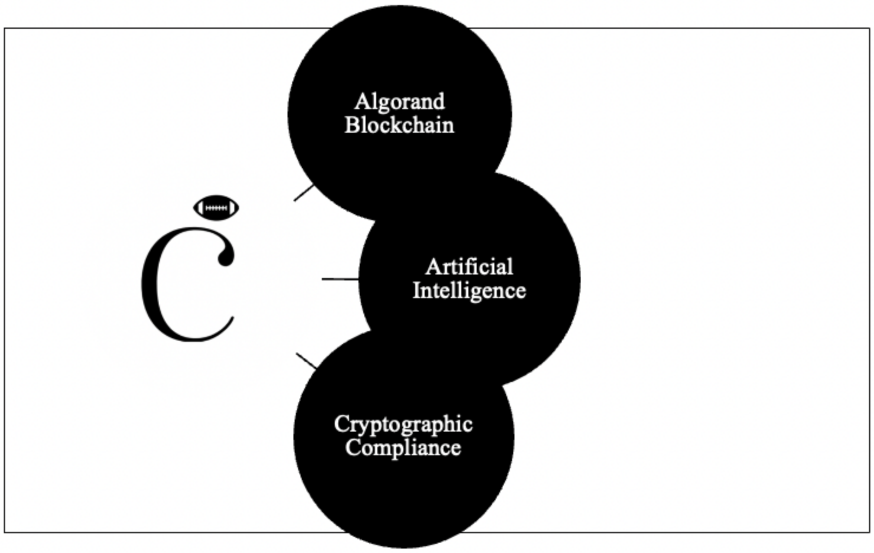

Figure 2

Figure 2 models the Choice Coin keystone characteristics. Choice Coin's software is built directly on the Algorand Blockchain and is interoperable with quantum computing hardware. Additionally, Choice Coin utilizes artificial intelligence technologies for security and to validate transactions.

A. Software Utility

An Algorand Standard Asset (ASA) is a digital proof, which may be tokenized to represent value. Choice Coin is a new ASA developed specifically for governance and to encourage democratic participation. The computational form and structural security for ASAs comes from cryptographic hashing.[10]

$$H(S_{\iota^r} * r): \{0:1\}^{256} \to \{0:1\}^{256} \qquad (10)$$

Equation (10) is a randomized hash function with a digital signature. The ASA architecture includes detailed security protocol. For example, Equation (11) represents a security model from the perspective of an adversary.

(11)

[10] Jing Chen, Silvio Micali, Algorand 26 (2017), arXiv:1607.01341.

$$H\left(\sigma_{\alpha}^{r,1}\right) < H\left(\sigma_{\beta}^{r,1}\right) < H\left(\sigma_{\gamma}^{r,1}\right)$$

Even still, a malicious attacker, $\alpha \oplus \beta \oplus \gamma$, is unable to inject new users to the system and cannot corrupt the network.[11]

Choice Coin is a digital asset for voting and is focused as a solution to the decentralized governance problem. In other words, Choice Coin offers a mechanism by which organizations and institutions can vote securely using software systems on the Algorand Network. Specifically, it provides a voting tool for decentralized decisions.

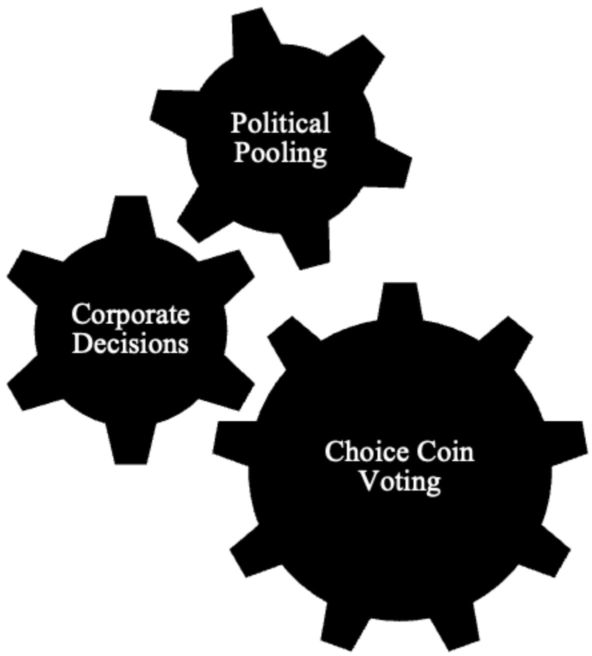

Figure 3

Figure 3 demonstrates the relationship and application for Choice Coin as a machine by which political pooling and corporate decisions are made. A voting token for powering autonomous organizations, Choice Coin serves as the main participation token for both centralized and decentralized organizations.

Thereby, Choice Coin is configured to ensure a finite supply, which will also be greater than its total circulating supply.

$$H(S_{\iota^r} * r): \{0:1\}^{512} \rightarrow \{0:1\}^{512} \quad (12)$$

Equation (12) depicts a cryptographic extension for a hash using the SHA-512 algorithm. The Choice Coin cryptographic metrics reflect a scalable strategy to ensure post-quantum security using SHA-512 hashing. The application of the SHA-512 algorithm is possible to scale given

[11] Jing Chen, Silvio Micali, Algorand 27 (2017), arXiv:1607.01341.

advancements in both industrial classical computers and new quantum computing technologies, making it viable to create a quantum secure polling protocol.

ASAs include the inherent security and usability features as the main Algorand asset, Algo.[12] Moreover, ASAs enable users to create tokens with specialized functionality including manager control, asset freeze, and transaction clawback.[13] From the available utility suite, Choice Coin's privileges were created to abide by and according to principles for the highest ethical standards, software security excellence, and optimized regulatory compliance. These standards include the principle of least privilege, where the network creator limits the scope of their own ability to a minimum to preserve the decentralized integrity of the digital ecosystem.

Specifically, the clawback and freeze privileges ensure security, and will only be used in the event of malicious participants acting in contradiction to the law or international standards of decency. First, the asset freeze function allows the compliance address to freeze the assets in another address. This is important for security because it protects against potential malicious use cases. Second, clawback is a common compliance technique blockchains use, allowing transfer reversal to ensure assets are not used for criminal purposes. Choice Coin's compliance address is specifically distributed across a network of custodians who must reach consensus before initiating a clawback.[14]

Critical to all functionality is security for both Choice Coin and the various smart contract mechanisms by which Choice Coin silos may be deployed.

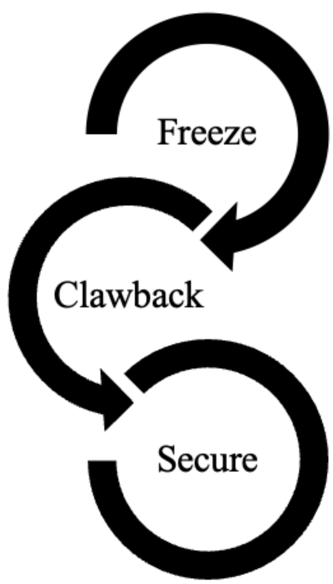

Figure 4

[12] Additionally, ASAs may be fungible or non-fungible with diverse degrees of control.
[13] Silvio Micali, Efficient Smart Contracts at Scale: Algorand's Stateful Teal Contracts, 6 (2020)..
[14] Musab Alturki, et al., Towards a Verified Model of the Algorand Consensus Protocol in Coq, arXiv: 1907.05523 (2019).

Figure 4 models a Choice Coin security protocol, allowing for both transaction clawback and asset freeze. Both clawback and freeze allow for the compliance account to have control if necessary to serve a legal function, such as to freeze assets which come under the control of a criminal organization. Thus, these utilities allow for functionality that helps maintain ethics in governance, usability, and transfers. Therefore, Choice Coin prioritizes both decentralization and security.

B. Quantum Intelligence

At the technical convergence of software and hardware innovation, quantum intelligence is singularizing systems toward a new information era. Resting on the fundamental fabric of reality, quantum computers utilize electrons and other sub-atomic particles such as ions and photons to perform computation.[15] Quantum computers differ from previous computing systems because of the way in which they process information.[16] Where classical computers process information with bits, which are a Boolean or binary representation, quantum computers process information with qubits representing information in a complex vector space.

The term artificial intelligence (AI) has been discussed in the context of blockchain and at length by various scholars and industry leaders. For example Gary Gensler – the head of the United States Securities and Exchange Commission, wrote an important paper on the confluence of deep learning and financial stability.[17] Additionally, an early article defining machine intelligence argued, intelligence "measures an agent's ability to achieve goals in a wide range of environments."[18] Generally, AI refers to any machine capable of learning, remembering, and taking actions. For human machine collaboration, it follows that AI is often used as a tool to help humans in goal oriented industrial applications and activities. The convergence of quantum computing and AI, quantum intelligence is at the heart of the Choice Coin design.

A critical component for Choice Coin code and quantum intelligence is embedded knowledge, a formalized human intelligence in a computational form. Embedded knowledge may be structured in software code for several systems within the Choice Coin protocol, such as security, validation, and compliance.

$$e_k(F_{i-n}) = \sqrt[\sum_{j=1}^{n} w_j]{\prod_{i=1}^{n} F_i^{\,w_i}} \tag{13}$$

A general form of embedded knowledge $e_k(F_{i-n})$ is defined in Equation (13) and allows for a generalizable object-oriented valuation using quality metrics. The embedded knowledge

[15] Vikas Hassija, et. al., Present landscape of quantum computing, IET Quantum Communication, Vol. 1 Iss. 2 (2020). See also Alejandro Perdomo, et. al., A study of heuristic guesses for adiabatic quantum computation 2 (2010).
[16] A. Turing, On Computable Numbers, with an Application to the Entscheidungsproblem, 230, 230 (1936).
[17] Gensler, Gary and Bailey, Lily, Deep Learning and Financial Stability, SSRN 3723132, at 32 (November 1, 2020).
[18] Shane Legg, Marcus Hutter, Universal Intelligence: A Definition of Machine Intelligence (2007).

leverages a weighted and factorized array, which is adjustable for niche needs, and thus available for general purpose application.

In addition to embedded knowledge systems, quantum machine learning may also be applied within the Choice Coin ecosystem for various objectives. A quantum neural network (QNN) is a method for generalizing to make predictions using either quantum logic or quantum hardware.[19] QNNs map differently to various quantum hardware depending on the physical substrate. For example, QNNs may be mapped to an adiabatic quantum computing using a Chimera graph architecture.[20]

Every QNN has an input layer and an output layer; and a model's depth is defined by the number of layers between the input and output layer.[21] Each layer of hidden neurons acts as a feature extractor by providing analysis for more complicated features.[22]

$$(14) \qquad \begin{array}{ccl} x_i & \rightarrow & x_{i+1} \rightarrow \\ x_j & \rightarrow & x_{j+1} \rightarrow \\ x_k & \rightarrow & x_{k+1} \rightarrow \end{array} \begin{array}{c} x_l \\ x_m \end{array} \rightarrow \quad x_n \vdots \begin{array}{ccl} x_i & \oplus & x_{i+1} \oplus \\ x_j & \oplus & x_{j+1} \oplus \\ x_k & \oplus & x_{k+1} \oplus \end{array} \begin{array}{c} x_l \\ x_m \end{array} \oplus \quad x_\psi$$

$$(15) \qquad \begin{array}{ccl} t_i & \rightarrow & t_{i+1} \rightarrow \\ t_j & \rightarrow & t_{j+1} \rightarrow \\ t_k & \rightarrow & t_{k+1} \rightarrow \end{array} \begin{array}{c} t_l \\ t_m \end{array} \rightarrow \quad t_n \vdots \begin{array}{ccl} t_i & \oplus & t_{i+1} \oplus \\ t_j & \oplus & t_{j+1} \oplus \\ t_k & \oplus & t_{k+1} \oplus \end{array} \begin{array}{c} t_l \\ t_m \end{array} \oplus \quad t_\psi$$

Equation (14) and Equation (15) illustrates the formalism for single neural networks and their respective quantum derivatives.

$$(16) \qquad Q_i[a(x,t), b(x,t), z(x,t)]$$

Each resulting prediction from the neural networks x_ψ and t_ψ may be integrated with quantum intelligence function Q_i as shown in Equation (16).

$$(17) \qquad Q_i \begin{cases} a \rightarrow min\ \alpha \int x\rangle\langle t \\ b \rightarrow min\ \beta \int x\rangle\langle t \\ z \rightarrow min\ \gamma \int x\rangle\langle t \end{cases}$$

$$(18) \qquad Q^* = \int i^3$$

[19] Eugene Charniak, Introduction to Deep Learning, MIT Press 8-9 (2018).
[20] Luca Asproni, et al., Accuracy and minor embedding in subqubo decomposition with fully connected large problems: a case study about the number partitioning problem, Quantum Machine Intelligence (2020).
[21] John D. Kelleher, Brenden Tierney, Data Science, MIT Press 134 (2018).
[22] Sebastian Raschka, Vahid Mirjalili, Python Machine Learning 18 (2017).

Equation (17) provides the general form of three functions $q, a, and\ b$. Equation (18) singularizes the optimal quantum intelligence Q^* with references to three functions.

C. Codifying Compliance

Compliance is a dynamic process by which people and organizations follow the law. Choice Coin customized its cryptocurrency compliance program through a computational process to meet its specific needs in the blockchain industry. In fact, logic embedded sequences for compliance are instilled in the Choice Coin source code. For example, the asset freeze and transfer clawback functionalities are controlled by a semi-autonomous compliance manager within the Choice Coin ecosystem that operates on the Algorand Blockchain.

The process by which Choice Coin certifies compliances is comprised of three parts. First, a corpus is aggregated from relevant laws. Second, an optimization algorithm processes data alongside a compliance manager to ensure compliance. Third, the corpus is continuously updated according to changes in the legal and regulatory landscape, as well as changes in software code. Compliance is key for Choice Coin, as is developing an ethical culture in its online ecosystem and ensuring Choice Coin participants abide by its defined compliance processes.[23]

The textual corpus is comprised of four elements: (1) case law l_i, (2) statutory law s_i, (3) regulatory texts r_i, and (4) secondary sources t_i.

$$corpus = [l_i, s_i, r_i, t_i] \tag{19}$$

Equation (19) describes the corpus as an array with four elements. The main two corporal elements are United States case law and statutory law. These two elements are aggregated and combined with several secondary sources as well and integrated with regulatory texts for specific agencies.

To succeed in optimizing compliance – it is necessary to measure performance according to defined, measurable, and objective features. Compliance with all bodies of law and regulation can be automated according to a design for optimality. Laws surrounding cryptocurrencies are no exception. The object-oriented approach to compliance recognizes the existing legal infrastructure with particular focus on instilling optimal obedience in organizational protocol.

The first step is to take an object-oriented approach to understanding the textual corpus. Equation (20) measures each element in the corporal array.

$$l_i = \sqrt[n]{\prod_{i=0}^{n} c_i} : s_i = \sqrt[n]{\prod_{i=0}^{n} s_i} : r_i = \sqrt[n]{\prod_{i=0}^{n} r_i} : t_i = \sqrt[n]{\prod_{i=0}^{n} t_i} \tag{20}$$

Equation (21) applies an artificial intelligence a_i to the array.

[23] Veronica Root, More Meaningful Ethics, U. CHI. L. REV. Online, 21 (2019).

(21) $$a_i[l_i, s_i, r_i, t_i]$$

Equation (22) demonstrates the functionality for a_i as a maximum function, which corresponds to optimizing a compliance protocol given the syntactic corpus.

(22) $$C^* \begin{cases} l_i \\ s_i \\ r_i \\ t_i \end{cases} = max \sqrt[n]{\prod_{i=0}^{n} a_i}$$

Moreover, in the event certain factors may be deemed more important, then a weighted mathematical model may be adopted.

(23) $$F_i^{W_i} = [F^{w_1} \cdots F^{w_n}]$$

Figure (23) defines a weighted factorized array, which may define certain factors for measuring compliance.

(24) $$F_i = 0 \Leftrightarrow 1$$

(25) $$W_i = 1 \Leftrightarrow n$$

Equation (24) defines the scale for measuring factors and Equation (25) defines the measurable method for weight mathematics within an optimization algorithm.

(26) $$B' = \frac{1}{\sum_{j=1}^{n} W_i}$$

Equation (26) defines a weighted variable, aggregating weights from across the algorithm's factors.

(27) $$C^* = \max C \left(\prod_{i=1}^{n} F_i^{\ w_i} \right)^{B'}$$

Equation (27) defines C^* – the optimal compliance program using weighted factors to account for human intuition in quality analysis.

Given the legal corpus surrounding cryptocurrency regulation, the algorithm is flexible. The Choice Coin source code was meticulously manipulated to ensure the asset was not a security nor money under U.S. Law. In fact, Choice Coin is a governance token, which functions to power a voting protocol to promote democratic participation and decentralized democracy.

Figure 5

As both the law and the Choice Coin protocol evolve, compliance is a continuous keystone. As depicted in Figure 5, compliance is a perpetual and dynamic process, especially on the edge in technical innovation and in front of regulation.[24] Choice Coin is committed to staying on the edge in compliance innovation – ensuring the protocol is optimized for obedience according to the law of relevant jurisdictions. As an open source project, Choice Coin will maintain a compliance repository on its GitHub, available under the Apache License.[25]

[24] Veronica Root, The Compliance Process, 94 IND. L.J. 203 (2019).
[25] Apache License, Version 2.0 (January 2004).

III. Autonomous Governance

Voting is a method by which collective information is processed to determine consensus. A consensus is a defined majority or agreement. Voting happens across industry – in corporate shareholder meetings and political elections. In fact, voting is important because the right to vote is the central tenant of modern democracy, but also because it is a principle means for business practice. Thus, its integrity critical to modern political societies and economic markets.

In Greece, eight millennia before the modern era, Athenian Democracy developed a new system by which participants could collectively make decisions.[26] Voting is an ancient tradition in human history. Yet not much has changed about the way in which humans vote more than 8,000 years later. The process of voting remains centralized, with participants relying on a central authority to properly express their voice. The decentralized voting problem concerns the process by which groups makes decisions, specifically securing systems across information networks.

A. Promoting Participation

One of the best measures for a blockchain network's success is the number of participants actively involved in its ecosystem. The Choice Coin Network is intrinsically designed to draw and retain members through an optimized participation structure. Choice Coin offers three main methods for participation in the Choice Coin ecosystem. However, Choice Coin's inclusive strategy may be amended to include more participation options over time. The three main participation options are democratic involvement reward incentives, charitable contributions, and open innovation and development.

Community and civic involvement are crucial to growing the Choice Coin Network. As such, Choice Coin will offer rewards to users who participate in the political process by various means. In fact, a specific silo will be allocated toward democratic participation. This will allow the Choice Coin community to earn Choice Coin in exchange for civic engagement activities. Activities which may be rewarded are writing a letter to an elected official, drafting a legislative proposal, or writing an article about a particular candidate's positions on cryptocurrency.

A critical component for Choice Coin is Choice Charities, an initiative focused on giving users a choice in Network charitable contributions. Users may vote using Choice Coin, to allocate Choice to charities through a decentralized decision process. In some circumstances, the charity receiving the most votes may then receive a certain amount Choice Coin. Charities within the Choice Charities Network must be a registered non-profit with tax exempt status, to ensure the integrity of the initiative.

Open innovation is a key character trait for the borderless economy, as well as a critical component to the technical edge, across innovative industries like quantum computing, AI, and blockchain. The technical edge refers to the most novel and advanced technologies in existence and operation. As such, Choice Coin will promote open innovation of its platform through

[26] Cammack, Daniela Louise. 2013. Rethinking Athenian Democracy. Doctoral dissertation, 13-14 Harvard University. (2013), http://nrs.harvard.edu/urn-3:HUL.InstRepos:10423842.

developer rewards and micro-grants. The micro-grants may be issued through various mediums, such as GitCoin or the Algorand wallet, and will promote open innovation on the Algorand Network and Choice Coin GitHub. Moreover, the open innovation program may also include providing rewards to writers, to encourage valid and vetted information dissemination across the Choice Coin and Algorand Networks.

The Choice Coin Network will support the Algorand Network more generally through this open innovation mechanism – like the way in which Uniswap and GitCoin are supporting assets on the Ethereum Network. But what will ultimately separate Choice Coin from every other asset is that Choice Coin is capturing the technical edge in open voting innovation. Critically, Choice Coin is an open source project and encourages open development from its Community, in the form of software available under the Apache License.[27]

B. Fortior Voting Protocol

Choice Coin powers the Fortior Voting Protocol, which supports decentralized decisions. The Fortior Voting Protocol enables organizations to decentralize their decision-making process, thus reducing barriers to entry to blockchain technology and integration. It also records the data on the Algorand Blockchain for the purpose of both storing information and aggregating votes to record the eventual winner.

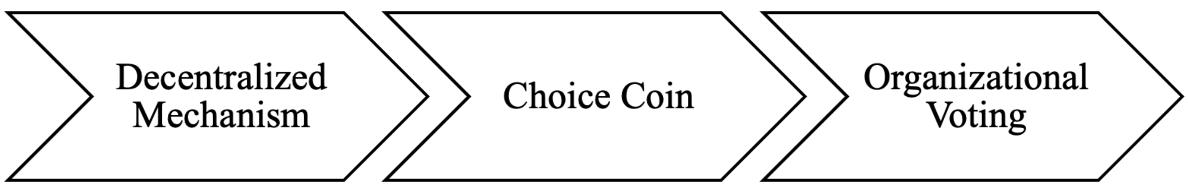

Figure 6

Figures 6 illustrates the Fortior Voting Protocol as a three-step process, where an organization implements a decentralized voting mechanism; a voting token based on the Choice Coin architecture is distributed to all members of the organization; and voting occurs, with the results recorded and tabulated on the Algorand blockchain.

The Fortior Voting Protocol is simplified toward perfecting process efficiency. The Protocol allows organizations to assign votes to participants and governments to assign votes to populations. Voting processes using Choice Coin may be open or closed to the members of a particular organization. The decisions or proposals will each have dedicated addresses on the Algorand Blockchain with constituent addresses compiling the votes. For example, votes may be tabulated through stateless smart contracts that send one Choice to an address for the decision. Throughout the streamlined process the administrator may stop counting at any time to tabulate the results. Ultimately, the results are computed through a stateful smart contract counting the number of votes.

[27] Apache License, Version 2.0 (January 2004).

The specific advantage the Fortior Voting Protocol provides is the ability for the entire voting process to be securely decentralized. Each voter's information is stored in a secure database and protected by post-quantum cryptography. For additional protection, decentralized databases may be siloed to reduce risk for scaled security threats. The voter may use a secure key to initiate the voting process. This allows for a remote voting process that retains security, thus further reducing barriers to entry for voting with the Algorand Blockchain.

The Fortior Voting Protocol emphasizes the allocation of proper weight given in decision-making processes. Specifically, an embedded intelligence enters parameters into the stateless smart contract upon successful validation of the voter's identity using the secure key. The specific parameter is the stake, which is both recorded in the database and entered by the voter for validation. The stateless smart contract then sends a certain number of assets to a decision address, which uses an Algogeneous smart contract to aggregate votes and record results. In short, Choice Coin leverages the Fortior Voting Protocol on the Algorand Blockchain to create secure record of voting decisions. Collaboratively, Choice Coin and the Fortior Voting Protocol will help advance democratic decision making in groups, organizations, and governments.

C. Democratic Decisions

In the world of cryptocurrency transfers, the decentralized governance problem requires formulating a way for participants to reach a consensus on how to distribute data without external interference or governance. For example, if an organization operating under a decentralized system needs a specific way to determine a governance change, the organization will use voting among certain members within the network to reach a decision. Another example is elections, which poll participants across national populations. In both instances, decision-making and governance have long suffered from a lack of equality and access. Specifically, constituents and members are often left out when making organizational or large-scale decisions.

The Fortior Voting Protocol leverages a decentralized ledger and Choice to record votes made by participants. Votes are recorded on the Algorand Blockchain and are made available through the Algo Explorer. The Algo Explorer only records the public Algorand address of the voter, ensuring that an individual voter's privacy and identity are kept private. This is done by hashing the required voter data into hexadecimal form through a SHA-512 protocol.

SHA-512 is also a post-quantum cryptography protocol, ensuring that its collision-resistant property holds even when put up against a quantum computer. This provides assurance that private information is not leaked to malicious attackers. Moreover, the system is both open and secure, providing an improvement over current systems, where voting records and other information are often made public without the consent of participants. Another improvement of the legitimate ledger is the ability for voters to certify that their votes are being counted correctly. The public ledger allows each individual voter to check the voting record of their personal Algorand address, thus serving to increase voter confidence in the democratic process.

Consensus remains a problem in contemporary electoral systems, with most voting protocols using runoffs or recounts to determine the winner. However, this opens the opportunity for malicious players to further attack the voting system and also results in delays that can further prolong the voting process. The Fortior Voting Protocol proposes using quantum technology instead to ensure that consensus can be reached faster. This will be most applicable in situations that require a quick decision to be made.

Quantum computing is specifically used in the Fortior Voting Protocol in cases where there is a tie, or the result is not statistically significant. Quantum computing provides both organizations and voters with a decision that is computationally fair, thus enabling them to reach a decision faster. Consensus is reached by calling a quantum oracle, which samples random values from the quantum computer to determine outcomes when required. The quantum oracle then votes for an available option, which is then declared the winner. The quantum oracle is an optional feature for the Fortior Voting Protocol.

Finally, both Choice Coin and the Fortior Voting Protocol serves to minimize blockades for voters in democracy. A decentralized voting system ensures that all the participants can vote without having to be a part of a closed process or having to wait in long lines. Choice Coin enables voters to express their Choice remotely, thus serving to increase voting participation in electoral processes. All a voter provides is identifiable information and they will be able to fill out the ballot using Choice and the Fortior Voting Protocol. An Embedded Intelligence program then compares the hashes of these values with the hashes stored in a remote database for identity verification. This process ensures that security can be maintained while allowing voters to participate in democracy from the comfort of their homes.

Conclusion

This White Paper introduced Choice Coin, a decentralized voting and governance asset on the Algorand Blockchain. Part I discussed assimilations of Choice Coin with Algogeneous Smart Contracts. Part II defined the Choice asset, including the software systems and computational compliance mechanism. Part III provided processes for autonomous governance with Choice.

Ultimately, Choice Coin is meant to serve as a voting asset that can power autonomous organizations and a participation incentive for decentralizing democracy. As such, Choice Coin's purpose is facilitating democratic participation and secure decentralized voting. Critical to this endeavor is ensuring Choice Coin and its community maintain excellence in ethics and compliance. On the cutting edge in quantum cryptography, artificial intelligence, and blockchain technologies, Choice Coin is inventing through open innovation toward a freer society.