

**SmarTract™**

# SmarTract Protocol

by Lookout Mountain Foundation

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## □ Introduction

The SmarTract Protocol – Revolutionizing how Enterprises create, execute, and administer contracts using smart contracts, seamlessly integrated with an existing cryptographic signature infrastructure already used by a network of Partners and Enterprises that includes nearly 100 million Parties who sign as many as 1 billion contracts annually.

## □ Overview

Lookout Mountain Foundation is launching the SmarTract Protocol (the “Protocol”) to drive adoption of smart contracts by partnering with the existing and expanding Partner ecosystem of SIGNiX, Inc. (“SIGNiX”), the leading cloud-and-mobile digital signature platform based in the United States. By partnering with SIGNiX, this ecosystem is expected to provide a strong economic incentive for the use and adoption of the SmarTract Protocol. Initial participants in the ecosystem are expected to be certain existing SIGNiX Partners in real estate, wealth management, healthcare, and securities transfer, clearing, custodian, and settlement. This white paper makes clear that the plan is to rapidly deploy a multi-chain, open-source project supported by a global marketplace of decentralized applications (Dapps) that will manage smart contract communication and operation, on- and off-chain, for smart contracts of virtually any duration or complexity.

## □ SmarTract Protocol in Brief

Functionally, the SmarTract Protocol is designed to enable an ecosystem that simplifies the creation, operation, and management of smart contracts and provide immutable, decentralized access, and authenticity validation services for associated documents, (the “SmarTract Ecosystem”). The Vision is a fully decentralized Ecosystem, including multiple Operators globally, for all aspects of operation of smart contracts over the entire contract life cycle.

## □ Vision

- 1. Creates, consumes and manages PKI-based identities for parties to digitally sign contracts**
- 2. Creates, consumes and manages workflows to authenticate parties and digitally sign static contracts (e.g., an ISO-standard PDF hashed with each signature for tamper-proof seal before and after every event in the document)**
- 3. Creates smart contracts to autonomously operate the key terms and conditions of legally binding, human readable digitally signed contracts**
- 4. Upon digital signature, executes the smart contract code**
- 5. Facilitates mass creation and interaction with smart contracts:**
  - Short-lived smart contracts that autonomously operate routine actions in simple contracts
  - Complex smart contracts with a term as long as multiple human generations, such as sda trust or brokerage account, which can involve multiple fiduciary service providers, including a trustee, lawyer, accountant, tax advisor, and financial advisor
- 6. Supports an open, decentralized, global marketplace with the potential for thousands of Dapps that are ultimately required for on-chain and off-chain event logging, identity authentication, communication, and interaction with smart contracts of any duration**
- 7. Provides long-term, immutable, highly available, completely decentralized validation of legal evidence under contract and regulatory law**
- 8. Enables cross-chain integration for authentication and validation on major blockchain networks such as Ethereum or EOS.IO**

Each SmarTract will be an automated agreement, composed of a human-readable electronic document that is cryptographically and immutably paired with smart contract code, where the smart contract automates some or all of the contract terms (together, “SmarTract”). Phrased another way, a SmartTract is a hybrid construct, composed of a cryptographically linked, digitally signed, static contract that is the legal evidence in a court of law and a byte-code smart contract, each of which is executed in the proper sequence to ensure legally binding terms are in place prior to the launch of the smart contract.

Initially, the SmarTract Protocol will operate in tandem with the SIGNiX application (described below in ‘The Power of SIGNiX’) as a combination of centralized and decentralized capabilities, but eventually this is expected to give way to a fully decentralized vision of the contract lifecycle as described throughout this paper.

## The SmarTract Protocol combines:

- **simplicity:** a simple user experience with no knowledge of blockchain required
- **privacy:** the confidentiality benefits of public key infrastructure (PKI)
- **interoperability:** standards-based digital signatures compatible with any blockchain
- **reliability:** launched from an existing, high-volume digital signature contracting process
- **flexibility:** multi-chain solution-public, semi-public / invitation-only, and private blockchains

## □ The Problem with Today's Contracts

Manual execution and administration of contracts and regulatory forms over their lifecycles remains a paper-intensive and people-intensive problem with routine tasks often performed by costly professionals, such as lawyers, CPAs, and bankers, as well as internal accounting, legal, and compliance personnel.

Digital signatures improve efficiencies, speed the process of completing contracts, reduce cost, and automate regulatory compliance. Post-signature, however, digital signatures do not address contract administration cost burdens. Contract management systems, integrated with electronic signatures, ensure the rapid creation and storage of electronic contract originals, but they do not eliminate much of the manual human administration of a contract's terms and conditions post-signature. Manual contract administration, interpretation, defense, enforcement, payment, amendment, negotiation, cancellation, dispute, and renewal of contracts causes hundreds of billions of dollars annually in unnecessary drag on the global economy. This friction in contract administration is a costly burden on the real economy (market for goods and services) and in the financial markets that support the real economy.

## □ A Smarter Solution

Famously dubbed by Vinay Gupta as “The Internet of Agreements,” smart contracts might be the first dramatic innovation in contract law and agency in centuries. Smart contracts, a concept first introduced by Nick Szabo in 1996, contemplates a future where contracts are their own ‘autonomous agents,’ and contractual relationships between parties are managed and enforced via smart contract code. “New institutions, and new ways to formalize the relationships that make up these institutions, are now made possible by the digital revolution. I call these new contracts ‘smart,’ because they are far more functional than their inanimate paper-based ancestors. A smart contract is a set of promises, specified in digital form, including Protocols within which the parties perform on these promises.”<sup>1</sup>

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Szabo, Nick. Smart Contracts: Building Blocks for Digital Markets. 1996. [http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart\\_contracts\\_2.html](http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html). Retrieved 2017-10-18.

Creating a smart contract directly addresses the costly problems associated with contract administration post-signature and is critical to a fully automated process. Further, smart contracts are an inherently global solution due to their decentralized nature. To fully realize Szabo's vision, a solution is needed that is readily understandable by people who don't program but who do need to create complex, active smart contracts that perform over time frames that could be decades or more.

## □ Ownership and Operation of the Protocol

To achieve the goals set forth in this white paper, Lookout Mountain Foundation (the "Foundation") will create and distribute the SMRT token (the "Token"). In addition, the Foundation will contract with SIGNiX for the development of the Protocol as well as delegate to SIGNiX the operation of the open source project, community of Protocol developers, the Marketplace, Marketplace Vendors, Operators, and Parties. SIGNiX is expected to be the first user, adopter and operator of the SmarTract Ecosystem, including by using the Protocol to create and maintain SmarTracts, and adopting SMRT Tokens for staking, maintaining a community pool, payment, and other matters relating to the operations of the SmarTract Ecosystem described in this white paper. .

## □ The Power of SIGNiX

The Foundation's partnership with SIGNiX brings a current ecosystem of software Partners already enabling over 100 million digital signatures to be applied to approximately 40 million contracts annually via the installed base of Partners who are converting to digital signatures, typically from paper-and-ink-and-print-and-scan-and-fax. At full penetration of these integrated Partners, the community is expected to have as many as 100 million users who sign an estimated 1 billion contracts annually. This large and expanding community of Partners allows seamless integration for smart contract creation and management. SIGNiX Partners are often the market-leading software platforms in their vertical markets. As a result, the SmarTract Protocol is uniquely positioned to enable some of the largest software platforms in real estate, wealth management, healthcare, and life sciences to seamlessly transition from digitally signed static contracts to digitally signed, autonomous smart contracts for any or all use cases that necessitate future smart contract adoption.

SIGNiX's success as a digital signature platform stems from simplifying the complexity of public key infrastructure (PKI) and strong cryptography for digital signatures. The eight issued SIGNiX patents include the process used to make PKI cryptographic technology operate "infrastructure free" in the cloud with no hardware, no software download, and no key management required by the Parties. Since digital signatures are the prerequisite to launching smart contracts, SIGNiX is uniquely positioned to automate the creation and operation of a smart contract ecosystem.

To sign contracts with digital signatures in high-volume contracting workflows, SIGNiX simplified the use of PKI but maintained its security, privacy, and legal benefits. SIGNiX delivers its present commercial platform via a cloud-based ecosystem of Partners using SIGNiX's web services application programming interface (FLEX API™).



## Existing Market Opportunities

SmarTract can bring enormous value globally to all industries, led by those in which SIGNiX is currently providing a leading digital signature solution, together with synergistic industry software Partners and a large and growing base of Enterprises, Parties, and transactions.

### □ Smart Contract Addressable Market

The lead underwriter in the recent IPO of an e-signature company, MorganStanley, initiated equity research coverage on the e-signature market in June 2018. In that research report by equity research analyst Stan Zlotzky, the global electronic signature opportunity is estimated to represent an addressable market of \$25 billion in annual recurring revenue (ARR). Additionally, the report estimates that the vast majority of the market has not adopted electronic signature, meaning 95% or more of the potential market remains to be captured. Digital signatures are (a) a very large market in mainstream adoption, (b) a prerequisite for smart contracts, and (c) an ideal position from which to launch the SmarTract Protocol for high volume adoption of smart contracts that emanate from existing, high-volume contracting with digital signatures.

How big is the smart contract extension of the digital signature market? The smart contract addressable market is certainly comparable to the digital signature market because the smart contract operates well beyond the initial digital signing process. A single smart contract can operate as long as decades or even multiple human generations (for example, in the case of a brokerage account that lasts indefinitely through wills and trusts).

More importantly, smart contracts substitute very low cost, autonomous computing for expensive, manual, error-prone contract administration by costly professionals, such as lawyers, accountants, banks/payment processors, courts/arbitration, compliance personnel, and regulators, amongst others. The ROI from cost savings on contract administration is much larger with smart contracts than just the move away from ink-on-paper signatures to digital signatures. Partners are already realizing the ROI from digital signatures, and these Partners understand that digital signatures are the prerequisite for smart contracts.

The initial users of the SmarTract ecosystem are expected to be existing users of the SIGNiX platform, who are leaders in various industries described in greater detail below.

## □ **Wealth Management and Securities Trading**

Wealth management and the trading of investment securities is a global ecosystem that performs essential functions for our society and economy. These transactions must be completed and processed efficiently, accurately, and in real time. Records of these transactions must be securely stored and verifiable well into the future. The volume, complexity, and risks that characterize today's global environment present a number of significant challenges that can be addressed by blockchain technology:

- **Different systems can record multiple versions of the "truth."**
- **There are new and previously unanticipated technology threats targeting financial systems.**
- **Many legacy platforms suffer from unnecessary complexity in comparison to the promise resulting from blockchain.**
- **In spite of promises, systems today cannot truly accommodate 24/7/365 processing.**
- **There is a lack of standardized rules associated with numerous types of complex financial transactions.**

There are a number of core blockchain capabilities that can address these critical challenges:

- **Linkage between transactions**
- **Transaction scripts with standardized rules and conditions**
- **Immutable records**
- **Consensus verification**

Based on these technological advantages, blockchain and smart contracts can be used in a number of critical applications:

- **Master data management**
- **Asset/securities issuance, securitization, and servicing**
- **Confirmed asset trades**
- **Trade/contract validation, recording, and matching for complex asset types**
- **Netting and clearing trades**
- **Collateral management**
- **Streamlined settlement**

The ultimate vision for a blockchain-enabled solution is a platform with reduced risks, costs, and delays, and which incorporates:

- **A network and a database with standardized rules, built-in security, and maintenance of internal integrity and history**
- **Smart contracts for sales trades with rules-based agreements**
- **A common, shared version of the truth**
- **Encryption of all data in a common manner**
- **24/7/365 processing**
- **A reduction in manual interactions, data exchanges, data format conversions, and reconciliations with other systems**
- **Reduced time and risk to complete a transaction**
- **Full transparency of transactions/trades**

## □ Real Estate and Mortgages

SIGNiX's existing Partners in real estate serve over 80% of the more than 1.3 million real estate agents in the U.S. Through existing partners in real estate, SIGNiX digital signatures are used for over \$1.5 trillion in home purchases in the U.S. annually. The global real estate market exceeds \$200 trillion, and the impact of blockchain technology and smart contracts is widely anticipated to be revolutionary.

Today's primarily manual process, especially for executing mortgages, is slow, inefficient, very expensive, subject to various forms of fraud, and thoroughly inconvenient for the buyers and sellers of real estate. Utilizing blockchain technology would result in dramatic reductions in the time, cost, fraud, legal intervention and the number of participants, or middlemen, necessary to complete each transaction.

The most immediate use cases and benefits are expected to include:

- **Maintenance of secure and tamper-proof property records**
- **Real time execution of real estate transactions with automated performance of terms**
- **Programmable escrows**
- **Transparent asset lifecycles**
- **Digital title transfers**
- **Real estate transaction data**
- **Automation of securitization from original documents**

SIGNiX's digital signatures are currently used to execute approximately 9.6 million real estate transactions annually for tens of millions of buyers, sellers, and agents. SIGNiX Partner zipLogix is licensed by 100% of the 1.3 million real estate agents in the U.S. that are members of National Association of Realtors. Nearly two-thirds of zipLogix users have added paid access to SIGNiX (private-labeled as zipLogix Digital Ink) for digital signatures today, which serves as a large potential user base for SmarTract.

## □ Life Sciences

Through SIGNiX's life sciences Partners, SIGNiX digital signatures are used by tens of thousands of physicians each month who are managing hundreds of thousands of patients in as many as 500 clinical trials annually. As one of the most heavily regulated industries in the world, the life sciences industry was a pioneer in document imaging and workflow decades ago because of the long duration that clinical trial data must be stored. Despite the Food and Drug Administration (FDA) publishing standards for electronic data and electronic signatures in 1997, clinical trials are still primarily recorded and stored on paper. That is changing rapidly now as FDA 21 CFR Part 11- compliant, cloud-based digital signatures penetrate the clinical trial industry. Further, pursuant to recent FDA guidance allowing for electronic informed consent (eIC) by the patient to enter into a clinical trial as a subject, SIGNiX is launching what is expected to be the largest eIC initiative to date. SIGNiX is launching an eIC process with an Enterprise in a single clinical trial with over 24,000 patients. This Enterprise manages as many as 500 total clinical trials per year.

SIGNiX believes that blockchain is the inevitable next step in satisfying the long-term data management and chain-of-custody requirements for electronic records in the manufacturing and distribution of pharmaceuticals and medical devices. Blockchain enables the permanent recording and private, immutable storage of clinical trial data. Further, health data stored in a secure, trusted and automated way with smart contract enforcement of privacy and regulations could enable patients to aggregate their data from diverse health sources and choose what they share with their physicians and researchers.

## □ Healthcare Services

Secure and accurate storage of healthcare data is essential to protect highly confidential and sensitive personal health information. At the same time, individuals should have access to their patient records and also be able to confidently grant access to clinical and financial stakeholders. Blockchain can enable fast, secure, and authenticated access to personal medical records across healthcare organizations and geographies. Further, blockchain can enable a patient to securely complete all paperwork and sign it digitally. No more clipboard at the doctor's office.

## □ Competitive Advantages

A number of other blockchain-based solutions have been introduced in the smart contract space, although most are in the early stage of development, including EtherParty, Mattereum and OpenLaw. Each of them is focused on use cases supported with standard templates. This approach significantly limits the relevant applications and use cases, as many high volume processes have complex and variable documents not suited to a simple template.

The biggest obstacle early-stage competitors face, however, is the lack of an existing base of customers, users, and contracts. By partnering with SIGNiX, the SmarTract Ecosystem is expected to gain access to an existing base of Partners and Enterprises applying 100 million digital signatures to contracts today. At full penetration, this current ecosystem represents a market of as much as 100 million Parties executing as many as 1 billion contracts annually. Another challenge for most is the limited management and support infrastructure for successfully scaling the initiative.

The technological advantages, including deep experience with PKI and digital signature technology, are extremely beneficial. The robust FLEX API for seamless digital signature integrations serves as the foundation for automating the creation of SmarTracts via the SmarTract API. Finally, there is proven expertise in simplifying complex technology and making it accessible to a wide range of Parties, as reflected in the first implementation of PKI-based digital signatures in the cloud. This capability is essential as the creation and management of smart contracts will be available to Parties with no expertise or understanding of the blockchain or smart contracts.

# The SmarTract Ecosystem

## □ Ecosystem Participants

### Partners

Partners are software companies that are expected to integrate SmarTract into the native user interface of their software applications, creating a valuable new feature that they can sell to their installed base, often under their own brand. Like digital signature Partners, SmarTract Partners are expected to share revenue (SMRT token payments) with the Foundation. Certain Partners will be SmarTract launch Partners and will be allocated SMRT tokens for seeding the ecosystem with the Partner's existing customers. These launch Partners will likely be existing Partners of SIGNiX that have used its FLEX API to create and offer their own digital signature and authentication service in the native user interface of their existing software applications.

- **Typically, each Partner's existing software products already have a large installed base of customers for high-volume contracting in heavily regulated industries, such as wealth management, healthcare services, life sciences, financial services, and real estate.**
- **The Partner's customers are converting to the use of digital signatures from printing PDFs to sign with a pen and then scan/email, fax, or mail.**
- **The addition of digital signatures and the ability to remotely authenticate a person utilizing Knowledge-Based Authentication (KBA) or other identity authentication methods is expected to create a product and revenue opportunity for the Partner, which they sell as a critical new feature in their application.**

Key capabilities that are expected to be offered in the SmarTract Ecosystem by our first launch Partner, SIGNiX, using their proprietary technology include:

- **authenticating signers remotely in accordance with best practices and with regulations like Patriot Act, AML, and KYC**
- **digitally signing contracts using PKI-based digital signatures**
- **creating and managing complex authentication and signing workflows specific to any given regulated industry, such as the FDA, the IRS, and HHS (HIPAA), amongst others**
- **managing the capture of discrete data from forms and PDF fields and transmitting via XML for the Partner's systems of record**
- **relaying to the Partner's system and to the Parties the human-readable, digitally signed contracts and related legal evidence via ISO-standard file formats, such as PDF or XML**

A partial list of SIGNiX's existing Partners who are bringing new users daily includes:

- **The largest securities clearing firm in the world**
- **The largest for-profit healthcare services provider in the world**
- **The leading cloud-and-mobile platform for residential real estate with greater than 75% U.S. market share**
- **The leading professional income tax preparation software firm in the world**

## □ Enterprises

Enterprises are not the same as “Partners” but instead are direct customers – such as corporations, governments, educational institutions, and other organizations who purchase a license for use by their employees, agents, and customers. Typically, Enterprise licenses are paid for with fiat currency. However, SmarTract will enable the acquisition of SMRT tokens required to operate that license through integration with third parties.

## □ Parties

Most Parties interact with signing and authentication workflows only via invitation from a transaction initiator, such as an Enterprise or a Partner. Invited Parties operate in identity authentication and signing workflows and sign documents without needing a license or software download and without knowledge of the sophisticated public key infrastructure, strong cryptography, and blockchain technology they are using.

Parties to contracts generally include:

1. Employees or other agents of an Enterprise
2. Employees or other agents of a customer of a Partner
  - a. For example, a broker/dealer customer of Pershing's NetX360 system is a customer of a Partner, namely Pershing. Financial advisors and other employees of broker/dealers initiate transactions on Pershing's NetX360.
3. Parties to contracts that are not 1) or 2) above. Typically, these Parties are customers of an Enterprise or customers of a Partner's customers.

Like Enterprises and Partners, all Parties need a means of organizing and managing the lifecycle of the smart contracts to which they are a Party. The SmarTract solution is the SmartVault. Subsequent to smart contract creation, each Party must be able to securely and privately utilize their proper credentials to access, operate, change, cancel, dispute, retrieve, and validate their smart contracts. Due to the adoption of certain PKI standards in the blockchain protocol, only certain forms of digital identities and cryptography are valid for use on public or private blockchains.



## □ Vendors

Vendors are entities that sell components or services that utilize the SmarTract Protocol in the SmarTract Marketplace. The SmarTract Marketplace is expected to include various prebuilt SmarTract templates that Partners and Enterprises can license for use, custom-built templates, SmarTract code snippets for the SmartCanvas, and Helper Dapps that provide on-chain and off-chain services to SmarTracts. See later sections for more information.

## □ Validators

Validators are Marketplace participants that verify or certify the integrity, security, and correct operation of components before they are accepted for inclusion in the Marketplace. Validators may be companies or individuals that specialize in testing and security services, or they may be Vendors that achieve a predetermined reputation score.

## □ Arbiters

Arbiters settle disputes that may arise involving Marketplace components or services. Arbiters may be professionals that choose to offer their services via the SmarTract Protocol, or they may be select Validators with a predetermined reputation score. Initially, SIGNiX will serve as the Arbiter until more Validators are able to build up a reputation score.

# The SmarTract Protocol

The SmarTract Protocol brings static, digitally signed documents into the smart contract era to operate a contract's terms and conditions autonomously. The SmarTract Protocol cross-links the terms and conditions of an electronic document that is a digitally signed, human readable document with the elements of code that make up the associated smart contract.

Smart contract elements, like expiration, payment, termination, delegation, renewal, and other terms are incorporated using an easy to use interface or SmarTract API calls. The key to this step is cryptographically linking smart contract elements with traditional digitally-signed contracts. The SmarTract Protocol is expected to be used in conjunction with third party proprietary applications, such as SIGNiX, which will be used to authenticate identities, and digitally sign ISO-standard PDFs.

SmarTract is designed to allow changes to be proposed and code blocks programmatically altered through a distributed negotiation service that is a foundational Helper Dapp that will be a part of the SmarTract Ecosystem. The code snippets all link to specific text -- terms and conditions in the digitally signed contract -- which will allow users to see how the SmarTract relates to the digitally signed, legally enforceable document. In this way, the contract's legal evidence will be cryptographically linked to the SmarTract and memorialized in off-chain and blockchain-based event logs (audit trails), which is the standard in places like the EU, much of Asia, and specific national agencies in the US, such as the FDA and the IRS. SmarTract will record the hashed information from the digitally signed contract in the applicable distributed blockchain ledger for future validation against the human readable contract (available offline as an ISO-standard PDF). The off-line, digitally signed PDF can be cryptographically validated from the hash on-chain, programmatically from any Internet connection.

Once executed, a SmarTract will rely on an interconnected ecosystem of traditional, centralized, off-chain services as well as decentralized, blockchain-based services in the form of Dapps to help manage and operate a SmarTract. These services are referred to as Helper Dapps. Helper Dapps are open source, foundational functionalities delivered in the Protocol. Helper Dapps make it easy for third parties to create Dapps in the Marketplace and extend the capabilities of SmarTract. For example, a SmarTract Helper Dapp will communicate with Parties about dates, like reminders and warnings, or when certain terms require attention, such as auto-renewal dates, notice dates, cancellation notice dates, and in-service dates. This all occurs via SMS, email, or other methodology from any third party communication system which wants to adopt the message traffic (e.g., a Twilio SMS Helper Dapp or a Mailgun Email Helper Dapp). More than 20% of SMRT tokens are being allocated to incentivize key stakeholders in participating in the Marketplace as Helper Dapps in order to ensure that their legacy, high-volume processing systems that do high volume off-chain, can communicate with and take advantage of the new SmarTract platform.

Every SmarTract generated will include a link to a SmarTract Dashboard, where details of each SmarTract can be seen by all applicable Parties and designated agents, on matters including the latest update on terms, time until expiration, and the ability to download an authenticated (via blockchain hash entry) set of signed documents that underlie the SmarTract. Even new contracts and addenda can be added, initiating spin-off documents and smart contract workflows.

SIGNiX will publish an easy-to-use SmarTract API using the Protocol through which software vendors and Enterprise users can publish their own code blocks, Helper Dapps, and templates. Payment gateways, banks, rental systems, and insurance platforms, could all create their own content that allows for easy insertion into SmarTract workflows and increases the volume of SmarTracts and diversify the set of use cases for the platform.

SMRT Tokens are expected to be adopted by users and operators of the SmarTract Ecosystem for all transactions, including to create a SmarTract and to keep contracts and services in operation. The Foundation will also use SMRT Tokens to incentivize third party software Partners to offer their own branded services, incorporating SmarTracts via APIs and staking methodologies, See “Tokenomics” for further information.

There are four distinct elements to the SmarTract Ecosystem, three of which (Core, Helper Dapps and Marketplace) are described in detail here, and the fourth (SmartCanvas) is described in the Roadmap.

## □ SmarTract Core

The SmarTract Core defines how a SmarTract is created, linked, and referenced on the blockchain. Core also dictates how any digital signature and workflow solution initiates the process and executes the smart contract.

Digital signatures and other cryptography are mandatory for this solution as (a) digital signatures are specified in the blockchain Protocol itself, and (b) digital signatures use PKI, which logically links (via hashing on- and off-chain) the two elements (PDF and smart contract) together and also triggers the activation of the SmarTract itself. The human readable elements of the electronic document should be maintained for future reference of the SmarTract, as explained above.

Of critical importance, SmarTract Core will also standardize how events in the SmarTract are memorialized in the blockchain to allow for later auditing. Events from the signing process as well as post-signature actions during the operation of the SmarTract will be displayed in the Dashboard as explained later in this white paper. Initially, blockchain-based events will also

be memorialized in off-blockchain, traditional audit trails used in the SIGNiX digital signature system. This promotes redundancy, privacy, and other compliance requirements, as well as integrity of the transaction record. Aspects of the PDF ISO standard, possibly including extended metadata and PDF portfolios, will be considered for their suitability in maintaining this reference.

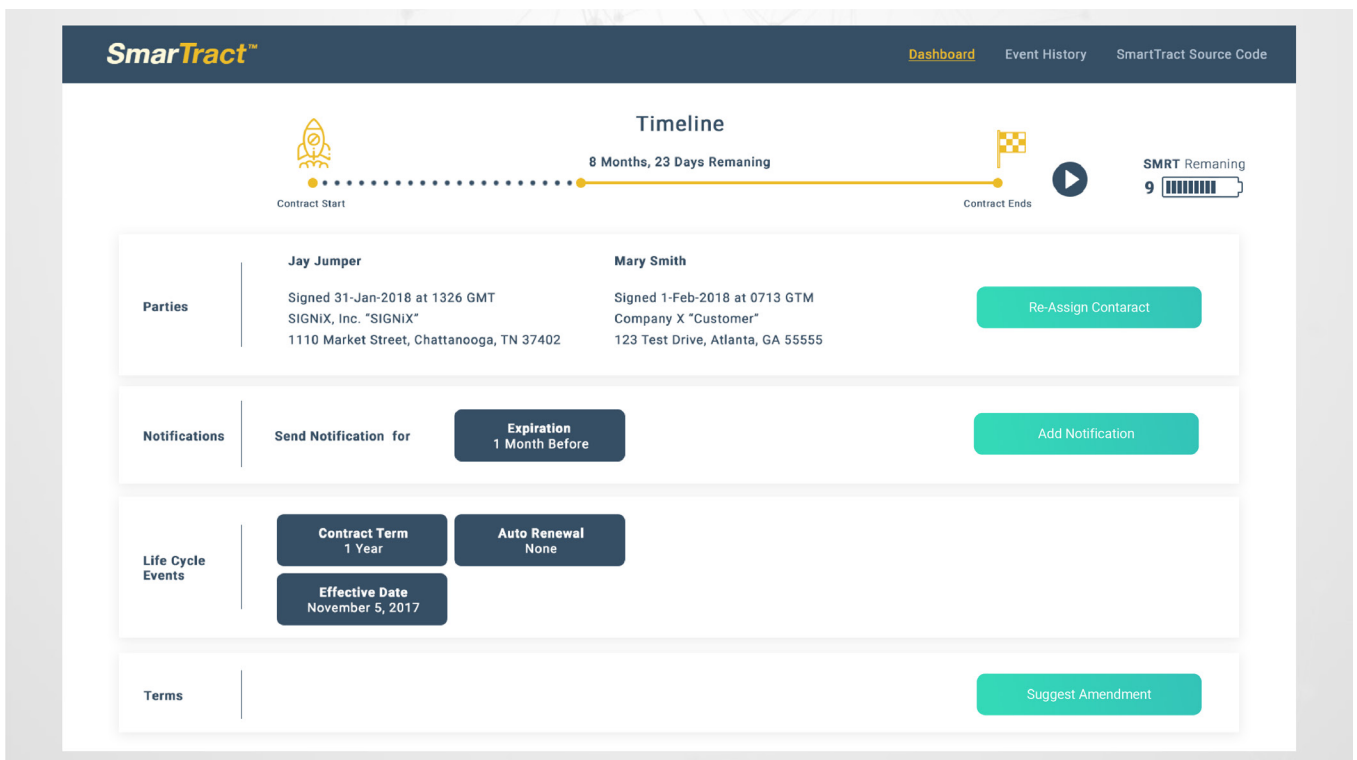
Aspects of the Core and resulting APIs will act as an abstraction layer on top of Solidity (or other languages like it) to allow for the easy creation of code blocks ('snippets') based on natural language processing of input electronic documents, as well as negotiation and assembly of an executable SmarTract.

As explained later, the initial SmarTract release is designed to integrate with SIGNiX's existing digital signature platform. Upon workflow initiation, the service contacts each Party asking them to consent, review, fill, and then approve, acknowledge, initial, or sign the documents in a cloud-based platform. The SmarTract API will extend the traditional digital signatures for contracting to create flexible, complex, smart contracts that also tie back to the original legal evidence and Parties as required under present law in high volume, digital contracting in the US, EU and Asia. Future releases will bring generic digital signatures into the open Protocol, allowing anyone to create and manage digital signature workflows together with smart contracts.

Adding SmarTract to this established process for authenticating signers and facilitating digital signature workflows is a natural extension. The combination of these two steps also minimizes confusion by properly sequencing the steps and reliably avoiding divergence between the electronic document (PDF contract) and the smart contract. In addition, both the smart contract and the legal evidence required under contract law are unified with the same strong cryptography that created the digitally signed contract. During the signing process, an extra workflow step will be inserted to show that the SmarTract will also be executed and reference the completion of the negotiation/approval process, if included. Parties will have another opportunity to review the contract elements prior to final signature.

SmarTract Core will standardize how these digital signatures tie to both the electronic documents and the smart contract, as well as execute the smart contract itself. It is designed to be extensible to support further capabilities, including compatibility with other smart contract formats as well as additional roadmap functionality, such as negotiation.

Finally, SmarTract Core also handles interaction with and management of the SmarTract Dashboard. Each SmarTract processed through the platform is visible via a Dashboard from which its status can be ascertained at any time during the lifetime of the SmarTract and even afterwards (if that option is enabled and paid for). The Dashboard will graphically show where the SmarTract is in its term, which events have been triggered, who the Parties are, and other key terms. It also serves as an audit trail, allowing Parties to the agreement and other Parties with standing to see specifically what has occurred during the execution of the SmarTract code.



The Dashboard provides the Parties to the SmarTract with the capability to trigger out-of-band notifications, amendments, updates to contacts, reassignment, and even termination.

The Dashboard will be designed via the SmarTract API. Third parties could create their own Dashboard elements and workflows for best practices on a given industry's customary contracts. This will include the ability to create an interface to read and interpret status, code blocks, and stored SMRT tokens from a SmarTract and publish those to a Dashboard, as well as the status of Helper Dapps servicing the SmarTract.

## □ **Distributed Contract Environment: Helper Dapps & Marketplace**

The SmarTract Ecosystem is designed to be operated from the blockchain via an interconnected web of Dapps that, in turn, may interact with external actors.

These Dapps are actually their own sets of SmarTracts which execute code, change state, and act based on messages from other SmarTracts and data feeds from external sources (a/k/a Oracles). More complex contracts that rely on more sophisticated Dapps will cost more to operate. All aspects of the SmarTract platform are effectively Dapps, but, in order to assist with understanding, we separate Dapps into two categories: SmarTract Core and Helper Dapps. SmarTract Core is what cryptographically links the smart contract with the static, digitally signed, human-readable, legally binding contract.

Helper Dapps, on the other hand, act as support for SmarTract, without having to build that capability into the SmarTract Core itself. The intention of the SmarTract Core is to drive a thriving ecosystem that will be attractive for third party services to participate in. Partners are seeded tokens to stake each new SmarTract and allow initial operation of a SmarTract by a Partner using some of their allocated tokens for initial units of use without cost.

Helper Dapps provide capabilities for SmarTract from both blockchain and non-blockchain services and are incentivized with allocated SMRT tokens from the token distribution. Payment will be accepted in SMRT tokens, and service providers will also provide staking of tokens to offer quality-of-service (or “QoS”) and lifecycle coverage guarantees. Helper Dapps are designed to operate via entries in the blockchain after a certain number of miner confirmations. The SmarTract Protocol seeks to standardize that notification methodology to allow any service to create, run, and operate Helper Dapps with minimum specialized knowledge. This Marketplace should also allow for the creation of decentralized, redundant services that overlap, providing a competitive market for the Dapps that support mass deployment of smart contracts via SmarTract.

The Protocol will also standardize how these services publish QoS data and allow SmarTract to automatically choose Helper Dapps based on such data. Effectively, SmarTract can call a broker that looks through all the services that perform the same functions and pick one, maybe each time a SmarTract needs the service or on some other schedule. Then other providers could add additional Helper Dapps in the same category of service and register it with the broker.

The complete decentralization of the SmarTract platform and contract operation is paramount. However, based on the current state of the blockchain and its inability to efficiently execute certain tasks or provide specific capabilities, such as a reliable timestamp, that will be critical for many contractual obligations, the Protocol is a hybrid, extensible model. This will take advantage of the blockchain for what it does best, while also relying on off-chain, sometimes centralized services to perform basic functionality that can be provided at a lower cost. As the ecosystem evolves, solutions are emerging that address these shortcomings, and the ecosystem is expected to become more decentralized as more parties participate in the ecosystem.

## □ Helper Dapp Categories

### Document References and Storage

In the example presented above, specific references to the electronic document text for each code block, as well as for the document and audit trail of the signature process itself, are maintained in SmarTract. They collaborate with external storage services, incentivized by tokens to maintain these documents for at least the term of the contract, if not longer, based on what was initially stipulated. Extended examples might include Enterprise systems of record, such as Microsoft Dynamics, SAP, Oracle/NetSuite, and Workday.

### Timeline References

Most, if not all, contracts contain provisions that operate based on time, including: effective date, expiration, and renewals. Therefore, this is a critical section of the SmarTract which will interact with a variety of Dapps to perform functions over the term of the agreement.

Time itself is an interesting concept in the world of the SmarTract Protocol, with time being recorded by blockchain miners in each block but with some lag based on when confirmations of mined blocks and chains come into effect. With that in mind, multiple approaches<sup>2</sup> will be considered for redundancy in the operation of SmarTract, including pulling data feeds from Oracles.

### Messaging

SmarTract will need to communicate with various players. This could be via email, SMS, secure chat, or other methodologies. For example, in the case of email delivery, the traditional approach would be to contract with a specific mail service provider (MSP) or to set up mail servers directly. In the Helper Dapp model, multiple MSPs create Helper Dapps to offer mail delivery services in exchange for a fractional SMRT token payment. These services would then compete based not only on projected SMRT cost but also quality of service (QoS), expected performance, or time to send.

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<sup>2</sup><https://ethereum.stackexchange.com/questions/42/how-can-a-contract-run-itself-at-a-later-time>

### Examples may include:

1. Email messaging providers, such as MailGun, Gmail, and ConstantContact
2. SMS providers, such as Twilio and MessageMedia
3. Secure chat, such as WhatsApp and Telegram
4. Inter-blockchain: for example, blockchain A verifies an event on blockchain B

## Oracles

SmarTracts are influenced and triggered by events and actions taken outside of the blockchain (“off-chain”). The initial Ethereum specification and yellow paper written by Gavin Wood describes the concept of data feed contracts, which give “access to information from the external world within Ethereum.”<sup>3</sup> Oracles are the only way for smart contracts to interact with data outside of the blockchain environment.

In SmarTract, Oracles will be incentivized with SMRT tokens. The SmarTract API will provide a standardized mechanism by which Oracles can publish data feeds, Helper Dapps can subscribe to them, and Oracles earn fractional SMRT tokens for the operation of their Helper Dapps. In addition, polling capability will also be defined to allow for interval-based checks on trigger points, such as market prices or subscription management systems.

## Addenda and Substantial Contract Changes

SmarTract will also allow for the amendment of, and creation of addenda to, a SmarTract. It is likely such changes will result in a new SmarTract which will reference and incorporate the existing SmarTract, wrap it, and be negotiated and executed in much the same way as the initial SmarTract. As noted above, Parties to the amended agreement would be required to pay a specified amount of tokens to amend any SmarTract.

## Other

Helper Dapps could run services closer to the SmarTract Core, offering new capabilities as yet unexplored. Helper Dapps could even become part of the neural net / machine learning aspect of document analysis, improving on the initial specifications proposed for SmartCanvas in the Roadmap.

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<sup>3</sup> Section 12.1. <http://gavwood.com/paper.pdf>



**Helper Dapps could also include authentication and dispute resolution functionality, including:**

1. On-chain identity verification and management, such as Authy, uPort, and MEDICI
2. Off-chain Dapps for KYC, SMS, KBA and other identity authentication services, such as IDology and Experian
3. Interactive on- and off-chain pricing, renewal, cancellation, negotiation, and dispute resolution:
  - a. Parties to SmarTracts will need to permit access to smart contract processes for lawyers, arbiters, judicial officers, regulators, law enforcement, etc.

# The SmarTract Marketplace

As explained above, the SmarTract Protocol is designed to drive innovation and competition through open standards, an open-source, multi-chain ecosystem, and SMRT-based incentives. Competition is key to maintaining an economically viable marketplace of services that provides an ever-growing list of actions, events and capabilities that encourage SmarTract creation. The SmarTract Marketplace is designed to be an open platform by which third parties can participate in the ecosystem.

## □ SmarTract Marketplace

The Foundation will initially contract with SIGNiX for the operation of a SmarTract Marketplace. Several services are expected to be made available in the SmarTract Marketplace, as described below.

### SmarTract Templates

Whole SmarTract transaction templates can be provided by Vendors who create Dapps. Those templates can be used by anyone in the ecosystem. In addition to custom SmarTract Development where Partners or Enterprises can request development of a SmarTract transaction template, and Vendors can bid on development rights.

### SmarTract Components

Vendors can create new components that can be used in the SmartCanvas.

### Helper Dapps

Vendors can develop Helper Dapps that are usable from SmarTracts. A Helper Dapp can either compete with existing ones in an established functionality pool, or it can be the first Dapp in a new pool.

All of these services work in a similar way, as outlined in the following sections that describe how the Marketplace operates for general use SmarTract templates. The Marketplace is still in the early design stages, so changes and refinements are expected.

All fees and stakes in the Marketplace are expected to be paid in SMRT tokens.

## □ Marketplace Design Principles

The Marketplace will use reputation and staking to incentivize production of reliable components.

**Staking works according to the following rules:**

1. Participants need to be willing to lose more than they could have earned.
2. Each participant should stake an equal amount in arbitration so that the winner at least breaks even after the Arbiter's fee is withdrawn.
3. The Marketplace must enforce collection of all stakes. If a stake is required at a point where a participant might not provide it, then the stake must be collected at some earlier time when the participant would provide it.

## □ Component Creation

A new Marketplace component can either be created directly by a Vendor who wants to offer a component or service, or at the request of a customer. The case of a customer request is more nuanced and will be described in a later paper.

Components offered for general use should be validated by a third party before becoming available to customers. Custom components created for a specific customer may only be validated by a third party if the customer requires it.

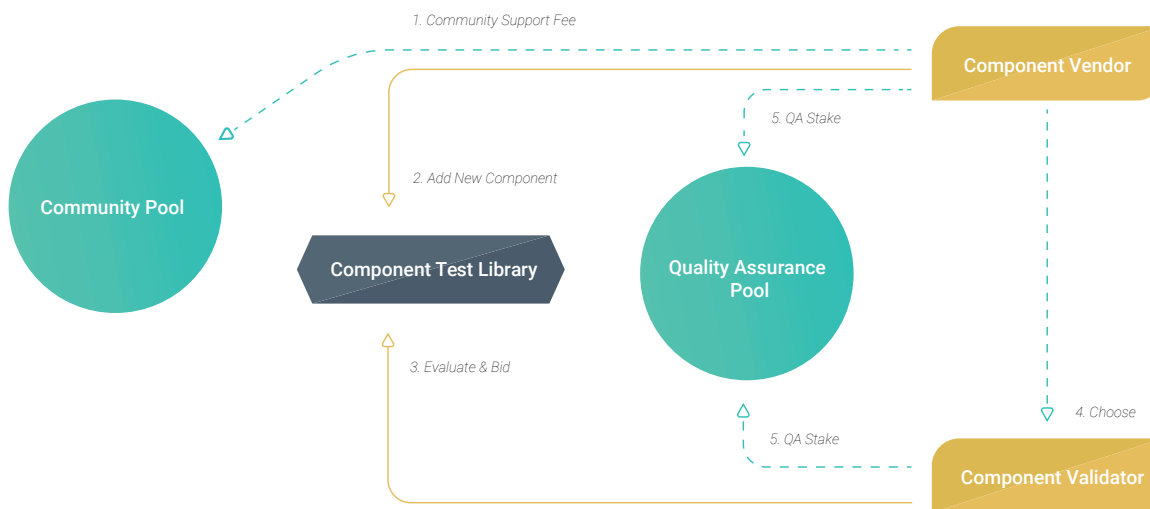
## □ Vendor Creates Component

The case of a Vendor creating a new component offering on their own initiative is shown in the diagram below.

The Vendor develops the component and tests it thoroughly until they are satisfied with it. Then they pay a new component fee to the Community Pool and upload the component. If they want to use the SmarTract validation service, the upload goes to the Marketplace test library.

Component Validators see the newly added component, and place bids on validating it. A bid may consist of a test plan and a price. Validators may base their price, in part, on the reputation of the Vendor.

The Vendor chooses the bid that they prefer, based on aspects of the submitted test plan, price, and reputation of the Validator. Once the Vendor chooses a bid, they notify the winner. Both the Vendor and Validator must then stake an equal number of tokens into the QA pool.



## □ Component Validation Process

Validation proceeds in rounds. The Validator tests the component according to the plan in their bid. If they find problems, they inform the Vendor. The Vendor updates the component and the Validator tests it again.

In each round, the Validator runs a complete set of tests according to the plan, and includes the result of each test in their outcome report for that round.

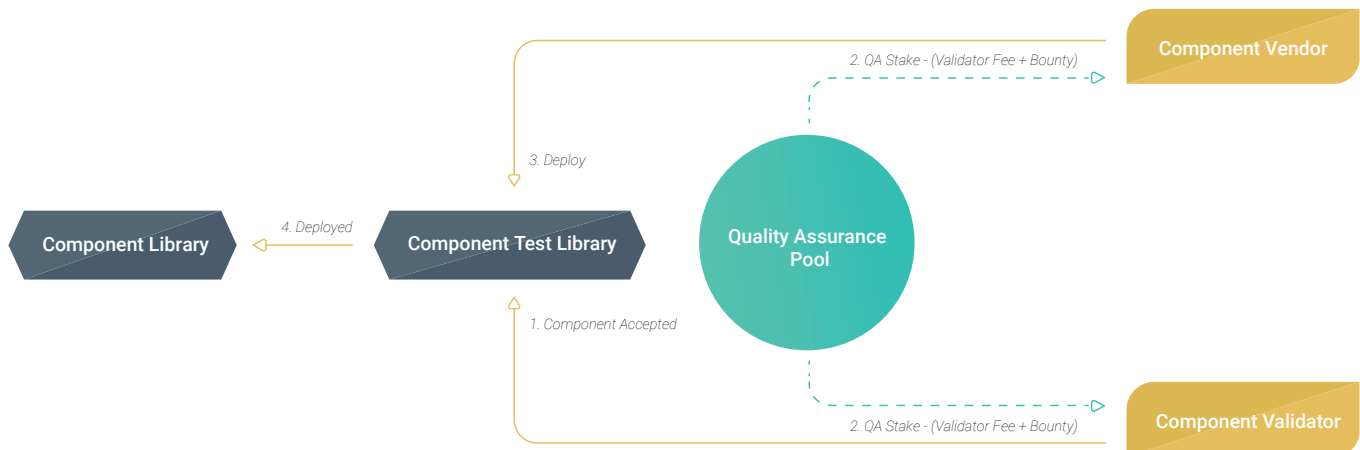
If the Validator doesn't complete the validation process within the time limit offered in the bid, both their stake and the Vendor's stake go to the Vendor.

If the Validator completes the process, they receive their stake, plus their fee, plus a bounty, and the Vendor receives their remaining staked funds after subtraction of the fee and bounty.

The bounty is based on the number of bugs that were identified in each round. Greater weight is given to earlier rounds. The Validator therefore maximizes their profit by finding as many bugs as possible, as soon as possible. The Vendor minimizes their validation costs by testing components as well as they can before submitting them for validation.

The validation process succeeds if all tests pass within the number of rounds and total time limit offered in the test plan. Otherwise, it fails.

If validation is successful, the Validator marks the component as accepted. When a component is marked as accepted, the Marketplace allows the Vendor to deploy the component into the component library where customers can see and use it. When the Vendor deploys the component, they set a price for its use. Vendors may change the price at any time.



If validation fails, the Vendor can either withdraw the component from the test library, or optionally update it and then solicit new Validator bids.

## □ Validation Arbitration

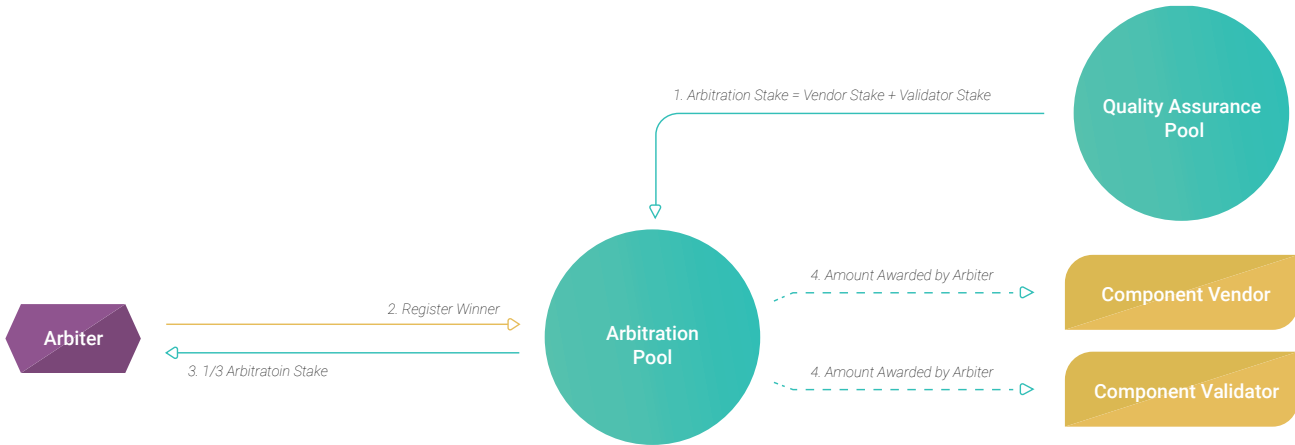
If the Vendor and the Validator have a disagreement about any part of this process and are unable to resolve it themselves, then either one of them may invoke arbitration.

At the beginning of arbitration, the QA stakes of both the Vendor and Validator move to the arbitration pool. An Arbiter is appointed at random from the available Arbiters.

Each side makes their case to the Arbiter and answers the Arbiter's questions. Then the Arbiter decides the winner.

The Arbiter is paid a portion of the arbitration stakes, regardless of the arbitration outcome. The remaining stake is paid as directed by the Arbiter.

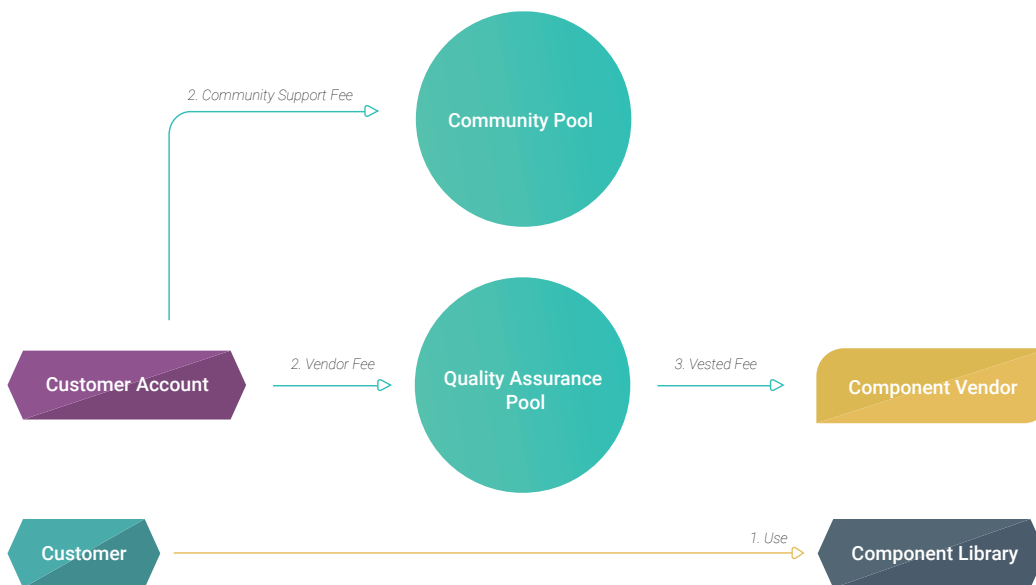
Validation immediately either succeeds or fails according to the normal rules, except that the stakes have already been paid out.



## □ Component Use

Customers may browse the component libraries of the Marketplace and choose components for use.

When the customer starts a SmartTract transaction that includes Marketplace components, the customer is charged the fee set by the Vendor. A small charge goes to the Community Pool and the remainder goes to a Quality Assurance Pool for this purchase. The fee vests over time from the QA Pool to the Vendor's account as described in the Tokenomics section, below.



A customer may report an error at any time, but if they want compensation for the error they must add a stake to the QA pool when the error is reported. The Vendor must match the customer's stake with an equal sized stake of their own. If there are not enough unvested Vendor funds left in the QA Pool to cover the customer's stake, then the amount needed is committed from the Vendor's Engagement Pool.

The Vendor is notified and must evaluate the error report. If they agree that the error is real, or fail to respond within a reasonable time, then the customer's QA stake plus the Vendor's QA stake are paid to the customer. The Vendor must fix the problem and have the fix validated, or risk losing their stakes on other customer's usages as well.

If the Vendor disagrees with the error report, and can convince the customer that the error report itself is an error, then the customer's QA stake is paid out to the Vendor. The other stakes remain unchanged.

If the Parties cannot come to an agreement, then the problem goes to arbitration.

The customer's QA stake plus the Vendor's QA stake go to the arbitration pool. An Arbiter is chosen at random from the available arbiters.

Each side makes their case to the Arbiter and answers the Arbiter's questions. Then the Arbiter decides the winner.

The Arbiter is paid a portion of the arbitration stakes, regardless of the arbitration outcome. The remaining funds are divided as directed by the Arbiter.

## □ **Helper Dapps in the Marketplace**

The Helper Dapp element of the Marketplace will determine how Helper Dapps will be created, operated, and managed, including integrated third-party payment processing and integrations with select third-party token exchanges. The Marketplace will also set up parameters and systems for how Helper Dapps publish quality of service and performance data and handle staking for offering services, so competitive forces can play a role in how services are offered and connected to SmarTract.

Finally, the Marketplace will include a broker system which can look through all of the services that perform the same functions and pick one each time a SmarTract needs the service or on some other schedule. Then other providers could add additional Helper Dapps in the same category of service and register it with the broker.

# SmarTract Protocol Roadmap

## □ Overview

The SmarTract Protocol is expected to launch in 2018 in partnership with SIGNiX. Following launch, the Foundation expects to continue to develop the Protocol in consultation with the community, with an aim to develop and incorporate additional functionalities in the Protocol, including:

- **Applicability to a variety of use cases**
- **Decentralization**
- **Flexibility and open standards**

Six major indices of Protocol development will be tracked, including Core, SmartCanvas, Helper Dapps, Marketplace, Chain Support, and Digital Signature Platform.

## □ Core

The SmarTract Protocol Core will start with basic capabilities and simple use cases and will feature a dashboard, API initiation, and basic templates, document authentication, and smart contract functionality. Core will eventually include support for more complex capabilities such as negotiation of SmarTracts, conditional contract terms, and advanced dashboarding. Additionally, third-party e-signature services will be able to take advantage of the SmarTract Protocol.

## □ SmartCanvas

As use cases build and multiply, additional templates are expected to be offered on the Marketplace. Within a medium time horizon, greater SmartCanvas capabilities are expected to emerge, featuring a default set of code snippets and a more complete set of user experience tools that can be mixed and matched to create a custom SmarTract to complement any uploaded PDF and delivered for digital signature and smart contract creation. This is expected to be offered alongside the API-based initiation (introduced at launch) and include a dedicated front-end that will allow users to upload PDF documents and choose smart contract code snippets that together create a complete SmarTract. The intent is for SmartCanvas to ultimately utilize neural net, machine-learning algorithms to analyze the document with natural language processing to find key terms and contract lifecycle events, such as effective date, parties, expiration, amounts, payees, and payment terms, among others.



## □ **HelperDapps**

Helper Dapps will start simple with basic messaging and time-based services available at launch. In the near term, we expect capabilities such as SmartVault (distributed immutable storage described earlier in this white paper) and payments to be brought online by our launch Partners. As the Protocol matures, other service providers are expected to offer increasing capabilities and services to SmarTract via their own Helper Dapps.

## □ **Marketplace**

Shortly after the initial launch of the SmarTract Protocol, the Marketplace is expected to be launched, and is expected to include an operational version of the staking, validation, listing and other capabilities explained in detail above.

## □ **Chain Support**

While the initial version of the SmarTract Protocol is designed to be operated on Ethereum, the Foundation expects the Protocol to provide multi-chain support, initially for client-operated private blockchains and eventually cross-chain support for other major, alternative blockchains.

## □ **Digital Signature Platform**

The Foundation's long-term goal is create a fully decentralized platform, embracing blockchain from the initiation of a digital signature request all the way through the contract lifecycle.

# Tokenomics

Contracts in wealth management, healthcare, life sciences, and real estate can last decades, even centuries. These types of contracts can soon be implemented as SmarTracts. In order to support its long-term, multi-chain nature, the SmarTract Ecosystem will adopt the SMRT tokens for use in its network.

This section describes the essentials of how SMRT tokens are expected to operate within the Protocol ecosystem.

## □ Funding Community Development

The Foundation will seed existing SIGNiX Partners and Enterprises with tokens from a Community Pool to encourage them to adopt SmarTract. New Partners and Enterprises may also be seeded with tokens to incentivize them to join. As the SmarTract Marketplace becomes available, seed tokens may also be supplied to Marketplace Vendors and Validators to encourage their participation.

Tokens received via seeding must be used within the SmarTract Ecosystem.

The Community Pool will be replenished with SMRT tokens via a small charge for use of the ecosystem. Tokens deposited into the Community Pool will be used to support community governance and community and Protocol improvement and also to encourage continued growth via seeding new participants.

## □ Core Token Dynamics

SMRT tokens are expected to be adopted for use for all transactions within the ecosystem: SmarTracts, the Marketplace, and the SmartVault.

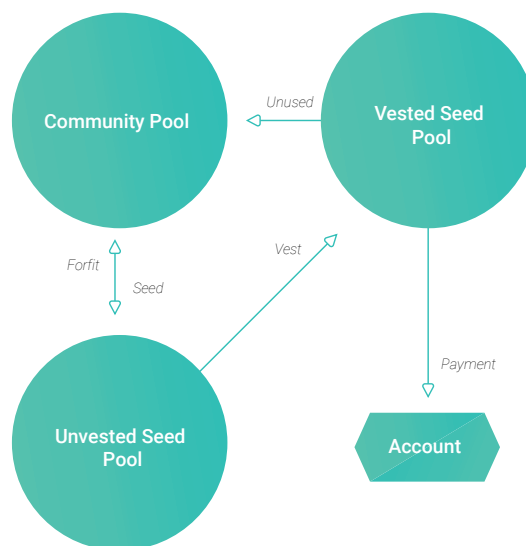
In order to explain how tokens flow through this system, we will examine how a new Enterprise customer, XYZ Corp. joins the community and uses the system.

When XYZ Corp. wants to use SmarTract, they are expected to enter into an agreement with the Foundation or a Partner, who will then provide XYZ Corp. access to the ecosystem.

## □ Seeding

In order to encourage early adoption of SmarTract, new SmarTract customers like XYZ Corp. may be given some number of tokens from the Community Pool at no charge during the seeding phase. These tokens go into an Unvested Seed Pool for XYZ. Some vest immediately and are moved to the Vested Pool, where they can be used to make payments or staking required for SmarTract services. Other tokens vest over time, contingent on continued system usage. If usage doesn't reach a threshold within a vesting period, then the fraction of tokens that would have vested in that period are forfeited back to the Community Pool.

Seeded tokens can only be used for SmarTract payments and staking. If XYZ closes their account without using all of their seeded tokens, any unvested tokens are forfeited back to the Community Pool, and any vested seeded tokens are returned to the Community Pool unused.



## □ Platform Level Staking

All Partners and Enterprises will be required to provide and maintain a minimum stake before they can use SmarTract. Those who receive funds through seeding may have some of the seeded funds applied to create the stake. Those that didn't receive any seeded tokens, or who want to raise their stake with their own funds, can pay the stake directly.

In order to encourage use of and engagement with SmarTract, Partners and Enterprises will be given discounts on their usage fees in proportion to the amount they maintain in their stake. A larger stake leads to a larger discount.

A new discount rate takes effect immediately on the deposit of funds. However, the total discount received for a deposit is capped at the amount deposited until a minimum holding

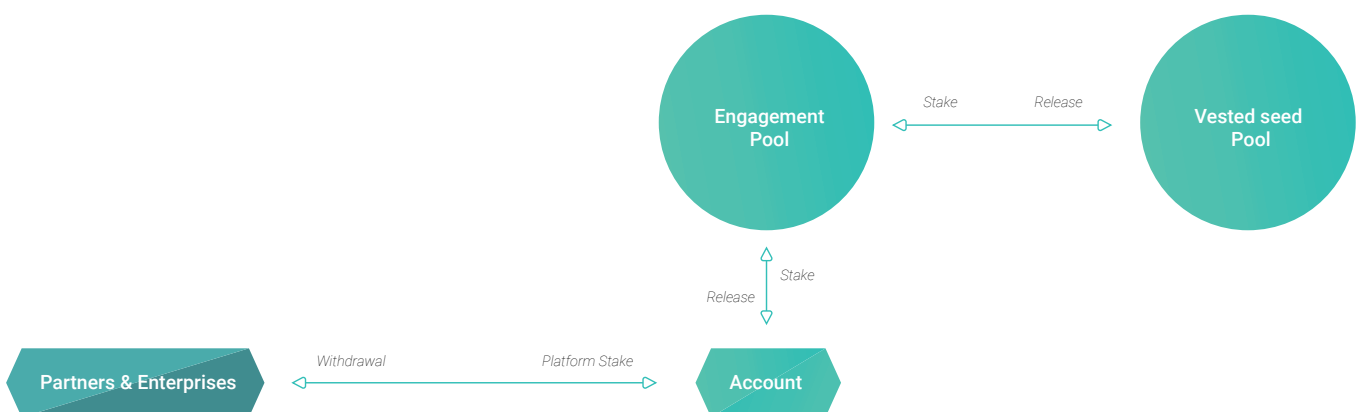
period has elapsed. If funds are withdrawn before the end of this period, the amount of discount received for the funds is deducted from the withdrawal and paid to the operator.

The stake may also be used as a buffer to keep SmarTract services functioning when there are insufficient funds in the customer's account to pay any new fees.

For example, suppose XYZ Corp. has a SmarTract on the Ethereum blockchain. They need to make a function call to this contract through SmarTract, but there are insufficient funds in their account to pay for the Ethereum Gas this function call will require. In this case, funds can be drawn from the platform stake in their Engagement Pool to cover the cost.

Such reductions in the platform stake will lead to corresponding reductions in the fee discount that XYZ receives. If the platform stake drops below the minimum required for usage, then XYZ will not be allowed to start new SmarTracts or run any other SmarTract services that require a fee in SMRT tokens until the stake is restored to at least the minimum level.

Customers may add or remove staked funds at any time. Any seeded tokens released from the Engagement Pool must be returned to the Vested Seed Pool. Tokens staked directly by the Partner or Enterprise are released to their account. The customer may then either withdraw them or allow them to be applied toward payment of fees or future staking.



## □ Fees and Payment

It is expected that various SmarTract service providers will charge a fee for certain services, such as when a transaction is pushed to the blockchain and the parties are invited to come and sign. At this point there will be a charge by the service provider.

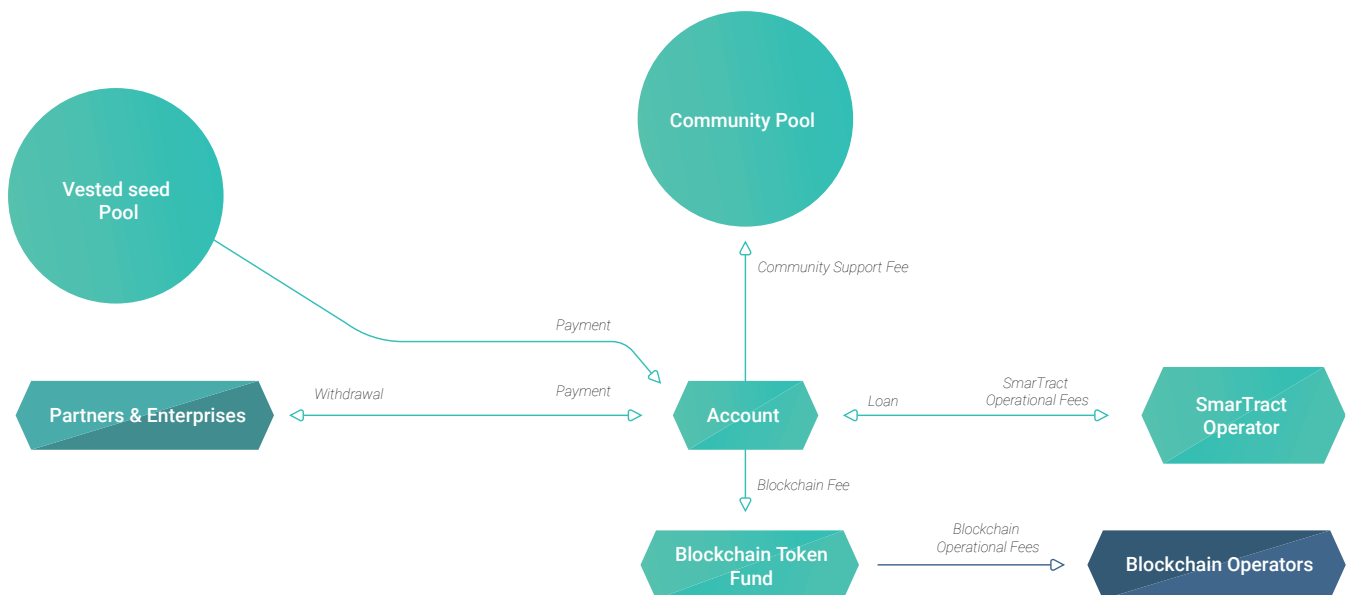
Subsequent interactions with the SmarTracts, such as notifying them of document signings or use of their dashboard, will entail both SmarTract and host blockchain operations. When a

blockchain service is invoked, the SmarTract service provider will pay the blockchain fee from a fund it maintains for this purpose and then charge the blockchain fee plus any SmarTract fee to the account of the Partner or Enterprise associated with the operation.

A small percentage of the fees collected go to the Community Pool, where they may be used to seed other new customers or be applied to other purposes that benefit the community.

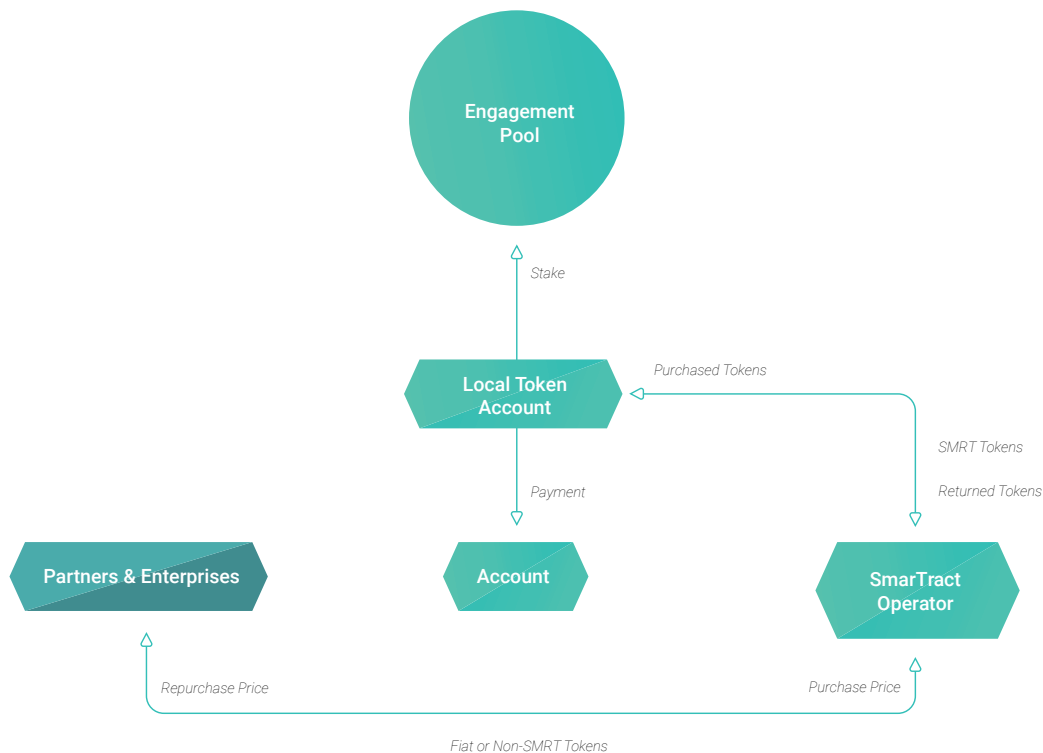
The fees for a customer like XYZ Corp. are subtracted from their account. This account keeps a running total of the fees charged and payments made. XYZ may be required to maintain a positive balance in their account in order to fund continuing operations.

When a payment is due, the tokens to cover it will first be taken from XYZ's Vested Seed Pool. If there are insufficient tokens in this pool to cover the bill, XYZ must supply the rest itself.



When a customer like XYZ Corp. is ready to pay, they have two options for obtaining tokens: a) buy them on the platform from the SmarTract operator, and in turn tokens must be used within the system, or b) buy them from a third party.

XYZ can pay any tokens bought from third parties directly into their account. If XYZ buys tokens from the operator, the purchased tokens go into a local token account that is separate from XYZ's payment account. As with vested seed tokens, locally bought tokens can only be used within SmarTract, for staking or to pay existing fees. The operator may accept payment for SMRT tokens in a range of other currencies, such as dollars, euros, Bitcoin, or Ether.



XYZ is always free to withdraw tokens remaining in their account after fees have been deducted. However, withdrawing all tokens may affect their ability to use the system, as described above.

Note that no seeded or locally-purchased tokens can be withdrawn this way. Seeded and locally-purchased tokens are only added to an account to pay existing fees, so any tokens remaining in the account were paid into it by the account owner.

## □ Token Dynamics in the Marketplace

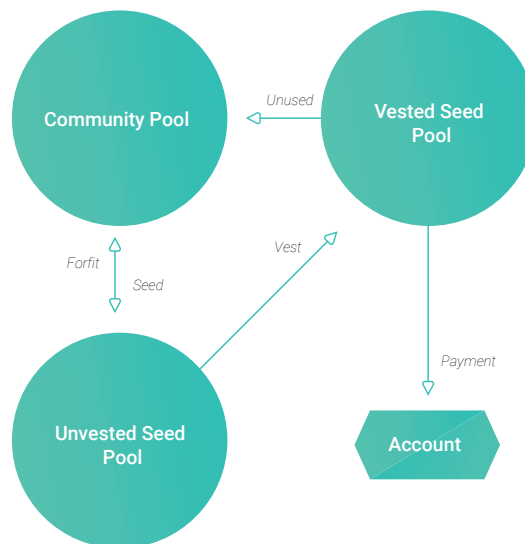
The SmarTract Marketplace is expected to provide several types of services as described earlier in this white paper. For all of the services in the Marketplace, Vendors create or operate components. Enterprises and Partners may use these components for a fee. The correct operation of the components may be verified by Validators, and any disputes that arise can be settled by Arbiters.

When a Vendor, Validator, or Arbiter wants to participate in the SmarTract Marketplace, they first sign a Marketplace agreement with the operator of the Marketplace. Enterprises and Partners participate as customers in the Marketplace, via the applicable choices made in the standard agreements with the Foundation.

## □ Seeding

Marketplace Vendors and Validators may be seeded with SMRT tokens in the same way as Enterprises and Partners. Seeded tokens are provided from the Community Pool. These tokens go into an Unvested Seed Pool. Some may vest immediately and are moved to the vested pool. Other tokens vest over time, contingent on continued system engagement. If usage doesn't reach a threshold within a vesting period, then the fraction of tokens that would have vested in that period may be forfeited back to the Community Pool.

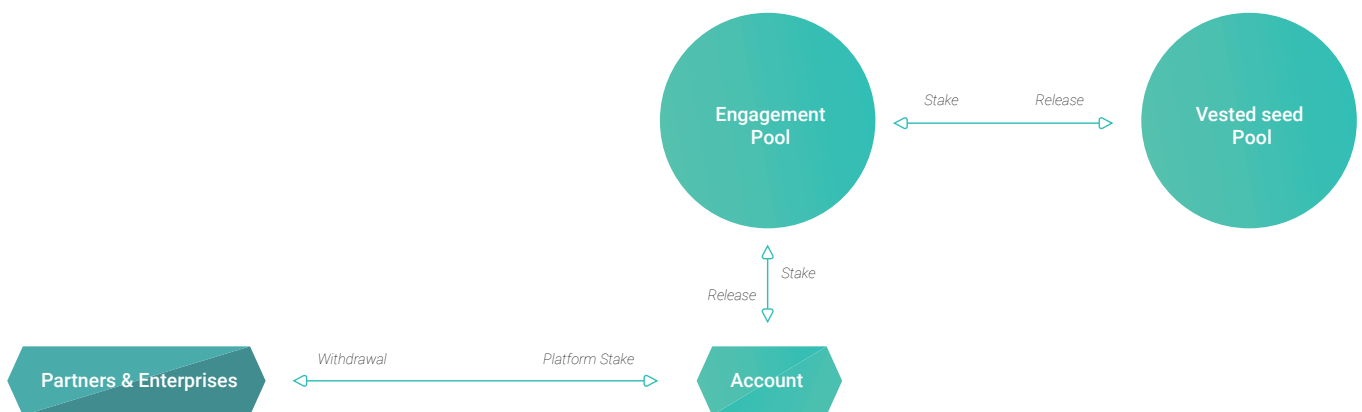
Seeded tokens can only be used for SmarTract payments and staking. If a Vendor or Validator closes their account without using all their seeded tokens, any unvested tokens are forfeited back to the Community Pool, and any vested seeded tokens are returned to the Community Pool unused.



## □ Platform Level Staking

The rules are similar as those for Partners and Enterprises. Vendors and Validators will be required to stake tokens before they can participate in a Marketplace, and the rules are similar as those for Partners and Enterprises. A stake will be required for participation in the Marketplace, and the stake must be maintained above some minimum level in order to utilize the ecosystem. SIGNiX will determine the size of the required minimum stake, which is directly related to the number of products offered and inversely related to the reputation of the Vendor or Validator: the more products, the higher the minimum; and the higher the reputation, the lower the minimum.

Vendors' and Validators' stakes will be used to help incent good behavior in the Marketplace, as further explained in the sections on payments, below.

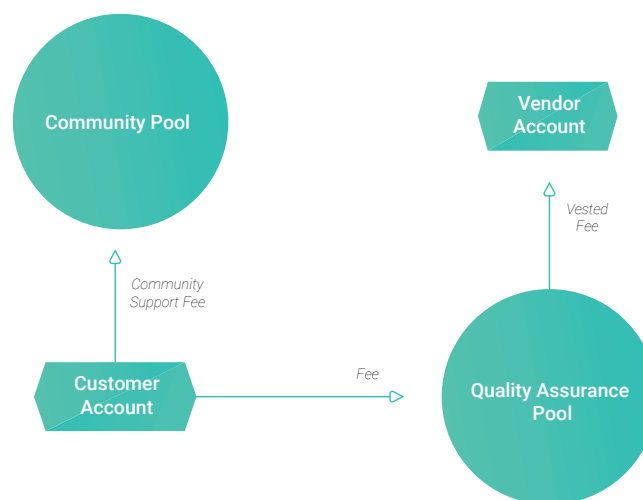


## □ Payments & Staking – Customer and Vendor

Vendors offer components and services in a Marketplace, and Marketplace customers (Partners and Enterprises) can use them for a fee. When a customer makes a purchase in a Marketplace, a small portion may go to maintain the Community Pool, and the rest goes into a Quality Assurance Pool (QA Pool) for this purchase.

The fees paid into the QA Pool vest as applicable. Vested fees are transferred to the account of the Vendor, where the Vendor can withdraw them or use them for another purpose within SmarTract.

Funds in the QA Pool vest faster for high reputation Vendors, and more slowly for low reputation Vendors. Vesting is also faster for Vendors that maintain a large platform-level stake than for ones that maintain a smaller platform-level stake.



Funds retained in the QA Pool provide a stake in case the component or service misbehaves.



If a customer has a problem with the component or service, they can report it. If the customer would like compensation for the error, they can include a stake with the error report. This error reporting stake can be any amount between some minimum and the amount the Vendor is able to stake, up to the price the customer originally paid for the component.

The error reporting stake can either come from the customer's account or from their Platform-level stake in their Engagement Pool. Funds staked from the Engagement Pool are locked against withdrawal or other uses but still count as Engagement Pool funds for discounting purposes.

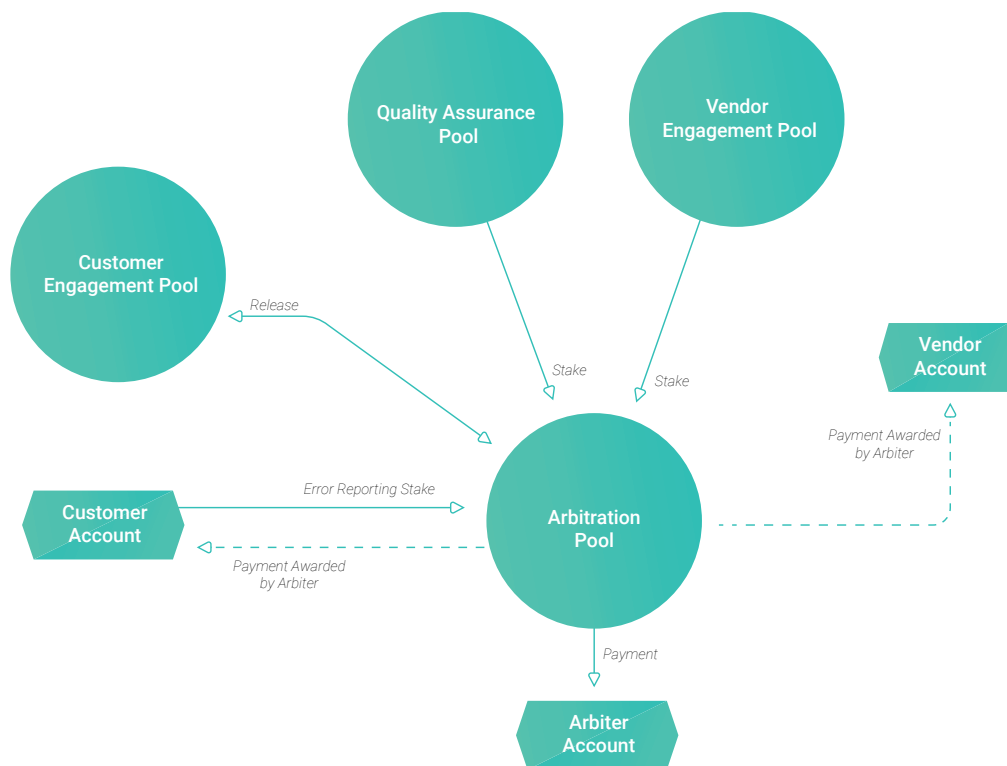
The customer's error reporting stake goes into an Arbitration Pool for this report. An equal amount is moved from the Vendor's QA Pool to the Arbitration Pool. If there are insufficient funds in the Vendor's QA Pool to cover the customer's stake, then the rest is taken from the Vendor's platform stake in their Engagement Pool.

If the Vendor agrees that the problem is real, then all the funds in the Arbitration Pool go to the customer. If the Vendor convinces the customer that the problem is not real, then all the staked funds go to the Vendor.

If the Vendor and customer cannot reach an agreement, an Arbiter will decide. In this case, the Arbiter gets one third of the staked funds, and the arbitration winner gets the rest.

If the customer staked funds from their Engagement Pool, any awarded funds are returned to the Engagement Pool up to the amount staked from there, and the rest go to the customer's account.

The first customers that report an error have an advantage, in case the Vendor's Engagement Pool becomes depleted. If funding in a Vendor's Engagement Pool drops too low, they must raise the funding level or new sales of their components and services will be subject to potential suspension if not timely rectified. It is therefore in Vendor's interests to make components updatable and to fix them as soon as possible after any error report.



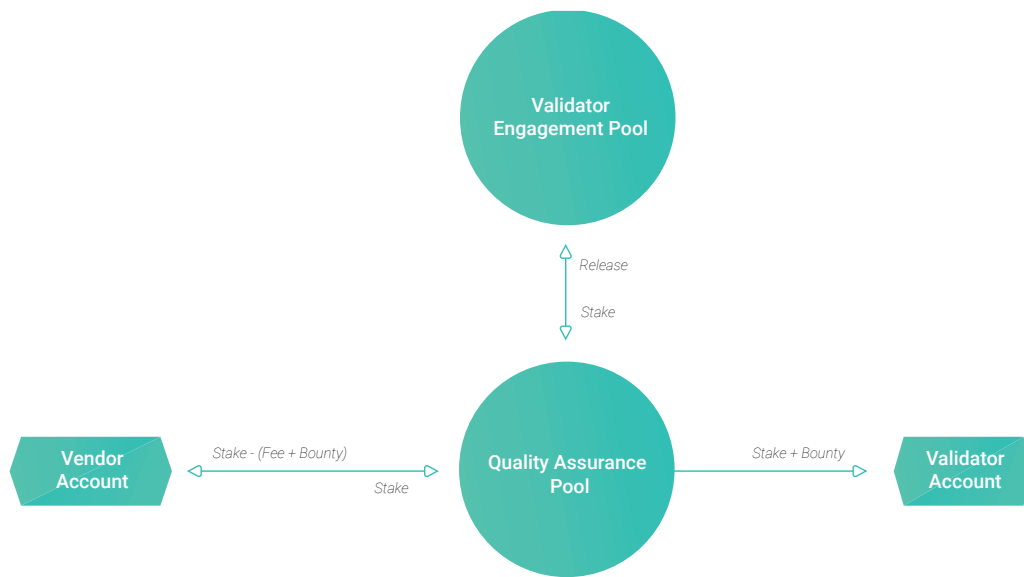
## □ Payments & Staking – Vendor and Validator

To ensure quality, components and services need to be well-tested, preferably by a third party not involved in their development. The Marketplace therefore includes features to facilitate product testing by third-party Validators.

Payment for validation services may include an overall fee, plus a bounty for each problem identified by the Validator. The total size of the “bug bounty” is capped, either by a maximum payout or by a decreasing bounty schedule.

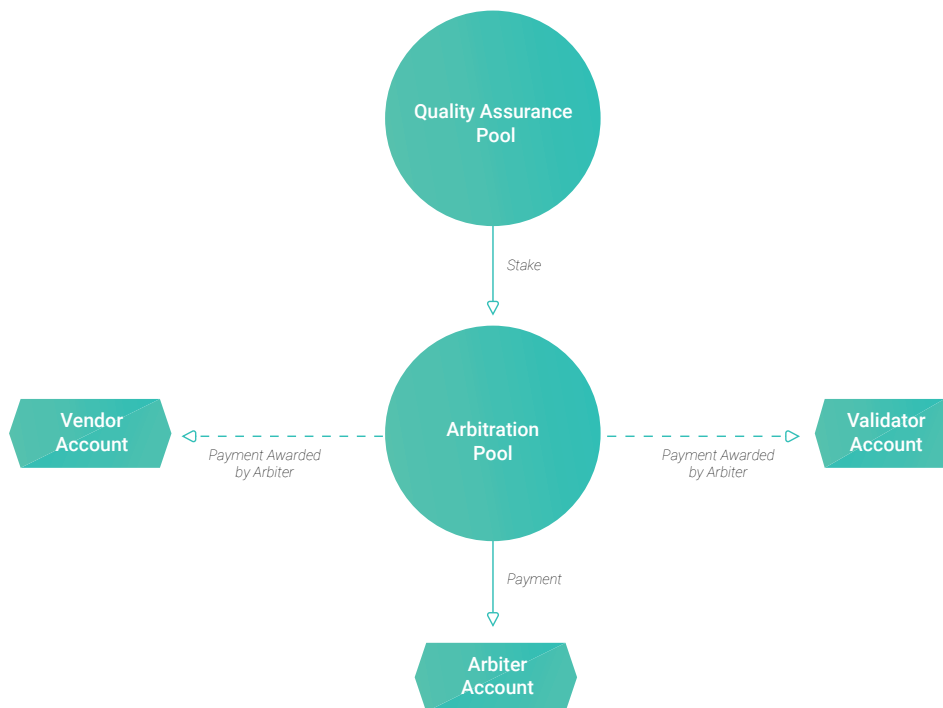
At the start of a validation engagement, the Vendor deposits a stake into a QA Pool for the engagement. The Vendor’s stake is at least large enough to cover the validation fee and the maximum bug bounty. An equal size stake is taken from the Validator’s Engagement Pool and placed into the QA Pool on behalf of the Validator.

If all goes well, funds in the QA Pool are divided as follows: the Validator is paid the validation fee plus the total bounty for any bugs found. In addition, the Validator’s full original stake is returned to their Engagement Pool. The Vendor receives the remainder of their original stake, after deduction of the Validator’s fee and bug bounty.



If there is a problem that the Vendor and Validator can't resolve between themselves, an Arbiter will decide the outcome.

In this case, the Arbiter receives one-third of the funds in the QA Pool, and the remaining funds are divided between the Vendor and Validator, as directed by the Arbiter.



## □ Reputation

A reputation score is expected to be maintained for Vendors and Validators in the Marketplace. As described above, reputation affects token flows. In addition, token flows and token holdings can affect reputation.

Reputation is calculated based on the following general criteria:

### Utilization

- Vendor: The number of products offered times the rate of sale of each product
- Validator: The number of validation engagements successfully completed

### Token Earnings

- Vendor: The dollar value of the product sales in the current rating period
- Validator: The dollar value of payments for validation engagements in the current rating period

### Arbitration Losses

- Vendor: 100% minus the percentage of arbitrations the Vendor was involved in and lost
- Validator: Same as for Vendor

### Value of Token Holdings

- Vendor: The dollar value of all token holdings of a Vendor includes all tokens in the Vendor's SmarTract Marketplace accounts and all their staked tokens. Identification of owned tokens can also be proved via proof of control of the private key associated with the account. Proof of control may be done by requesting the Vendor to transfer a randomly chosen fraction of SMRT tokens from the account being registered to their SmarTract Marketplace account. The same account can only be registered once.
- Validator: Same as for Vendor

### User Ratings

- Vendor: Vendors may receive reviews and ratings from customers that have purchased their products and from Validators they have had validation engagements with.
- Validator: Validators may receive reviews and ratings from Vendors who have worked with them.

These criteria are combined to form an overall reputation score. The contribution of each criteria is weighted as follows:

### Vendor & Validator Reputation Component Weights

| Criteria                | %   |
|-------------------------|-----|
| Utilization             | 20  |
| Token Earnings          | 20  |
| Arbitration Losses      | 20  |
| Value of Token Holdings | 20  |
| User Ratings            | 20  |
| Total                   | 100 |

## Team

Driven by a successful, serial entrepreneur as Founder, management has an established track record of rapid growth in cloud-and-mobile software companies. The management team averages over 6 years at SIGNiX. The team is well-equipped for the development and launch of a blockchain project with experienced technical leadership, together with the breadth and depth of expertise in PKI, cryptography, digital signatures, cloud software, blockchain, solidity, and smart contracts.



### □ Jay Jumper, Founder

Jay Jumper is the Founder and Chief Executive Officer of SIGNiX. For more than 10 years, Jay has worked to establish SIGNiX as the leader in cloudbased digital signatures in North America. Prior to founding SIGNiX, Jay had a prior entrepreneurial success as Founder and CEO of a company that is today a profitable fintech “robo-advisor” named ProNvest. Managed by a separate team, ProNvest continues its rapid growth and is now >\$1 billion in assets under management. Jay remains ProNvest’s largest shareholder and is a board member. Prior to founding ProNvest, Jay was CEO of a registered investment advisor known as The Jumper Group. Jay began his career at SunTrust after graduating from the University of Tennessee with a BS in Marketing.



### □ John Harris

Prior to joining SIGNiX in 2012, John spent 6 years at Adobe® managing Adobe’s broad electronic signature and approval capabilities across a range of products, from click-through approvals to complex digital signatures. John broadened Adobe’s digital certificate trust programs in Adobe Acrobat® and Reader® to include commercial and government certificates from around the world. John also directed efforts to bring Adobe’s power to bear on smartphones and tablets. Prior to Adobe, John spent 10 years managing biometric, encryption, and strong-authentication products at Sony Electronics and Thomson-CSF. John received his BA in Political Science from the University of Massachusetts and his MA from George Washington University in International Security Policy.



## □ Pem Guerry

Pem Guerry possesses a wide range of financial, marketing and technology-management experiences in both the private and public sectors. Previously, Pem was Assistant Commissioner of Finance and Administration for the State of Tennessee under Commissioner (now Senator) Bob Corker, with responsibilities including management of the State's overall technology resources. After serving in the public sector, Pem was President of RiverValley Partners and President of World Healthcare Systems. Pem earned his BA from Southern Methodist University and an MBA from Wharton Business School at the University of Pennsylvania.



## □ Gary Peat

From 2000 to 2013, Gary served as a General Partner of Council Capital starting with the debut fund in 2000. Council Capital is an active private equity firm today, but Council Capital originally was an early-stage venture investor in cloud-and-mobile software with a focus on healthcare services information technology. From 1993 to 2000, Gary was a Principal at Stonehenge Partners from where he focused on early stage investing in "dotcoms" (aka cloud software companies). In total, Gary spent more than 20 years as an early-stage venture investor with a majority of his time investing in cloud software. Gary started his career at JP Morgan after receiving his BS and MBA from the University of Houston.



## □ Robert Oswalt

Robert participated in authoring all 8 issued patents at SIGNiX and has primary responsibility for SIGNiX's platform architecture and the technical implementation of SIGNiX's vision. Prior to joining SIGNiX in 2004, Robert was VP of Technology for RegistryPro. Previously, Robert was a distinguished senior technologist in the computer aided software engineering division of Sterling Software. Robert is an expert in PKI, digital signatures, and cryptographic processing. Robert received his BS in Physics and his MS in Information and Computer Science from the Georgia Institute of Technology. In addition, Robert studied artificial intelligence at the graduate level at the McCormick School of Engineering and Computer Science at Northwestern University.



## □ Katy Blackwell

Prior to joining SIGNiX as Blockchain Counsel, Katy advised international blockchain companies on cryptocurrency issues including sale structure, securities compliance, and regulatory strategy. Katy has counseled both nonprofits and startups regarding formation, corporate governance, regulatory compliance, mediation, and transactional matters.