

## How Documents, Agreements and Smart Contracts Can Help BFSIs Future-Proof Their Journey to Blockchain

As distributed ledger use cases and solutions emerge in the financial services industry, it has become clear that bridging the gap between the current capital markets ecosystem and new technology like blockchain is the best way to forge a realistic path to successful adoption.

There is one use case that is the most natural fit for banks, financial services and insurance companies (BFSIs) to enter the blockchain world by delivering immediate value, ROI and a solid path to the future: documents, agreements and smart contracts.



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## **Executive Summary**

When blockchain was first announced in 2008, it promised to revolutionize the way we manage and transact data. After more than a decade, businesses are making sizable investments in the technology and the first use cases are starting to appear.

Worldwide, the financial services industry invested \$552 million in blockchain technology last year, around 37% of the total \$1.5 billion spent, according to International Data Corp. Overall spending is estimated to increase nearly eightfold, to \$11.7 billion, over the next three years, led by the financial sector, according to IDC.<sup>1</sup>

The potential applications for blockchain, often referred to as distributed ledger technology (DLT) in the capital markets, have captivated the financial services industry for the last several years. The technology's allure centers around same-day settlement and streamlined front-, middle- and back-office operations, potentially saving firms billions in the process. Just as the promises of blockchain are not likely to result in disintermediating exchanges or middlemen (these same groups are now spearheading blockchain initiatives), it is not probable that they will replace current, regulatory-driven processes or legacy systems either. Rather than replace the middleman, blockchain will add a new layer of more efficient middlemen.

Blockchain implementations in financial services will tend to be private, requiring memberships similar to those of exchanges, and will avoid disruption to the current capital markets ecosystem rather than use a potentially risky "big bang" approach. As a result, real-world solutions are needed to bridge the gap between existing operations processing and new technologies. Without that bridge, proposed solutions will never leave the prototype or "proof of concept" stage due to the absence of a realistic path to adoption. What firms need now is a future-proofed way to adopt blockchain in their current environments, with minimal disruption – enabling them to exponentially reduce risk and gain greater security, scalability and efficiency.

This paper will discuss various blockchain use cases in financial services, all of which have one fundamental requirement that triggers efficient transactions: **agreements**. Executing, storing and linking existing or "legacy" legal documents with smart contracts on blockchain is a low-risk, low-impact way for financial services companies to future-proof their technology assets and bridge the gap between the current regulatory landscape and new, evolving mandates and innovations that will likely emerge. Once smart contracts are on blockchain, firms also will be able to view related transactions on the blockchain by connecting books and records stored on legacy systems.



# Blockchain Characteristics and Advantages

The word "blockchain" may invoke thoughts and images of the controversial Bitcoin cryptocurrency and the elusive dark web. But blockchain, or DLT, is not limited to cryptocurrency. It consolidates networks, databases and applications all into one smart network that securely stores data and documents, increases transparency, mitigates risk, and reduces cost and waste by eliminating the need for reconciliation – which traditionally has been the method for managing centralized data.

A blockchain has two distinguishing characteristics: (1) the inalterability of transactions, and (2) decentralized control. With traditional databases, one organization controls the master data. But with blockchain, participating organizations have equal ability to read and write master data.<sup>2</sup> In the last several years, newer, enterprise-focused blockchain technologies have emerged to run on private authorized networks.

#### INALTERABLE AND SECURE

The blockchain consists of a continuously growing list of records, called blocks, which are linked and secured using cryptography (i.e., codes that cannot be read without a key). The goal of blockchain is to remove a centralized server or intermediary so that a decentralized network of computers can share and retain identical, cryptographically secured records.

In this regard, blockchain creates the type of security that financial services companies want and need. Because a blockchain lists an entire history of transactions, anyone who wants to verify a specific transaction is theoretically able to do so. This can be done while maintaining privacy and without sharing details of the records to participants who are not entitled to view them. Additionally, because records on a blockchain cannot be altered, it is very difficult for a "bad actor" to falsify or alter transaction data.<sup>2</sup>

#### TRANSPARENT, RELIABLE AND EVENT-DRIVEN

Blockchain fosters transparency and trust. The decentralized nature of its technology means that the different nodes that participate in maintaining the entire system also verify transactions before they become part of the permanent record. Some proponents of blockchain technology view this attribute as its most important feature with the belief that it facilitates the creation of networks free from a single point of failure.<sup>3</sup>

Blockchain also provides the ability to trigger actions or activities. Financial transactions, for example, traditionally require participants to reconcile ledgers in each transacting organization, creating a delay between depositing a check and when the funds become available for use. In a blockchain solution



whereby the exchange, clearinghouse, repository and custodian all work with the same exact golden source data, the traditional reconciliation process can be eliminated. This is possible because, within a blockchain, each organization has immediate visibility into transactions that are unchangeable. In theory, within a financial network built upon blockchain, such funds could be instantly available. This shift from people to algorithms should also allow for very small, high-frequency transactions to be made across regions.<sup>2</sup>

Rather than paying middlemen to stand between transacting parties, acting as auditors and referees, this digital system will allow users to collectively agree on the validity of the data. This In the future, smart contracts may bring sellers and buyers in direct contact, which will allow for instant peer-topeer transactions.

promises instant settlement times (as opposed to days) and reduced costs. In the future, smart contracts may bring sellers and buyers in direct contact, which will allow for instant peer-to-peer transactions.<sup>4</sup> In the end, it is the solution provider that will become the keeper of the fully verified information.

#### INTEGRATEABLE WITH EXISTING INFRASTRUCTURES

Blockchain will change the way people do business, but not entirely – much how like driverless cars will not replace the way people drive any time soon. Until critical mass is achieved, with SROs and industry utilities on board and leading the way, current technologies will still be needed. But for now, blockchain's ability to integrate with current trade processing, clearing and settlement processes such as those provided by DTCC, and messaging, payment and transaction platforms and protocols – like FIX, SWIFT and SET – makes it extremely attractive. At the same time, blockchains must be able to communicate with each other in a truly agnostic environment that is free from limitations inherent in a specific blockchain provider.



## Emerging Use Cases in Financial Services

While blockchain technology has been seen as a disintermediation threat to Wall Street in the past, the very industry that feared disintermediation and dismissed blockchain are now embracing it. Blockchain, or DLT, could make instant trade settlement a possibility. While blockchain's first application, cryptocurrency, is struggling to achieve mainstream adoption, financial services companies are committing manpower and capital to build the future on top of shared databases. Regulators, exchanges and utilities are the key drivers and gatekeepers of blockchain adoption, while the top financial institutions focus on streamlining specific events along the transaction lifecycle.

Here are a few of the business and operational use cases that are quickly emerging in the financial services industry:

#### CUSTODY, TRADING AND TRANSFERS

Blockchain allows entities to establish a digital network where trade details are simultaneously broadcasted to, confirmed and recorded by all users of the network. The network can count on all details being unequivocally agreed upon by all parties and all users fully aware of these details at the same time. Finally, because every user in the network records the transaction independently, it's nearly impossible for a hacker to alter the record. This makes it especially attractive to financial services companies such as Fidelity Investments, who announced in October 2018 the launch of a new company to offer custody and trade execution of cryptocurrencies.<sup>5</sup>

#### **CREDIT DERIVATIVES**

In a few months, DTCC will begin the largest live implementation of blockchain in the financial services industry. Records for about 50,000 accounts in DTCC's Trade Information Warehouse, where information on \$10 trillion worth of credit derivatives is stored, will move to a customized digital ledger called AxCore. The warehouse already keeps an electronic "golden record" of events needed to clear and settle these securities daily, but each participant in a complicated credit derivatives transaction also keeps its own records, which must in turn be reconciled multiple times before the investment matures. By moving those records to the blockchain, where it's visible to all participants in real time, most of those redundant efforts will be unnecessary.<sup>6</sup>



#### **RETIREMENT PLANS**

Blockchain technology is poised to completely upend the retirement market and the way 401(k) advisors do business. Although nascent among record keepers of defined-contribution plans, the technology promises to boost cybersecurity, increase efficiency (thereby decreasing overall 401(k) plan costs), and vastly improve data sharing between advisors and record keepers.<sup>7</sup>

#### DIGITAL CUSTODY

Digital custody remains a work in progress for custodial banks. Unlike typical securities, digital assets are held directly by the owner rather than indirectly by the custodians and puts the settlement systems at odds with each other. Northern Trust, however, has been providing custody for digital private issues via a blockchain for the past three years. During that time, it noted that its standard custody model was not fit-for-purpose for institutional clients. Custodians still can deploy their existing technology and architecture without losing any (or most of) the benefits.<sup>8</sup> Fidelity Digital Asset Services has taken a slightly different approach by becoming an institutional brokerage that focuses on digital currency as well as the most liquid digital assets.<sup>9</sup>

#### **EXCHANGE INITIATIVES**

Exchanges around the world are taking part in blockchain initiatives. Here are just a few examples:

- Intercontinental Exchange (ICE), owner of the New York Stock Exchange, launched new bitcoin market exchange Bakkt, starting with a Bitcoin (BTC) futures contract.<sup>10</sup>
- Singapore Exchange (SGX) and the Monetary Authority of Singapore (MAS) successfully trialed blockchain for tokenized assets settlement.<sup>11</sup>
- More than 25 companies are taking part in a blockchain consortium spearheaded by the Japan Exchange Group (JPX), including Mizuho Bank, Daiwa Securities Group, Merrill Lynch Japan Securities and Nomura Holdings, among others.<sup>12</sup>
- Nasdaq is working on several blockchain initiatives including payment, proxy voting, and mutual fund issuance and settlement, among others.<sup>13</sup>
- South Africa's Strate central securities repository is leveraging Nasdaq's proof of concept for proxy evoting using blockchain.<sup>14</sup>

#### **CROSS-BORDER TRANSACTIONS**

A 2018 study from Juniper Research found that blockchain deployments will enable banks to realize savings on cross-border settlement transactions of more than \$27 billion by the end of 2030, reducing costs by more than 11% per on-chain transaction.<sup>15</sup> However, the research cautioned that the need to



parallel-run blockchain-based services with legacy systems would mean that savings would not be realized for several years after initial deployment, with annual cost reductions not reaching \$1 billion per annum until 2024.<sup>15</sup>

#### AGREEMENTS AND SMART CONTRACTS

Documents and agreements are core to any and all of these blockchain initiatives, before any actions or transfers can occur. Agreements often involve legal commitments and can be subject to regulatory rules about how they are signed and retained. These rules may differ by the type of agreement and by regional laws which may require specialized processes.

A significant amount of disruption is now occurring in the banking, financial services and payment industries related to "smart contracts," which is a scripting language and a set of protocols or instructions that use blockchain or decentralized ledgers to facilitate transactions or tell the contracts what to do. New research by Juniper, "Blockchain for Financial Services: Opportunities, Challenges & Forecasts 2019-2030," found that smart contracts will be key for financial institutions, particularly in the context of increasing accuracy and transparency.<sup>16</sup>

Smart contracts will be key for financial institutions, particularly in the context of increasing accuracy and transparency.

Because virtually any transaction could be automated with blockchain – from trade finance, processing and settlement, to insurance policies/claims and real estate transactions – it is also useful for holding all necessary information in a smart contract, updated instantly and viewable by all members on the network. The smart contract can also be used to initiate services such as automating the transfer of title on assets, loans, securities and money.

However, one should avoid making the assumption that the role of smart contracts is to create something new; rather, its role is to link to something old. Although smart contracts will not completely replace existing legacy agreements in the short term, they can link to original agreements to provide documented access and new ways of delivering services in the future. Therefore, smart contracts pave the way for simpler, frictionless adoption by enabling firms to bridge old agreements with new ones, rather than having to *replace* their original agreements with new ones.



#### DOCUMENT STORAGE

One of the primary benefits of blockchain-based tools is its ability to permanently and immutably store data, bringing blockchain implementations out of the realm of proof-ofconcept and into the real world.

Blockchain is the open-source technology on which documents, including smart contracts, are stored. It provides multiple improvements over existing document storage systems in terms of tamper resistance, making them highly secure. Each node, or block of encrypted information, contains the exact same data and transaction history, and that information is secured with cryptographed hashes (irreversible abbreviations) and digital signatures. Data and document storage bring blockchain implementations out of the realm of proof-of-concept and into the real world.

But there will still be a need for "proof of trust" or zero-knowledge proof (ZKP) protocols to conduct secure private transactions over public blockchain networks.<sup>17</sup> Such protocols are needed to increase adoption by validating these transactions, securely transferring data and storing them in the form of digital documents, recordkeeping and audit trails. As these protocols evolve to establish more validation and proof of trust, financial industry regulators will have the ability to track market activity without having to actually belong to a blockchain.



# The Importance of Interoperability, ROI and Domain Expertise

Three critical factors contribute to the real value of a blockchain solution – interoperability, return on investment (ROI), and domain expertise – yet are rarely discussed in the industry at this point in time. As a result, a gap has developed between the potential value of blockchain and the feasibility of implementing a solution in a financial services organization.

#### INTEROPERABILITY ACROSS BLOCKCHAINS

Will blockchain solutions be able to talk to each other? Or will your solution become trapped inside a specific blockchain?

The virtues of interoperability between blockchains will become a big issue. Once an organization decides to adopt blockchain for a solution, the tendency is to choose a specific open-source blockchain platform (such as Ethereum, EOS, Tron and NEO) on which to build the solution. The problem is, companies run the risk of getting boxed into a specific blockchain platform. Solutions that are blockchain agnostic and use APIs to access a blockchain with the solution itself acting as the gateway, will provide the most value. The key is to avoid inadvertently committing yourself to a specific blockchain.

#### COST AND ROI

How much will it actually cost to create a blockchain to store data, initiate transactions, act on resulting workflows, and create new blocks? What will be the cost justification if there are no immediate cost reductions?

Organizations are now achieving economies of scale on the cloud, as computing power and storage space has reached critical mass. With cloud storage services, companies can pay a monthly fee up front for a fixed amount of storage space. During the paid time, the company can use any amount of storage space up to that limit. When that paid time expires, it has two choices: pay for another month or their files get deleted. The cloud provider only keeps files for as long as the company keeps paying.<sup>18</sup>

However, the cost of blockchain technology uses a different price model that includes both storage and transactions. Blockchain databases cannot work on the pricing model since they must store data indefinitely, making the recurring payment model unfeasible. In financial services, data storage may include small critical amounts of data, or high-frequency data that changes frequently, or a combination of both.



Presently, the inability to forecast monthly expenses poses a major hurdle for any company seeking to achieve significant ROI by implementing blockchain solutions for high-frequency, high-volume transactions<sup>19</sup> rather than trusted data solutions such as document management.

In financial services, firms will become acutely aware of the uncertain cost of blockchain technology as they put pen to paper, causing them to become laser focused on the best use cases that will deliver the best value and return on investment (ROI). But without an understanding of what a blockchain solution will cost, it is impossible to say whether economic efficiencies can be achieved. By opting for solutions that are blockchain-agnostic, firms will be able to adapt easily to different cost variables – enabling them to apply blockchain solutions based on the right ROI.

#### DOMAIN EXPERTISE

Who developed or will develop the blockchain solution? Are they strictly system architects, or do they also understand the financial services industry? Does this really matter?

Blockchain technology emerged from system architects because it aligns well with their knowledge of assembling a complex environment of application, web and database servers within an engineered network on which a solution can reside. However, the missing piece of the puzzle is domain expertise to create the actual solutions and functionality that will provide the optimal use cases and best value for a particular industry or firm.

Currently, blockchain architects are focused on assembling these environments, but not necessarily on building practical use cases focused on bridging legacy environment with new technology within a specific industry. Hence, it would be wise to choose a blockchain solution provider who has a deep and broad knowledge of the financial services industry.

By opting for solutions that are blockchainagnostic, firms will be able to adapt easily to different cost variables – enabling them to apply blockchain solutions based on the right ROI.



### The Natural Entry Point into Blockchain: Agreements and Smart Contracts

Agreement processes span nearly every business function, from contracts to non-disclosure and other accords. These documents mark the beginning of an engagement or relationship with a client or counterparty. But most companies still struggle with manual processes, slow turnaround times and human errors. Such legacy agreement processes are needlessly burning up time and money while undermining the experiences of customers, employees and counterparties.

Rather than bouncing multiple copies of paperwork between numerous lawyers and banks and waiting until each registration stage has been processed, blockchain gives all parties a complete overview of the procedure. This enables multiple steps in the chain to be carried out simultaneously across, for instance, counterparties, exchanges, regulators and custodians for asset transfer and new customer onboarding. All entities involved can exchange information in a highly secure manner, assuring financial transparency and increasing efficiency end to end. For example, when a broker and institutional client sign a master agreement to engage in a trading, lending or other activity, the broker enters the details and signs off on a blockchain for audit purposes. Upon successful execution of the order, the platform will register the contract on the blockchain on behalf of the brokerage.

#### **END-TO-END AGREEMENTS**

The need for accuracy, security and transparency is giving rise to automating and connecting agreements end to end using purpose-built applications and integrations to connect a variety of other systems. Blockchain technology enables an agreement to move from preparation through to signature, enactment and management in a highly automated way. Even though some of the parts have already been digitized by word processing, email, electronic signature and PDF, a legacy process remains disconnected and relies on manual processes to make the parts work together.

Documents and agreements are a natural place to start digitally transforming business processes end to end, and take advantage of new technologies as they emerge such as cloud, artificial intelligence (AI) and blockchain. These technologies can work together to not only securely store documents in a regulatorapproved vault, but also link to legacy documents while smart contracts serve up the instructions that initiate blockchain activities based on an agreement's content, each with their own business logic and workflows driven by executable computer code. Given the inevitability of these and other technology developments, agreement clouds must be able to embed or connect to these capabilities. Legacy environments must also be able to integrate with the blockchain.



#### SMART CONTRACTS

A smart contract is not actually a legal contract (yet) and does not substitute a legal agreement. Rather, it is a set of instructions, thresholds and actions, but not legal terms. It is a self-executing contract requiring no trusted intermediary since the terms between buyer and seller are written into lines of code. Because blockchain stores agreements and smart contracts, it serves as a software-generated container that gathers all the information related to a particular contract.

Smart contracts help firms exchange money, property, shares or anything of value in a transparent, conflict-free way while avoiding additional third-party services and fees. They not only define the rules and penalties around an agreement in the same way that a traditional contract does, but also automatically enforce those obligations.

Smart contracts reduce costs since firms can eliminate the need for multiple intermediaries that must approve transactions. The terms of smart contracts cannot be misinterpreted since the code will be executed in full accordance with the determined logic. As smart contracts someday evolve to replace legacy agreements – far down the road – it is essential that they link to existing legal documents today.

### Integrating Blockchain with Finity360 Docs

Finity360 Docs is a unique document management solution that combines machine learning technologies to organize and file documents, as well as connect to any blockchain to manage and link smart contracts for auditing transparency.

- Cloud-based document management platform
- Specifically designed for financial services
- Links legacy agreements to smart contracts for total transparency
- Integrates with legacy technology and operations environments
- SEC, FINRA and CFTC compliant with current regulated technology
- Integrates with form and e-signature apps

- Blockchain-agnostic storage of documents using BEASY1 gateway tools from Enterprise Blockchain Exchange
- Hosted on AWS for high level of scalability and security
- Built natively on Salesforce.com for expanded functionality
- Developed by capital markets business, operations and technology experts



# Bridging the Current Ecosystem with New Technologies

It is clear that financial institutions want to adopt new technologies, but many organizational, legal and government challenges can stand in the way. One of them is legacy technology and infrastructures, which cannot be completely turned off as regulators push for stronger compliance and stricter regulations around blockchain and cryptocurrencies to eliminate fraudulent companies, investors and startups. Going forward, the industry will focus on real business use cases while Wall Street will adopt the technology under the guidance of the SEC and FINRA, and firms and regulators collectively work together to ensure legitimacy and credibility of the technology.

There is no shortage of blockchain critics. It has been reported that trial projects and experiments conducted over the last few years in the financial industry had not only failed to yield the expected time and cost savings, they had also added to disruption.<sup>20</sup> However, blockchain solutions will not replace the current capital markets ecosystem (including middlemen and legacy systems) any time soon. Rather, it will make middlemen more efficient by eliminating additional steps and reconciliation. In addition, blockchain need not be disruptive if an iterative strategy is in place to bridge current legacy environments with new technologies such as blockchain networks.

Blockchain technology will offer the opportunity to fundamentally re-architect processes, driving blockchain from experimentation to mainstream adoption across multiple business applications. These new processes will include those that are currently difficult to reconcile and involve a number of internal and/or external participants, latency challenges and security concerns. As it stands today, the regulatorydriven processes and legacy systems financial services companies use today must be able to work with the new technologies of tomorrow. In addition, pricing must be predictable and deliver the real business value and ROI firms are seeking.

At the beginning of every transaction or process are legal documents and agreements – the proverbial handshake that starts an engagement and drives subsequent recordkeeping and transactions.



At the beginning of every transaction or process are legal documents and agreements – the proverbial handshake that starts an engagement and drives subsequent recordkeeping and transactions. Financial services organizations can effectually begin their digital transformation using blockchain today by future-proofing their agreements process through the storage of documents in a secure and authenticated environment. Not only will document storage provide an entry point into blockchain at the lowest cost possible; but by doing so, firms will be ready for new technology such as linking smart contracts to trigger a range of transactions in the future.

In DTCC's CEO Mike Bodson's words, "We can sit back and be dinosaurs and get rolled over and become extinct, or we can start reimagining what the future looks like and act not only as the person who provides these services – whatever they may be in the future – but the bridge from today to tomorrow."<sup>21</sup>

Gerry Murphy, CEO of Arcus Partners, warns against getting chained to a block: "Look for solutions that will provide gateways and front-ends to the new blockchain technology, and are truly agnostic so you can future-proof your investment. If you pick the wrong platform, you could get trapped inside a block and face obstacles to realizing the true benefit and ROI of blockchain."

Financial services companies have the option to "wait and see" before making the transition to the future, or they can start preparing now without any additional cost to do so. Those who take action and get ready today for the ecosystem of tomorrow will be able to differentiate themselves through innovation that drives improved trust, transparency and service quality for years to come.

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### About Finity360

Finity360, an innovation of Arcus Inc., is a suite of cloud-based document and data management solutions that gives financial institutions the agility, scale and security they need to gain maximum business value from their traditional documents, digital assets, and operational workflows.

Based on more than 30 years of experience in capital markets, securities back-office operations, data aggregation and system integration, Finity360 helps capital markets and other financial services organizations modernize their operations and revenue models by eliminating technology, process, data and regulatory challenges.

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