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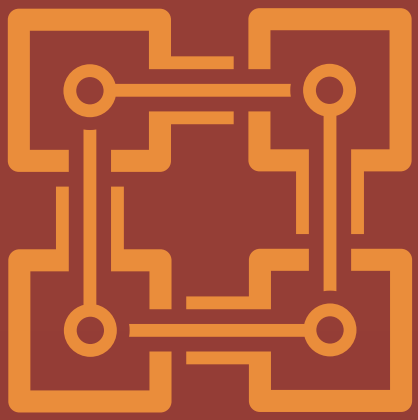

Beyond Bitcoin:

Workshopping how your association can put blockchain to work today

A companion eBook to a workshop presented by digitalNow in the summer of 2021, designed to help you understand where Blockchain fits into your strategic plan.

presented by: sidecar | cimatri

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About this ebook

With some NFTs fetching millions of dollars and cryptocurrency prices soaring (or plummeting) simply from a joke on “Saturday Night Live” — it can be tough to figure out where the blockchain begins and ends, let alone how to translate from cryptocurrency to an actual business use case for distributed ledger technology. But now it’s time to become part of the conversation.

In this eBook, we’ll go beyond the headlines and dive right in. While this publication is a companion to an interactive workshop presented in the summer of 2021 by digitalNow and CIMATRI, it was designed with association leaders in mind and can be used beyond that workshop, too.

We’ll start by offering a clear understanding of blockchain, ledger technology, what the benefits are and how they’ll impact your organization now and in the future.

This eBook is for you if you’re an association leader (whether you’re non-technical or technical) who is responsible for elevating your association’s use of emerging technologies to better serve your customers and members.

Our advice

- **Cut through the hype associated with blockchain by focusing on what is relevant to your association.** You've been hearing about blockchain for some time now and want to better understand it. While it is complex, you can beat the learning curve by analyzing its key benefits and purpose. Features such as transparency, integrity, efficiency, and security differentiate blockchain from existing technologies and helps explain why it has transformative potential.
- **Explore how you can use blockchain by first determining whether blockchain aligns with your needs.** "Should this product be built?" rather than "Can this product be built?" is a first principle of lean product management. Building a Blockchain solution for your organization is about finding a problem, validating that problem, and building a product that will solve the problem. We'll help you ask and answer these critical questions in this ebook.
- **Build a strategy for investing in Blockchain based on your ability to execute.** Association executives must take a practical approach to blockchain to avoid wasting resources (both time and money). It's easy to get excited about blockchain, but you need to ensure your use case is fully developed prior to jumping in. We'll work through that together.

How to use this eBook

- Follow our methodology for simplifying an otherwise complex concept. We'll focus on how the benefits of blockchain directly relate to real-world use cases so both business and technology leaders will be better aligned.
- Discover if blockchain is the best solution for your organization by mapping its key benefits to your needs and capabilities.
- Leverage a repeatable framework for brainstorming blockchain use case ideas, which you can apply to other emerging technologies in the future.
- Communicate your findings to stakeholders who may otherwise be confused about the transformative potential of new technologies.

What is Blockchain?

Put incredibly simply, blockchain is a giant database — a database in which every link is visible and known to all of the other links in the chain. But the magic of blockchain is in what makes it a little more complicated than that, so let's dive in.

Think of blockchain as a huge, shared database that is replicated and synchronized across all of the participants, which can number in the millions. Blockchains eliminate the need for third-party intermediaries like financial clearinghouses and other intermediate verification process steps. The members of the network control all updates to the ledger through a process called consensus. Every ledger record is unique and contains a timestamp and its own cryptographic signature.

There will be blockchains created across virtually all industries based on the use cases involved and the problems to be solved. These blockchain ledgers may be on public or private (permissioned or non-permissioned) networks.

Blockchains sequentially record all transactions in the network in segments called "blocks." These blocks are then "linked" to form a chain ... also known as a blockchain.

There are five foundational principles that underlie blockchain technology:

- **Peer-to-Peer Transaction:** Blockchain takes the idea of "serverless computing" to a whole new level as there is no central hub for processing transaction data. All transactions are processed and stored in the nodes plugged into the network and those nodes share that data with all of the other nodes.
- **Distributed Database:** Everyone partaking in the blockchain can see everything in the database. This architecture provides true decentralization where there is no single point of control or failure. This transparency allows independent verification of transactions to occur without a middleman verification step.
- **Transparency with Pseudonymity:** Blockchain users have the choice to remain anonymous or share their identities. However, the record itself is present and visible to all. Transactions are encrypted and assigned a unique address as the means of identification.
- **Irreversibility of Records:** Once a record has been transacted in the distributed ledger, it cannot be modified. These records are encrypted, ordered chronologically, and visible to all.
- **Embedded Logic:** Due to the programmatic nature of the blockchain, logic and algorithms can be applied to automate transactions between nodes upon pre-defined conditions.

Why is Blockchain considered secure?

Blockchains are considered secure based on four foundational technologies:

- The **replicated nature** of the ledger database ensures "consensus" is reached for any change to occur to the database, as any attempted manipulation of the data would be required to occur everywhere simultaneously.
- The use of **cryptography** ensures that any changes to the ledger forces a new block creation.
- Digital signatures mean the use of public/private key technology v**erifies the identity** of counterparties.
- **Decentralization** is the peer-to-peer model, which disintermediates any centralized control of the underlying network. All actors are equal, whether or not they are an individual, a Fortune 500 corporation, or a local non-profit. Once a transaction receives consensus from the network, it is irreversible.

What does bitcoin have to do with it?

Setting the stage

Cryptocurrency is in all the headlines, but the transformative power of the underlying blockchain technology is the real pot of gold at the end of this rainbow.

It all sounds very complicated and, to be frank, easy to dismiss because very few people really understand what blockchain technology really is and how it works.

Let's take the first steps towards closing this gap. By the end of this e-book, you'll be able to decide how you can explore this transformative technology in your organization.

What is cryptocurrency?

Cryptocurrency is a digital or virtual currency that is created by cryptography and recorded on a public ledger (or blockchain). It is not physical and it is not issued by a central government authority.

What is the difference between cryptocurrencies?

- **Bitcoin:** invented by Satoshi Nakamoto in 2009; it is the largest cryptocurrency by total value.
- **Ethereum:** also known as Ether, it is the second-largest cryptocurrency by value. It is also a platform for decentralized Blockchain that also includes smart contract functionality.
- **Litecoin:** designed to be a future payment method and can be mined more quickly than Bitcoin, producing one new coin every 2.5 minutes (whereas Bitcoin produces one every 10 minutes).

What about non-fungible tokens (NFTs)?

Would you pay $69m for a JPEG? What is a Non-Fungible Token?

NFT stands for non-fungible token. They are an application of blockchain technology and use the same method of programming as cryptocurrency, like Bitcoin or Ethereum, but that's where the similarity ends.

Physical money and cryptocurrencies are "fungible," meaning they can be traded or exchanged for one another.

An NFT is a digital asset that represents real-world objects like art, music and videos. They are bought and sold online, frequently with cryptocurrency, and they are generally encoded with the same underlying software as many cryptocurrencies. Although they've been around since 2014, NFTs are becoming increasingly popular now as a way to buy and sell digital artwork.

NFTs are generally one of a kind, or at least very limited in quantity, and have unique identifying codes (think of physical artwork prints with designations such as "1 of 10" and signed by the artist). Many early NFTs have been digital creations that already exist in some form elsewhere, like iconic video clips from NBA games.

NFTs create value because they allow the buyer to own the original item. The NFT contains built-in authentication, which serves as proof of ownership.

What are NFTs used for?

Blockchain technology and NFTs afford artists and content creators a unique opportunity to monetize their creations. For example, artists no longer have to rely on galleries or auction houses to sell their art. Instead, the artist can sell it directly to a buyer as an NFT.

Eliminating the middleman also lets them keep more of the profits. In addition, artists can program in royalties as a smart contract so they'll receive a percentage of sales whenever their art is sold to a different owner in the future, meaning they'll continue to benefit from their own work, especially if it increases in value. This is a new business model because artists generally do not receive future proceeds after their art is first sold.

How transformational technologies take hold

Based on research conducted at the Harvard Business School, history tells us that two critical dimensions affect how a foundational technology, and its business use cases evolve from single-use to transformational implementations.

The first is **novelty**, the degree to which an application is new to the world. The more novel it is, the more effort will be required to ensure users understand what problems it solves.

The second dimension is **complexity**, represented by the level of ecosystem coordination involved, the number and diversity of parties that need to work together to produce value. For example, a social network with just one member is pretty much useless; a social network is worthwhile only when many of your connections have adopted the platform. Other users of the application must be brought on board to generate value for all participants.

The same will be true for many blockchain applications. As the scale and impact of blockchain applications increase, their adoption will require significant institutional and cultural change.

Patterns of technology adoption

To understand how to adopt a new technology, we'll begin by looking at what we know about the transformation processes typical of other foundational technologies, such as the internet. As the Harvard Business Review says, "One of the most relevant examples is distributed computer networking technology, seen in the adoption of TCP/IP, which laid the groundwork for the development of the internet."

TCP/IP first gained traction as the basis for e-mail among the researchers on ARPAnet, the U.S. Department of Defense. Before TCP/IP, telecommunications architecture was based on "circuit switching," in which connections between two parties or machines had to be pre-established and sustained throughout the exchange. To ensure any two nodes could communicate, telecom service providers and equipment manufacturers had invested billions in building dedicated lines for point-to-point connections.

TCP/IP exploded with the advent of the World Wide Web. A host of new providers quickly emerged to provide the "plumbing"— that is, the hardware, software and services needed to connect to the public network. Netscape built browsers and web servers. Sun Microsystems drove the development of Java, the computerized language that allows us to program applications. As information on the web grew exponentially, Infoseek, Excite, AltaVista and Yahoo were developed to aid searches of vast amounts of information on the web.

Once this basic infrastructure was established, a new generation of companies took advantage of low-cost connectivity and created services that were substitutes for existing business models. News moved online. Amazon offered more books for sale than any bookstore. Online marketplaces such as Priceline and Expedia made it easier to buy airline tickets and brought unprecedented price transparency to the process. The ability of these newcomers to get extensive reach at relatively low cost put significant pressure on traditional businesses, like newspapers and brick-and-mortar retailers.

Relying on ubiquitous internet connectivity, the next wave of companies created novel, transformative applications that fundamentally changed the way businesses created and captured value. These companies were built on a new peer-to-peer architecture and generated value by coordinating distributed ecosystems of users. Think of how eBay changed online retail through auctions, Napster changed the music industry, Skype changed telecommunications, and Google, which exploited user-generated links to provide more relevant results, changed web search.

As you can tell, it took more than 30 years for TCP/IP to move through all the phases of technology adoption before subsequently reshaping the economy. These phases, which were described by Marco Iansiti and Karim R. Lakhani in the Harvard Business Review include:

- **Single-use applications:** These are low-novelty and require low coordination applications that create better, less costly, highly-focused solutions, like in the case of TCP/IP, e-mail, a cheap alternative to phone calls, faxes and snail mail.
- **Localization:** These are relatively high in novelty but need only a limited number of users to create immediate value, so it's still relatively easy to promote their adoption.
- **Substitution:** These are relatively low in novelty because they build on existing single-use and localized applications, but are high in coordination needs because they involve broader and increasingly public uses. These innovations aim to replace entire ways of doing business.
- **Transformation:** Completely novel applications that, if successful, could change the very nature of economic, social, and political systems.

Today, more than half the world's most valuable public companies have adopted internet-driven, platform-based business models, and physical scale and unique intellectual property no longer confer unbeatable advantages. Increasingly, the economic leaders are enterprises that act as "keystones," proactively organizing, influencing, and coordinating widespread networks of communities, users, and organizations. The very foundations of our economy have changed — and they did so through the framework of technology adoption.

The intersection of internet, computing power and cryptography

Blockchain — a peer-to-peer network that relies on the internet — was introduced in October 2008 as part of a proposal for Bitcoin. Bitcoin was the first application of blockchain technology.

The comparisons between blockchain and TCP/IP adoption are clear. Just as e-mail enabled bilateral messaging, bitcoin enables bilateral financial transactions. The development and maintenance of blockchain is open, distributed and shared—just like TCP/IP. Just like e-mail, Bitcoin first caught on with an enthusiastic but relatively small community.

Just as TCP/IP unlocked new economic value by dramatically lowering the cost of connections, blockchain have a similar impact on the cost of transactions. Blockchain applications have the potential to become the system of record for all transactions. If that happens, business models will once again undergo a radical shift, as new, blockchain-based marketplaces emerge.

Consider how business works now. Every organization keeps its own, private records. In many cases, these records are "locked up" in siloed systems distributed across departments and business functions. Reconciling transactions across individual and private ledgers takes a lot of time and is prone to error.

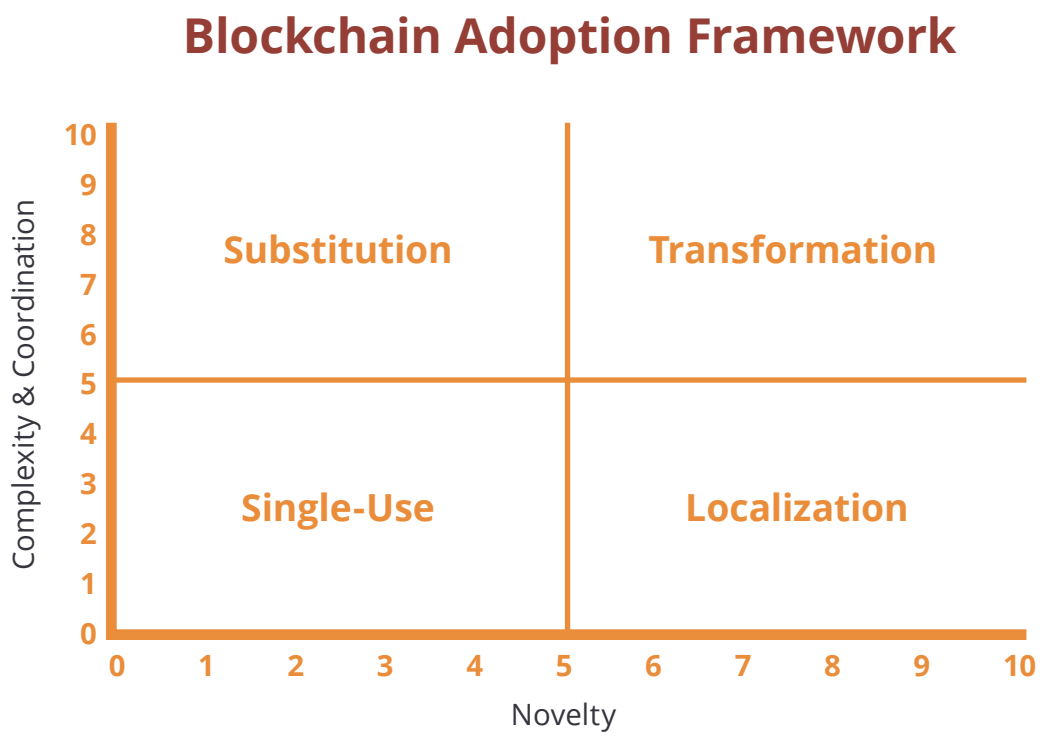
For example, a typical stock transaction can be executed within seconds. However, the settlement — the ownership transfer of the stock — can take much longer. That's because the parties have no access to each other's private ledgers and can't automatically verify ownership of the assets. Instead, a series of intermediaries act as guarantors as the record of the transaction traverses organizations and the individual databases (ledgers) are updated.

In a blockchain system, the ledger is replicated to every participant. When changes are entered in one copy, all the other copies are simultaneously updated. So as transactions occur, records of the value and assets exchanged are permanently entered in all ledgers. There is no need for third-party intermediaries to verify or transfer ownership. If a stock transaction took place on a blockchain-based system, it would be securely settled within seconds.

A framework for blockchain adoption

We can use this same framework fras described by Iansiti and Lakhani to determine if blockchain is right for your association.

Their framework defines a progression from a single-use application of blockchain to a fully transformative use case. We explained these earlier, but now we'll review the same terms in context with blockchain:



Single use

Low-novelty and low-coordination applications that create better, less costly, highly focused solutions. E-mail, a cheap alternative to phone calls, faxes, and snail mail, was a single-use application for TCP/IP, even though its value rose with the number of users.

Bitcoin, too, falls into this quadrant. Even in its early days, Bitcoin offered immediate value to the few people who used it simply as an alternative payment method. You can think of it as a complex e-mail that transfers not just information but also actual value. At the end of 2016, the value of Bitcoin transactions was expected to hit $92 billion. That does reflect a rounding error, but compare that

with the $411 trillion in total global payments, and it's clear Bitcoin is growing fast and increasingly important in contexts such as instant payments and foreign currency and asset trading, where the present financial system has limitations.

Localization

This includes innovations that are relatively high in novelty but need only a limited number of users to create immediate value, so it's still relatively easy to promote their adoption. If blockchain follows the path network technologies took in business, we can expect blockchain innovations to build on single-use applications to create local private networks on which multiple organizations are connected through a distributed ledger.

Much of the initial private blockchain-based development is taking place in the financial services sector, often within small networks of firms, so the coordination requirements are relatively modest. Nasdaq is working with Chain.com, one of many blockchain infrastructure providers, to offer technology for processing and validating financial transactions. Bank of America, JPMorgan, the New York Stock Exchange, Fidelity Investments and Standard Chartered are testing blockchain technology as a replacement for paper-based and manual transaction processing in such areas as trade finance, foreign exchange, cross-border settlement, and securities settlement. The Bank of Canada is testing a digital currency called CAD-coin for interbank transfers. We anticipate a rapid proliferation of private blockchains that serve specific purposes for various industries

Substitution

These applications that are relatively low in novelty because they build on existing single-use and localized applications, but are high in coordination needs because they involve broader and increasingly public uses. These innovations aim to replace entire ways of doing business. They face high barriers to adoption, however; not only do they require more coordination but the processes they hope to replace may be full-blown and deeply embedded within organizations and institutions.

Examples of substitutes include cryptocurrencies: new, fully formed currency systems that have grown out of the simple Bitcoin payment technology. The critical difference is that a cryptocurrency requires every party that does monetary transactions to adopt it, challenging governments and institutions that have long handled and overseen such transactions. Consumers also have to change their behavior and understand how to implement the new functional capability of the cryptocurrency.

Transformation

These are completely novel applications that, if successful, could change the very nature of economic, social and political systems. They involve coordinating the activity of many actors and gaining institutional agreement on standards and processes. Their adoption will require major social, legal and political change.

"Smart contracts" may be the most transformative blockchain application at the moment. These automate payments and the transfer of currency or other assets as negotiated conditions are met. For example, a smart contract might send a payment to a supplier as soon as a shipment is delivered. A firm could signal via blockchain that a particular good has been received, or the product could have GPS functionality, which would automatically log a location update that, in turn, triggered a payment. We've already seen a few early experiments with such self-executing contracts in the areas of venture funding, banking and digital rights management.

The implications are fascinating. Firms are built on contracts, from incorporation to buyer-supplier relationships to employee relations. If contracts are automated, then what will happen to traditional firm structures, processes, and intermediaries like lawyers and accountants? And what about managers? Their roles would all radically change.

Before we get too excited here, though, let's remember that we are decades away from the widespread adoption of smart contracts. They cannot be effective, for instance, without institutional buy-in. A tremendous degree of coordination and clarity on how smart contracts are designed, verified, implemented and enforced will be required. We believe the institutions responsible for those daunting tasks will take a long time to evolve.

And the technology challenges — especially security — are daunting.

Is my association a candidate for Blockchain?

What are the criteria for a blockchain use case?

IBM provides some solid guidance for general criteria that should be considered when evaluating potential blockchain projects:

- Is a business network involved?
- Is consensus used to validate transactions?
- Is an audit trail, or provenance, required?
- Must the record of transactions be immutable or tamper-proof?
- Should dispute resolution be final?

A guided approach to blockchain investment

How should association executives think about blockchain for their own organizations? Returning to the Iansiti/Lakhani framework, you can quickly identify the right opportunities:

For most, the easiest place to start is single-use applications, which minimize risk because they aren't new and involve little coordination with third parties. One strategy is to add Bitcoin as a payment mechanism. The infrastructure and market for bitcoin are already well developed, and adopting the virtual currency will force a variety of functions, including IT, finance, accounting, sales, and marketing, to build blockchain capabilities.

Another low-risk approach is to use blockchain internally as a database for applications like managing physical and digital assets, recording internal transactions and verifying identities. This may be an especially useful solution for companies struggling to reconcile multiple internal databases. Testing out single-use applications will help organizations develop the skills they need for more-advanced applications. And thanks to the emergence of cloud-based blockchain services from both start-ups and large platforms like Amazon and Microsoft, experimentation is getting easier all the time.

Localized applications are a natural next step for companies. We're seeing a lot of investment in private blockchain networks right now, and the projects involved seem poised for real short-term impact. Financial services companies, for example, are finding that the private blockchain networks they've set up with a limited number of trusted counterparties can significantly reduce transaction costs.

Organizations can also tackle specific problems in transactions across boundaries with localized applications. Companies are already using blockchain to track items through complex supply chains, for instance. This is happening in the diamond industry, where gems are being traced from mines to consumers. The technology for such experiments is now available off-the-shelf.

Developing substitute applications requires careful planning because existing solutions may be difficult to dislodge. One way to go may be to focus on replacements that won't require end users to change their behavior much but present alternatives to expensive or unattractive solutions.

To get traction, substitutes must deliver functionality as good as a traditional solution's and must be easy for the ecosystem to absorb and adopt. First Data's foray into blockchain-based gift cards is a good example of a well-considered substitute. Retailers that offer them to consumers can dramatically lower costs per transaction and enhance security by using blockchain to track the flows of currency within accounts — without relying on external payment processors. These new gift cards even allow transfers of balances and transaction capability between merchants via the common ledger. Blockchain could slash the cost of transactions and reshape the gift card economy.

Transformative applications are still far away. But it makes sense to evaluate their possibilities now

and invest in developing technology that can enable them. They will be most powerful when tied to a new business model in which the logic of value creation and capture departs from existing approaches. Such business models are hard to adopt but can unlock future growth for companies.

Consider how law firms will have to change to make smart contracts viable. They'll need to develop new expertise in software and blockchain programming. They'll probably also have to rethink their hourly payment model and entertain the idea of charging transaction or hosting fees for contracts, to name just two possible approaches. Whatever tack they take, executives must be sure they understand and have tested the business model implications before making any switch.

Transformative scenarios will take off last, but they will also deliver enormous value. Two areas where they could have a profound impact: large-scale public identity systems for such functions as passport control, and algorithm-driven decision making in the prevention of money laundering and in complex financial transactions that involve many parties. We expect these applications won't reach broad adoption and critical mass for at least another five years or more.

Transformative applications will also give rise to new platform-level players that will coordinate and govern the new ecosystems. These will be the Googles and Facebooks of the next generation. It will require patience to realize such opportunities. Though it may be premature to start making significant investments in them now, developing the required foundations for them — tools and standards — is still worthwhile.

Association Use Case #1:

Certifications (single-use example)

Amount of Complexity & Coordination: Low
Degree of Novelty: Low

The Current Certification Process

While each certification process is different, outcomes are similar: An individual (or in the case of accreditations, an organization) receives a credential from the association declaring them competent in some particular discipline. Most certifications also require some level of continuing education (CE), for which the association itself may offer educational opportunities to fulfill and/or recognize CE credits from third-party organizations.

For each part of this process, there's a burden of proof of completion on the certificate holder, the would-be certificate holder and the association itself. Today, this is done in a manual and highly fallible way. It is a process that can be easily broken with false documentation, or even correct documentation but from a CE provider with inappropriate accreditation to issue valid CE for that association.

Blockchain holds great promise in solving these issues.

Certifications via Blockchain

Accreditations and certifications could be issued on the blockchain. This would result in immutable evidence of the certification, which in turn could be used by employers reviewing candidates' and current employees' backgrounds when they are required to complete certain certifications.

For example, a doctor might receive a certification from an association for a particular specialty, and their employer could bring in the record of that certification from the blockchain into their human resources platform, in turn enabling that person to perform certain types of procedures.

In the CE world, if associations and third parties issued continuing education on the blockchain, they'd eliminate both the possibility of fraud and the need for manual processing. An association could automatically track when a CE credit came from an accredited institution, pull it directly into the association database tracking CE requirements and apply it, if valid, to the certification.

This is just one simple example of blockchain in associations, and it illustrates the idea of using the technology for non-financial purposes, not only fully automating a previously tedious process but also leveling up the trust within the system.

The biggest challenge with blockchain that associations will face is becoming comfortable with this new technology. With simplification, training and the right ongoing support, it won't be long before you see blockchain used by associations to the incredible benefit of members and society.

Let's go back to our checklist for this use case:

- **Is a business network involved?**
- **Is consensus used to validate transactions?**
- **Is an audit trail, or provenance, required?**
- **Must the record of transactions be immutable or tamper-proof?**
- **Should dispute resolution be final?**

Association Use Case #2:

Identity management (localization example)

Amount of Complexity & Coordination: High
Degree of Novelty: Low

For most of us logging into an online database – whether it is your company's servers or online shopping account — means entrusting a custodian (or company) to ensure your information does not become compromised.

But when it comes to password protections, history suggests we shouldn't be so quick to extend the trust of our sensitive information, to even our employers. After all, corporate hacks are not a rare occurrence: Target (2013), JPMorgan (2014), Home Depot (2014), Sony (2014), Hilton Hotels (2015) and various legal firms are all among the companies that did not sufficiently protect their central servers, ultimately exposing customers and employees to data breaches.

With non-custodial logins based on the blockchain, it is no longer a central entity who holds the power over usernames, passwords and the database that controls them. By removing the "custodian" of those credentials and replacing them with public and private keychains for logins, the former centralized entity can still ensure that those logging in are who they say they are without holding a central trove of credentials that hackers can easily acquire and use as ransom.

The stakes for better security around identity management range beyond logging into our Gmail accounts or even punching our social security numbers into some tenuously secured website. Some may not realize that critical infrastructure — power plants and grids, for example — still rely upon password protection.

Authentication systems built on the blockchain are about more than personal convenience and security. Ensuring that only authorized personnel are able to gain access to critical systems requires next-level security, and the blockchain represents a clear step up from the current password-based means of authentication.

Let's go back to our checklist for this use case:

- Is a business network involved?
- Is consensus used to validate transactions?
- Is an audit trail, or provenance, required?
- Must the record of transactions be immutable or tamper-proof?
- Should dispute resolution be final?

Association Use Case #3:

Accepting cryptocurrency for payments (Substitution example)

Amount of Complexity & Coordination: High
Degree of Novelty: Low

PayPal users in the U.S. can now buy, sell, hold and checkout with cryptocurrencies directly through PayPal using their Personal or Premier PayPal account. Users will be able to learn about crypto, track crypto prices, all without leaving the PayPal app.

What Cryptocurrencies does PayPal support? As of today, customers in the U.S. (except Hawaii) can buy, sell, hold and pay at checkout with four different Cryptocurrencies on PayPal: Bitcoin, Ethereum, Litecoin and Bitcoin Cash. PayPal plans to expand this service to select global markets in 2021.

Let's go back to our checklist for this use case:

- **Is a business network involved?**
- **Is consensus used to validate transactions?**
- **Is an audit trail, or provenance, required?**
- **Must the record of transactions be immutable or tamper-proof?**
- **Should dispute resolution be final?**

Association Use Case #4:

Digital IP (Transformation example)

Amount of Complexity & Coordination: High
Degree of Novelty: High

According to McKinsey, construction is one of the least digitized industries. The process of constructing a building involves many parties and counterparties who work across a diverse ecosystem of value creators working for different organizations.

The need for transparency, integrity, efficiency and security is obvious but current approaches to digitizing workflows in this industry have been clumsy at best. Construction Specifications Institute's standards and best practices have long been the de facto set of organizing principles for commercial construction. Recently, CSI formed the Construction Information Network to create new mechanisms for addressing the inefficiencies of this largely analog industry.

Crosswalk® is based on CSI's standards (or intellectual property) for construction, and formally launched as a service for software developers on May 4, 2020, as a suite of application programming interfaces.

Crosswalk is off to a promising start, having already tripled the pipeline for licensing revenue beyond what it normally brought in through its old-school printed-book and spreadsheet delivery model.

Crosswalk has also revitalized CSI's brand in the larger construction industry to a digital-first innovator and creator of an ecosystem that integrates construction software products and provides benefit for the entire industry.

The blockchain play for Crosswalk is focused on what has been called "Trust Services" for the construction industry. This includes use cases for version control for critical business communications, provenance tracking across a distributed supply chain, and payment services connected to smart contracts based on verification of contract performance.

Let's go back to our checklist for this use case:

- **Is a business network involved?**
- **Is consensus used to validate transactions?**
- **Is an audit trail, or provenance, required?**
- **Must the record of transactions be immutable or tamper-proof?**
- **Should dispute resolution be final?**

Appendix: Blockchain Glossary

Altcoin: An alternative cryptocurrency to bitcoin, typically marketed as a better substitute.

Blockchain: A peer-to-peer digital ledger that records data in a distributed and decentralized computing system. Through its design protocols, blockchain improves the transparency and efficiency of transactions while ensuring integrity and security.

Bitcoin: A popular cryptocurrency built by Satoshi Nakamoto that leverages blockchain as the fundamental technology. The emergence of bitcoin has attracted significant media attention and brought business use cases of blockchain into the spotlight.

Consensus: A mechanism in which participants on the blockchain reach agreement on the validity of the ledger. It is a critical feature of blockchain that ensures integral and identical data are kept.

Consortium Blockchain: A permissioned blockchain that is run by a selected group of pre-approved participants who control the consensus process. This is typically set up for organizations with similar interests, such as banking or healthcare.

Cryptocurrency: A digital currency that facilitates transfer of ownership and leverages sophisticated encryption techniques that make the transfer secure, incorruptible, and reliable.

Cryptography: Constructed protocols that prevent unauthorized users from viewing and modifying the protected data. Blockchain employs cryptography on each of its blocks to ensure the security and immutability of its data.

Decentralized Autonomous Organization: An organization that is established without human intervention and run purely by a set of incorruptible business rules.

Distributed Ledger Technology (DLT): A system of record that is shared across all the members of a network instead of centralizing the information on a single point. The data is replicated and synchronized to eliminate any discrepancy or data manipulation.

Digital Currency: A representation of digital assets with characteristics of traditional money, but operates independently of a central bank.

Digital Signature: A digital code that is generated on a participant's public key and is attached to the transaction to verify the sender's identity.

Ethereum: A public blockchain network, created by Vitalik Buterin, with smart contract functionality. It has a native currency, Ether, built into the system that shares many similarities with bitcoin.

Hash: A mathematical algorithm that converts information of any format and length into an encrypted output of fixed length. It is an encryption technique to safeguard information.

Immutable: Objects that are fixed and cannot be changed. In the case of blockchain, data becomes immutable once it is added to the blockchain through consensus.

Node: A copy of the data stored on a blockchain network. There are many nodes on the blockchain and all of them act as administrator to maintain the data.

Mining: In cryptocurrency blockchains, mining typically refers to consuming computing powers to find an answer to a mathematical question. Miners who are the first to find the right answer then demonstrate their proof of work and receive their reward in the form of a new block.

Peer-to-Peer: A highly interconnected network that allows participants to deal directly with each other without going through an intermediary function.

Permissioned Network: A private blockchain network that only limited, pre-approved participants can join to share and process information. It is common for business-centric blockchains to be set up as a permissioned network.

Permissionless Network: A blockchain network that is open to all participants; information stored on the blockchain can be viewed by all.

Proof of Work: The process of achieving consensus on a blockchain by requiring some type of work from the participants. Mining is a typical activity to generate proof of stake.

Proof of Stake: The process of achieving consensus in which the creator of a new block is chosen in a predetermined method, based on the existing wealth of the participant.

Proof of Activity: The process of achieving consensus by starting with proof of work and then moving to proof of stake afterward.

Proof of Capacity: The process of achieving consensus by confirming legitimate interest from participants and allocating a small amount of memory to each participant to solve a challenge.

Private Key: A cryptographic code that allows the owner of a block to encrypt critical information and generate the public key. This key is only visible and accessible to the owner.

Public Key: Created from the private key through a complicated algorithm to facilitate transactions and transfer between multiple participants. It cannot be reversed to generate a private key.

Satoshi Nakamoto: An unknown individual who designed bitcoin in 2008. The creation of bitcoin led to a cryptocurrency craze and also introduced blockchain as a transformative technology.

Smart Contracts: Self-executed protocols that are activated when predetermined conditions are met. They add significant value to blockchain by allowing transactions to take place automatically without human interference.

Token: An object that represents any traceable, tradable good. It can take various forms, including as a currency, points, certificates, etc.

Vitalik Buterin: The creator of Ethereum and a leading figure in blockchain technology.

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About CIMATRI

Our team of experts includes Certified Association Executives (CAE) who have spent over two decades orchestrating how technology supports mission. We work hand in hand with you to assess your business model and tech strategy, find the best options, and then implement them for you or teach your team how to do it themselves. It's all about getting the best solutions for you in place while aligning your technology, processes, and people.

About Rick Bawcum

Similar to today's 'digital natives', Rick developed an early familiarity with technology. His father was one of the original employees of Electronic Data Systems (EDS), so he spent many weekends tagging along to the various data centers where he worked. Rick's first employment in the industry was as a computer operator at a major bank (now VISA) processing credit card transactions. Rick later moved on to Big 6 consulting and various corporate positions in technology and operations leadership roles.

He has always believed that skillful use of technology can be transformational. Rick has a penchant for 'connecting the dots' and helping organizations develop strategic plans that are actionable. Technology choices are not always obvious for business leaders. Rick's passion is to help customers make use of technologies such as big data, artificial intelligence, blockchain and the internet of things as game-changers for their organizations.

As the CEO of Cimatri, Rick's role is to ensure the overall quality of deliverables. He works with association and non-profit clients on assessments, strategic planning, operations consulting, and information security. Rick's professional experience includes leadership roles in organizations ranging from start-up to Fortune 1000. He enjoys traveling with his wife, their children and grandchildren. They love art, architecture and history.

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About Sidecar

At Sidecar, we create the professional development tools a leader needs to grow their career and their purpose-driven membership organization. From interactive workshops to step-by-step courses, being a part of our community drives innovation and empowers you to be a change-maker wherever your career takes you.