

Blockchain for Associations: Separating the Hype from the Promise

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Life With Blockchain

Picture this: It's 2046, and you're an association executive in your mid-thirties.

The “Blockchain of Everything” debuted with much fanfare when you were in elementary school. Starting in the fourth grade, every class you took and every competency you developed during that class, from mastering fractions to becoming fluent in a second language to proficiency in business analytics tools, was published on your personal blockchain. In high school, your personal blockchain helped teachers identify your strongest skills, which supported creating an individualized learning pathway.

When you graduated, your high school diploma was registered on your public blockchain, providing immutable proof of where you went to school and when you graduated. College recruiters, who were able to watch your academic progress over the years, reached out before you graduated to let you know you had already been pre-approved to attend their institutions. You didn't have to fill out cumbersome and confusing paperwork to apply for financial aid, because the colleges had already looked at your family's ability to pay, and the government had approved you for student aid automatically and set up a self-executing tuition contract for you.

The college experience was a little different than it had been for your millennial parents. There were no more graduations to attend or degrees to issue. As soon as you reached a certain educational threshold, having passed any required exams or otherwise successfully demonstrated the competencies for your chosen field, prospective employers were notified that you now possessed the skills to successfully fill their jobs. Employers were able to contact you directly and immediately once their human resources departments, assisted by artificial intelligence and big data, identified you as a qualified candidate.

Having landed your dream job, the relevant membership association contacted you about earning its credential. Thanks to personal blockchains, associations are now automatically alerted when qualified people earn the appropriate credentials or are hired to do particular jobs in their industry or profession. All of your professional development is also registered on the blockchain for the purpose of issuing or renewing your certification, and your credentials are never in question or out of date again.



In order to purchase a home, you visit the real estate blockchain to look at properties in your area. You set up an appointment through the blockchain with the homeowner and take a tour. Once you decide to purchase, a self-executing contract is registered on the blockchain, and because your bank immediately knows your entire recorded blockchain financial history, they are able to quickly approve your loan. There is no need for escrow anymore, and, because the title is registered on the blockchain, it is immediately and securely transferred to you with no need for you to visit a title company.

You and your partner share a deep commitment to sustainable business practices, so you decide to plan a “values-based” wedding. By using the provenance blockchain, you can ensure that every item you use was sustainably and ethically produced, from your wedding attire to the diamonds in your rings to the decorations and food. Since your entire official relationship record trail is also on your personal blockchains, your marriage certificate is immediately recorded there as well. In the unfortunate case of a breakup, your prenuptial agreement is also registered on the blockchain as a self-executing contract, which means your assets are quickly and cleanly divided, with no arguments or need for divorce attorneys.

You have to wonder how people ever functioned pre-blockchain, with all of the confusing paperwork to fill out and file, potential fraud, expensive dispute resolution, and inefficiency.

This story is hypothetical, obviously, but these are just a few examples of the potential of blockchain and how seamlessly it may become integrated into your life. Right now, it’s poised to affect:

Education

Every class you take, every school you attend, every competency you attain, every degree or certification you earn will be registered on the blockchain. There is no possible way to “fake” a degree. Your educational history is verifiable and unique to you. It is easy for you to prove your credentials to prospective employers. Educational institutions, including associations, can search your educational profile and send you information about educational opportunities that are tailored to your skill level, interests, and areas of expertise, reducing the time you spend researching those opportunities for yourself. (See <http://www.blockcerts.org>.)

Credentialing

If you have earned a certificate or credential from a trade association or professional society that requires continuing education credits, you will no longer have to periodically dig through your files to try to figure out if you’ve accumulated enough credits to recertify. Your credits will be automatically posted on the blockchain as you earn them, and there will be no question that you have fulfilled the requirements for renewal. Your certificate is automatically renewed and updated on the blockchain upon issuance. (See <http://www.credentialingexcellence.org/blog/employing-blockchain-in-credentialing-practices>.)

Employment

In addition to your educational accomplishments, your entire work history will be posted on the blockchain. You will control your entire work history—job titles and responsibilities, dates of employment, maybe even your performance reviews—and share whatever components you choose with whomever you choose. Human resources staff will have new tools to locate and contact job candidates that might be a perfect fit for their companies. Someday, a recruiter could task Siri, Alexa, or Cortana to issue an invitation for you to come interview for your dream job based on what that recruiter already knows about your career track. (See <https://thebossmagazine.com/blockchain-for-recruitment>.)

Real Estate

With the blockchain, buyers and sellers may no longer need a real estate agent to handle transaction details for them. The seller could list her home, including verifiable details, on the blockchain. The buyer would see the listing, contact the seller for a home tour, and decide to purchase. The two parties would register their contract on the blockchain. The buyer's bank immediately sees his verifiable blockchain trail of financial position and ability to pay, so the bank is able to immediately approve his loan. Once the financing is in place, the contract self-executes, the money is transferred from the bank to the seller, and the blockchain-registered title automatically transfers to the buyer with no need for title companies or escrow agents. (See <https://propy.com/>.)

Banking

The delay and expense involved in any banking transaction comes from the fact that banks serve as middlemen. They are the guarantee that you have the money you have promised to give someone, then they issue the payment to the receiving party and prevent you from double-spending the same money. With blockchain, it's not possible to double-spend, so transactions are instantaneous and inexpensive. (See <https://www.ibm.com/blockchain/industries/financial-services>.)

Purchasing

Consumers increasingly wish to ensure that they are purchasing products from companies that are using ethical and sustainable business practices. With the blockchain, any piece of goods, from fish and organic produce to the individual parts involved in the manufacture of any complex item, can be registered on the blockchain, so consumers know where the product came from, how it was produced, how long it took to move through the system, and whether or not the product aligns with their personal values. (See <https://www.greenbiz.com/article/blockchains-emerging-role-sustainability>.)

Many of these innovations are still in the developmental stage, but they are being developed even as we write this. The time has come to think about blockchain's implications for you, your family, your association, and the industry or profession you serve. 🌟

A Dose of Reality

It's easy to get swept up in the blockchain hype. It's a promising technology with a mysterious origin story, having been created by an anonymous individual or group of individuals known only by the pseudonym Satoshi Nakamoto. Silicon Valley denizens talk about blockchain in their usual measured way—it's going to completely change every aspect of human life and endeavor, in the process rendering financial institutions and even governments irrelevant.

Hold on a minute.

First, blockchain technology is still in its infancy. Satoshi published their whitepaper laying out the concept of blockchain, *Bitcoin: A Peer-to-Peer Electronic Cash System*, on October 31, 2008, a little more than ten years ago. (We would highly recommend that you read the whitepaper—it's only nine pages, and you can probably skip the three-page section laying out the actual math unless you really want to geek out. The whitepaper elegantly describes the theoretical underpinning of blockchain and how the technology actually works.)

Because it is so new, most uses of blockchain, aside from Bitcoin, are still in proof-of-concept stage. Even cryptocurrencies, Bitcoin included, are still mostly at the proof-of-concept stage. They make terrific speculative investments, but if you want to actually use them to purchase goods and services, they're a disaster, and not just because they aren't widely accepted. Their value fluctuates as wildly as the fiat currency of a failed state. (There's a famous story of a guy who offered to pay 10,000 Bitcoins for two pizzas back in 2010, at the time, valued at about \$30. Those same 10,000 Bitcoins would be worth, as we go to print, a little more than \$39 million, down from \$64 million when we first started writing a few months ago. At its highest value to date, in December of 2017, 10,000 Bitcoins would have been worth \$179 million, which seems a bit pricey for two pizzas.)

There's also the private key problem. How do you access your cryptocurrency? It's in a digital wallet, and you use something called a private key to get into that wallet. Because cryptocurrencies are set up to protect the anonymity of their users, that is the *only* way you can prove legitimate access to your digital wallet. If I lose my bank card, or even my account number, I can still go into the physical bank with proof of my identity and get access to my funds there. Not so with cryptocurrency. A few years ago, someone had “thanked” one of the authors of this whitepaper for an insightful blog post with 1/10 of a Bitcoin. When its value hit \$17,900 per Bitcoin in December 2017, she tried to find her private key for her digital wallet and failed—that was almost \$1,800 that can NEVER be recovered BY ANYONE, not even the original holder, because he transferred ownership of that 1/10 of a Bitcoin, and there's no higher authority to appeal to in order to get it back. More recently, investors lost access to \$190 million worth of cryptocurrency when the founder of QuadrigaCX died unexpectedly, with no accessible backup of the encryption key necessary to move investors' funds from “cold” (offline) storage to their “hot” (online) wallets.¹ Again, that money is just gone.

Likewise, if someone steals your debit card and PIN and drains your account, or swipes your credit card number and runs up a bunch of charges on your AmEx, the bank or the credit card company will make it right. If someone steals your private key—which can be done by hacking your email or cell phone—they can take all your Bitcoins, and there's no one to whom you can appeal to get them back. In fact, that exact thing happened to Mt Gox, at the time the largest Bitcoin exchange in the world, in 2014,² where hackers stole over \$500 million worth of Bitcoins.

Additionally, many of the proof-of-concept uses that exist have deployed the technology to solve rich-white-guy problems, like allowing people who don't know each other to conduct financial transactions without third-party

1. <https://gizmodo.com/crypto-exchange-says-it-cant-repay-190-million-to-clie-1832309454>

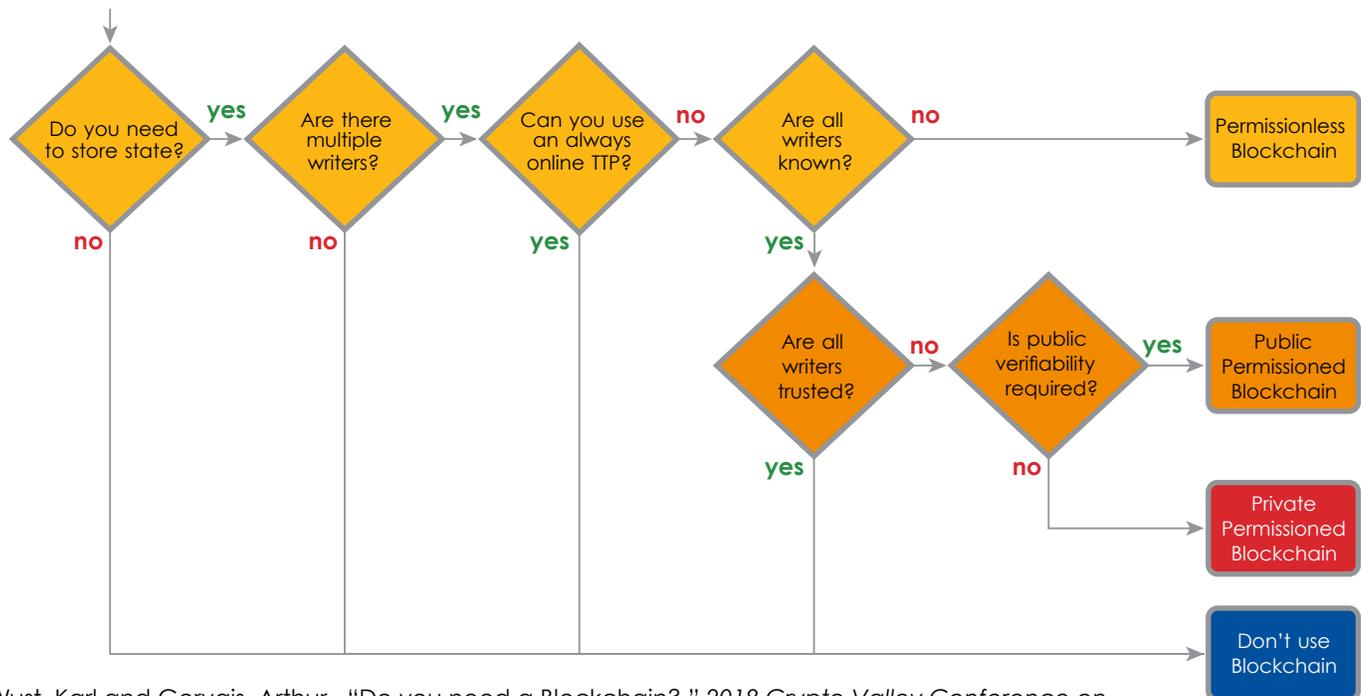
2. <https://blockonomi.com/mt-gox-hack>

involvement or confirming the provenance of unique and expensive items like art and jewelry. Maybe this isn't surprising, given that these proof-of-concept uses come from Silicon Valley, which tends to be somewhat overpopulated with rich white guys.

This myopic focus goes all the way back to the first uses of Bitcoin, from which its somewhat unsavory reputation derives. In its initial applications, Bitcoin was primarily used to buy stuff that's illegal—drugs, guns, prostitutes, child porn—on the Silk Road dark web. (For an enlightening, if somewhat salacious, recounting of this history, see tech blogger Andrew Norry's piece on Blockonomi: <https://blockonomi.com/history-of-silk-road>.)

Given that there appear to be so many potential flaws with the technology and that, in many cases, it's attempting to "solve" things that aren't really problems, or for which there already exist better, cheaper, simpler solutions,³ why even bother? After all, in most cases, the answer to the question "Do you need a blockchain?" appears to be "no."

Is that really where the blockchain story ends? Not quite. In fact, the blockchain story is just beginning. As the technology begins to mature, social-good innovators and entrepreneurs are beginning to look at ways it can be deployed to solve real-world problems, like verifying identity for refugees or homeless people who've lost their documents, ensuring aid money gets used as intended and not misappropriated, providing micro-payments to unbanked small business owners in developing economies, furnishing unalterable land ownership records as a bulwark against corrupt or chaotic governments, and verifying the provenance of goods to ensure ethical and environmentally sound production and manufacturing processes. In other words, solving pressing problems for the least fortunate and most vulnerable. Come along with us to find out more about them. ✨



Wust, Karl and Gervais, Arthur , "Do you need a Blockchain?," 2018 Crypto Valley Conference on Blockchain Technology (CVCBT), pp. 45-54 (2018), IEEE. Reprinted by permission of the authors.

3. <https://hackernoon.com/ten-years-in-nobody-has-come-up-with-a-use-case-for-blockchain-ee98c180100>

What Is Blockchain?

Blockchain is, at root, a database that allows “mutually mistrusting entities to exchange financial value and interact without relying on a trusted third party.”⁴ It keeps a historical, time-stamped record of transactions involving things that are valuable. The first major application has been digital cryptocurrency, but it can also record transactions related to other valuable items, whether they exist in the physical world (like a diamond or a piece of real estate) or in the more ephemeral, intellectual property realm (like rights to a digital music file or an electronic book).

Let's say you and I are going to a ballgame. I have \$10. You bought our tickets so our seats would be adjacent, for which I owe you \$10. But I also want to get a beer at the stadium. How do we make sure I don't double-spend my \$10, giving it to you for the tickets and then to the vendor for my beer? If it's a physical \$10 bill, I can only hand it to one of you. Problem solved. (Also, can I borrow \$10 so I can get a beer?)

The way blockchain manages all these exchanges of value is through a ledger—credits in, debits out. Normally in business transactions, we each maintain our own ledgers, and there's only one copy of each of our ledgers. You have one, I have a different one, and never the two shall meet. What that means is that you can't prevent me from cooking my books (and vice versa), and there's no way to ensure that one of us won't get cheated without involving a neutral third party.

Blockchains are different. Instead of each of us having our own ledger, there's one shared ledger, we all have a copy of it, and no one can make a change without a majority of our network agreeing that it's a valid change. Once that happens, all the ledgers on the network are updated accordingly.

Interview with Tim Haynes Blockchain Basics

During the process of researching this whitepaper, we had the opportunity to interview Tim Haynes, founder of Signal & Story: Emerging Tech Research, Strategy & Consulting and an expert on blockchain, who spoke on this topic in a well-attended session at ASAE's 2018 Technology Conference & Expo. This is part one of our interview with Mr. Haynes. Part two can be found on page 12.

Let's say you're in an elevator, and one of your fellow passengers asks you about blockchain. What's your 30-second explanation of the technology?

Blockchain is functionally a way of storing data, where unbreakable blocks of information are added sequentially onto a long chain. Once it's there, that data is there forever back to the beginning of that chain's existence.

It's also a distributed database, that is, the data on the chain is stored in lots of places.

Blockchain is like a screwdriver in a world of hammers. It's a new tool, and sometimes it's the best tool, but sometimes you still need a hammer.

Not all blockchains are alike. What are some of the key differences in its various incarnations?

There are so many different ways to structure blockchains, it's staggering. It's kind of like programming languages—you can use any of them, but different languages have different natural fits. You wouldn't use PHP to write a video game, just like you wouldn't use C++ to write a web site. Most of the differences relate to how you structure who has access to what data and how information is verified. *(Continued on page 7)*

4. <https://eprint.iacr.org/2017/375.pdf>

Let's return to our ballgame and beer example. At the beginning of our scenario, I have \$10. You have two tickets to the game and \$0. The beer vendor has at least one beer and \$0. At the end of our transactions, I'll have a ticket and \$0. You'll have a ticket, a beer, and \$0. And the beer vendor will be down one beer and have \$10.

As we saw above, if we're all going to exchange a physical \$10 bill, a physical ticket, and a beer, it's no problem. But what if we want to do this all (other than the beer, of course) electronically? After all, who carries cash or gets physical tickets mailed to them these days?

Now we have a problem. Without trusted third parties like the MLB app and Venmo, there's no way to confirm the validity of the tickets, there's no way to confirm I actually have \$10 to give you, and there's no way for the beer vendor to prevent me from spending the SAME \$10 to pay you for the ticket and him for the beer, or even to stop me from making a mistake and thinking I started with \$20 rather than \$10. Also, of course, all those intermediaries will take their cut for processing the transaction, which means the beer vendor is actually going to get more like \$9.65.

If we all decided to use blockchain to manage this process, you could transfer me the ticket, and we'd all see that transaction. Once I scanned in at the gate and the validity of the ticket was confirmed, I'd pay you \$10 and we'd all see that transaction, too. In fact, as we'll see below, if you and I had a smart contract governing this transaction, once the validity of my ticket was confirmed by scanning in at the gate, I couldn't NOT pay you. The money would transfer automatically, instead of letting me get away with being that one friend who always says she'll pay you later and then never does.

Interview with Tim Haynes (cont'd)

Fully public decentralized blockchains, like Bitcoin, allow anyone to become a member of the network and access and contribute to the maintenance of the chain. People get excited about that; it points to a digitized utopia where we don't need governments, contracts, or lawyers to do business with each other. But there are major drawbacks to this kind of network. It's like the old engineering adage: fast, cheap, good—pick two. Only this time, it's: fast, cheap, distributed—pick two. Fully public decentralized blockchains that are highly secure and redundant (which is what makes them unhackable, for all practical purposes) end up being slow and/or expensive to maintain and run.

For instance, Bitcoin and cryptocurrencies in general are posited as good replacements for fiat currencies in developing economies because they allow fast, low-cost micro-transactions. But in late 2017, when Bitcoin was at its highest recorded value to date, it could take days to process transactions or involve significant overhead costs (at one point, \$50 per transaction). That was because it's based on a "proof of work" model, which you've probably heard can be an enormous energy hog, and there were a lot of transactions happening on a network with limited bandwidth, so users had to pay a premium if they wanted speed. When that happens, cryptocurrency is no longer a good replacement for fiat currency.

But there are lots of other ways to set up your blockchain that aren't public and so are faster and use much less energy. Most emerging commercial uses of blockchain are permissioned and/or private networks that involve a much smaller number of vetted, trusted nodes. Those networks don't have to perform as many checks before writing new blocks because there is existing trust between the participants, which ameliorates most of the efficiency and energy-use problems. These types of blockchains have enough nodes watching the system to prevent fraud, but they don't allow anyone and everyone who wants in to participate. *(Continued on page 8)*

Meanwhile, the beer vendor would be able to see that you now have \$10 and can afford one of his cold, refreshing beers, and also that I don't have that \$10 any more to spend with him. He would give you your beer, you would give him your \$10, and we'd have achieved our goals. I'd have a valid ticket and \$0, you'd have a valid ticket and a beer and \$0, the beer vendor would have one less beer and \$10, and he'd get to keep all of that \$10. All without the intervention of a third party, and all without any concerns that someone would get cheated. Moreover, we'd only see the entries related to these transactions. I wouldn't be able to see your entire ticket purchasing history (so the secret of your fondness for Nickelback is safe), and we wouldn't both suddenly have access to the beer vendor's entire business account history.

In short, blockchain is "a protocol for exchanging value over the internet without an intermediary."⁵

In traditional situations, if we're not exchanging a physical item (cash), electronic transactions require a middleman, like a bank, Major League Baseball, or a credit card company, to make sure you don't try to scam me into accepting a fake ticket, and I don't try to scam you and the beer vendor into accepting the same \$10. But, as every association executive knows, that middleman wants her cut for processing the transaction and ensuring that none of the parties get cheated.

That creates, in blockchain parlance, "friction," which slows down our transactions and increases the costs to all parties. Blockchain allows people who otherwise could not trust each other to operate in a trusted environment with independent verification, reducing that friction and speeding up transactions by allowing us to exchange items of value without that third party and before we've had a chance to get to know each other well enough that we feel comfortable saying, "I'm confident she won't cheat me, so I'll decide to trust her." You and I can trust the ledger we can both see without having to trust each other.

Interview with Tim Haynes (cont'd)

What do you think is the most interesting current application of the technology?

The most immediate real-world problem blockchain can solve is related to immutability, the permanence of the data once it's written. That means data records stored on blockchains can't be forged. They can be wrong if you make a mistake, but they can't be faked. Because of that, blockchain is excellent for tracking valuable assets.

Some of the current applications of that include:

- Sweden is moving all land title records to blockchain, which means there's a secure record with one immutable owner of all pieces of real estate that everyone can view and agree on when real estate changed hands.
- Blockchain is currently being used for tracking diamond sourcing. Blockchain can keep records of serial numbers inscribed on diamonds, preventing forgeries and also verifying provenance, so purchasers can be certain they aren't buying "blood diamonds."
- Works of art are being tracked on blockchain, which prevents forgeries or selling stolen art to unwitting patrons. It's not going to stop people who knowingly traffic in stolen art, but it can protect art collectors from unknowingly buying stolen works.

Looking ahead, Maersk, the world's largest shipping company, is leading an effort to move the entire global shipping process onto blockchain. Right now, 20-25 percent of the cost of shipping goods is overhead paperwork. This effort will probably take at least a decade because there are complex local laws, processes, and tariffs in every location, worldwide, for every item that's currently being shipped. The challenge is getting all the ports and shipping companies in the world onto the blockchain, but removing the friction is worth it. Reducing or removing costs in time, efficiency, and lost or spoiled goods will have a multi-trillion-dollar global impact. *(Continued on page 9)*

5. *Blockchain. Enigma. Paradox. Opportunity.* pg. 1

According to IBM's Institute for Business Value, blockchains can overcome several types of friction:

- **Information.** Information can be incomplete, inconsistent, wrong, or inaccessible and thus can unfairly disadvantage one or more parties in a transaction. Information can also be hacked or stolen.
- **Interaction.** The more complex transactions get, the more intermediaries get involved, the more complicated, slow, and expensive transactions become. Even in 2019, some people remain completely cut off from exchanging value with others (think of micro-economies in the developing world).
- **Innovation.** Institutional inertia and industry and government regulatory processes slow things down.⁶

Blockchain gives all parties to a transaction access to the same information. It is extremely difficult—although, it is important to note, not logically impossible—to hack or alter information in the ledger without the other parties knowing. Blockchain cuts down on mistakes, not only because there's just one ledger, so there's no transcription errors, but also because a majority of participants in the network have to agree to any changes. Because it drastically reduces the number of hands that have to touch a transaction, it also drastically reduces the costs of transactions, which opens up opportunities to people who don't have access to or can't afford to pay middlemen. And it can reduce some of the need for regulation, although it is important to remember that some regulations are intentionally designed to slow things down, because moving fast and breaking things isn't always an unalloyed good.

That said, not all blockchains are created the same. Some of the key differences include

- Private (permissioned) versus Public (permission-less)
- Proof of Work versus Proof of Stake

Interview with Tim Haynes (cont'd)

What do you think is the most promising emerging application of the technology? What do you think the blockchain world will look like in five years?

We don't know yet. This is like asking what the Internet will be good for in 1995. It takes time and experimentation to figure out what new technologies are good for, so it's impossible to speculate.

One possibility I find particularly intriguing is that we might move all of identity onto the blockchain. Every person, apple, cat, chair, mp3 file, or other piece of data could be seamlessly tracked and identified as it moves through the world. The potential is awesome—no one would ever have to stand in line, hand over cash or a credit card to pay for anything at the point of sale, use a passport—but it also would mark the absolute end of any sense of privacy, which is potentially horrifying. Obviously, this is not definitely going to happen, but it could.

And there are some big downsides to an immutable data record.

As we've seen with the GDPR (General Data Protection Regulation) in Europe, there is a big pushback in developed countries right now around the storage and use of personal data. The question becomes: "How do I store data on the blockchain that I might, someday, need to delete?" At the moment, there is no good answer. The only way to do that now is to delete the entire blockchain. The analogy is that you can't delete one record—you have to delete the entire database across every single node that was contributing to or participating in that blockchain. *(Continued on page 10)*

6. *Fast Forward*, pp. 4-5

Let's address the private (permissioned) versus public (permission-less) issue first. To explain the difference, we're going to quote from Deloitte's recent *Blockchain: Enigma. Paradox. Opportunity.* report:

"Like many other types of databases, blockchains can be public or private. The Bitcoin network is public (also called "permission-less") because anyone can read or write data from or to the ledger if they are running the appropriate Bitcoin software. Private blockchains, on the other hand, are networks where the participants are known a priori and have permission to update the ledger. Participants may come from the same organisation or from different organisations within an industry sector where the relationships between them are governed by informal arrangements, formal contracts or confidentiality agreements."⁷

What about Proof of Work versus Proof of Stake?

Again, quoting the Deloitte report:

"In the absence of trust, public blockchains typically require additional mechanisms to arbitrate disputes among participants and protect the integrity of the data. This involves added complexity because there is no central authority to arbitrate in a decentralised network. In the Bitcoin blockchain, for example, new transactions can only be added to the blockchain after a participant on the network solves a complex mathematical problem, known as a 'proof-of-work.' This process is called 'mining.' The effort miners have to expend on finding a solution to this mathematical problem acts as a sign that the transactions are valid, even though the miners may not know one another."⁸

Interview with Tim Haynes (cont'd)

The challenge right now is ensuring you have enough understanding of this whole thing that you can ensure some longevity if you decide to move a particular process onto blockchain. It's software, and all software has bugs. If Microsoft wants to update Word, they roll out a new version, users install it at their convenience, and everyone moves on. But all the nodes in a given blockchain have to be running the same code. Nodes can't run different versions of the code or make different choices about how the blockchain will run. Any given blockchain needs a strong governance structure that details who has the rights to update the structure and what the incentives are to move the entire community when, for instance, regulatory issues like GDPR pop up, because every node has to move together, and no network is immune to change. 🌟

But there's a problem with Proof of Work networks, one you've probably already heard about: energy use. The thing that makes Bitcoin difficult to hack is the encryption it's based on, and "mining" coins is about solving the encryption problems that run the whole system in real time. The encryption is based on very large prime numbers, and "miners" are solving problems to find the next one in the series. They're basically building the encryption plane as they fly it. Once a "miner" solves for the next prime number in the series, and it's been verified by a majority of the rest of the distributed nodes in the network, she owns that "coin."

Unfortunately, it requires enormous computing power to solve these equations. According to a recent article in *The New Yorker*, "This year, it is said, the Bitcoin network will use as much energy as the nation of Austria, and produce as much carbon dioxide as a million transatlantic flights."⁹

7. *Blockchain. Enigma. Paradox. Opportunity.* pg. 6

8. *Blockchain. Enigma. Paradox. Opportunity.* pg. 6

9. <https://www.newyorker.com/magazine/2018/10/22/the-prophets-of-cryptocurrency-survey-the-boom-and-bust>

Cryptocurrency miners have attempted to solve this problem by locating their server farms near abundant sources of renewable energy, like large hydroelectric dams, or in locations that are cold year-round, even resorting to open-air server farms in an effort to at least not expend additional energy keeping the machines cool enough to operate.

Proof of Stake provides an alternate solution to trying to build server farms in Antarctica. In a Proof of Stake blockchain, “validators must hold a certain percentage of the network’s total value.”¹⁰ In other words, you buy in—you offer a stake, something of value—to get the other members of the group to trust you. If you behave badly, say by attempting to hack the network, you forfeit your deposit.

This is what renders the network functionally unhackable (notice we didn’t say it’s logically impossible to hack). As CompTIA’s excellent report *Harnessing the Blockchain Revolution* notes: “Blockchain data is tamper-resistant, meaning that one can’t simply modify the ledger without anyone else knowing. Blockchain data is cryptographically linked and secured so that making changes to the ledger is both difficult and easily detectable.”¹¹ Because the problems are so difficult to solve, Proof of Work blockchains are an undesirable target. Alternatively, Proof of Stake blockchains hold assets hostage to ensure good behavior.

And, because the blocks build on each other, there is no “undo” button. This is what people mean when they talk about blockchains being “immutable.” There is no going back; the chain can only go forward. Which means the only way to undo a mistake is to record a new transaction, and you can’t cook the books without everyone else in that network seeing exactly what you’re trying to do. Also, there’s very little chance you’ll convince 51 percent of them to go along with your chicanery and approve your malicious additions. (One exception to this, known as the 51 percent problem, is explained well at <https://medium.com/coinmonks/what-is-a-51-attack-or-double-spend-attack-aa108db63474>.)

This is merely a brief overview of some of the keys to how blockchain works. You can get into the weeds on any of these topics, and we’ve provided resources at the end of this paper to allow you to do so. But we think this overview will give readers enough shared knowledge to begin looking at some of the more interesting applications of blockchain beyond cryptocurrency and how the technology will affect associations and the members they serve. ✨

10. *Blockchain for Dummies*, IBM Limited Edition, pg. 16

11. *Harnessing the Blockchain Revolution*, pg. 7

How Will Blockchain Affect Associations?

By this point, you might be thinking, “This technology sounds amazing! I can’t wait to get started! Which project should my association take on first?”

Blockchain for Dummies offers some guidance via a series of questions to ask yourself:

- Do we need to track transactions that involve more than two parties?
- Is the current system overly complex or costly, possibly due to the need for intermediaries or a central point of control?
- Can the network benefit from increased trust, transparency, and accountability in recordkeeping?
- Is the current system prone to errors due to manual processes or duplication of effort?
- Is the current transaction system vulnerable to fraud, cyber-attack, and human error?¹²

Now, this probably sounds like every single transaction your association engages in with members, conference attendees, corporate supporters, volunteers, customers of your programs, advocacy partners—you name it.

However, there’s an important additional caveat, which the CompTIA report *Harnessing the Blockchain Revolution* makes clear: **Are there non-blockchain solutions that are available and effective?**¹³

In fact, for the vast majority of association business transactions, there are. The association industry enjoys a mature technology ecosystem, with stress-tested programs and services provided by technology partners who are experts in the industry for the majority of the functions we need to perform: membership management, financial management, conference management, learning and professional development management, sponsorship and advertising management, volunteer management, and

Interview with Tim Haynes

Blockchain and Associations

During the process of researching this whitepaper, we had the opportunity to interview Tim Haynes, founder of Signal & Story: Emerging Tech Research, Strategy & Consulting and an expert on blockchain, who spoke on this topic in a well-attended session at ASAE’s 2018 Technology Conference & Expo. This is part two of our interview with Mr. Haynes. Part one can be found on page 6.

Do you think blockchain is going to affect the nonprofit membership association world? How?

The most obvious first application will be verification of credentialing. Any institution that offers any sort of credential or degree will start moving to blockchain, where verification is a simple, automated process, and all parties have a vested interest in making it so. Everyone wins.

There is a potential impact on membership data records, but there are (as we discussed in part one of this interview) significant privacy issues, although it’s important to note that’s mostly a Western concern.

Associations might also want to start looking into smart contracts, in which blockchain is basically an escrow account: When X happens, Y is triggered automatically. This makes contract terms more clear, and payments process faster. For instance, conference room blocks could be managed on the blockchain: Once X number of rooms are booked, Y funds are transferred without any person having to intervene.

(Continued on page 13)

advocacy management. Blockchain solves problems that may not actually exist—or may not be significant enough to merit gambling on a technology that’s still in its relative infancy—in the association industry.

12. *Blockchain for Dummies*, IBM Limited Edition pp. 37-38

13. *Harnessing the Blockchain Revolution*, pg. 26

Being right at the leading edge of emerging technologies is usually not a good fit for associations. We lack the resources to take those bets, particularly in a situation where good alternatives exist even for many of the corporate applications of blockchain that are being piloted now. As an excellent (if slightly hyperbolic) blockchain skeptic author puts it on Hackernoon: “Everyone says the blockchain, the technology underpinning cryptocurrencies such as bitcoin, is going to change EVERYTHING. And yet, after years of tireless effort and billions of dollars invested, nobody has actually come up with a use for the blockchain—besides currency speculation and illegal transactions.”¹⁴ The issue, as the author points out in a follow-up article, is that blockchain is rarely the best of the currently available solutions to any given problem.¹⁵

What about the concern that, to quote IEEE’s recent report on blockchain, “these applications are being designed to remove rent-seeking corporations from digital processes while giving users more control over their data?”¹⁶ Couldn’t that spell the death-knell of associations, since we often serve as those intermediaries, facilitating connection among our members? Couldn’t they self-organize on a blockchain, rendering associations redundant?

The answer is possibly someday, but not likely any time soon. The reason for that is the technology, as discussed above, is in its relative infancy. There are many competing blockchain platforms that are not interoperable. It’s sort of the wild west, as we’ve seen with all the fraudster Initial Coin Offerings (ICOs) that almost immediately implode. As the IEEE report puts it, “when the rules themselves—thus the very design of a blockchain—come into question, competitors find themselves once more in the awkward position of having to negotiate and collaborate while somehow protecting their advantages.”¹⁷

Interview with Tim Haynes (cont’d)

Blockchain could also be used for advocacy. Let’s say your association is trying to get ten thousand signatures on a petition. Are those all real people who have a relevant stake in the issue at hand? With a digital blockchain signature, the signers commit and there’s no deniability—“Tim lives in X district, which means he is actually one of your constituents, and he thinks Y” —and Tim can’t easily change his mind and say he didn’t sign or agree.

Associations will also, at some point, likely have to think through the mechanics of accepting cryptocurrency for payment of dues or registrations and then through the tax implications of accepting it for donations.

How long do you think association executives have to get ready to live in that world?

Anywhere from right now to five years out, depending on the organization. You have to think about which application is most likely to hit your members first—i.e., are you in credentialing, is supply chain a big deal for your members, do you have a lot of younger members, do you have tech-savvy donors who might want to pay using cryptocurrency?

What advice would you have for an association executive who’s just starting to think about all this?

If you’re interested in experimenting with blockchain, start by finding a trusted partner who can help you build something that is as secure and efficient as possible and will work with you to put the regulatory processes in place so that the participants can continue to work together in the future. I recommend working with IBM. They are building a wide variety of projects with other trusted players in the blockchain space, e.g., Ethereum and Hyperledger. *(Continued on page 14)*

14. <https://hackernoon.com/ten-years-in-nobody-has-come-up-with-a-use-case-for-blockchain-ee98c180100>

15. <https://medium.com/@kaistinchcombe/decentralized-and-trustless-crypto-paradise-is-actually-a-medieval-hellhole-c1ca122efdec>

16. *Reinforcing the Links of the Blockchain*, p. 2

17. *Reinforcing the Links of the Blockchain*, p. 2

In fact, we've seen this before, when the free availability of information through this disruptive new technology called "The Internet" was going to kill off associations 20 years ago, and when the free availability of organizing and networking through this disruptive new technology called "Social Media" was going to kill off associations ten years ago.

What we've discovered since then is that, while people can access information for free on the internet, most people are poor judges of what constitutes valid, quality information. There is still a role for a curator. While people can accomplish simple self-organizing via social media, any large-scale enterprise (like a conference, a class, a march, or a protest) generally requires a formal organizer or group of organizers, professionals who are paid for their time and expertise.

Likewise, with blockchain, there is still an important role for centralized intermediaries: providing a source of authority to appeal to when something goes wrong, which, particularly given the nascent regulatory environment in which blockchain is operating, happens frequently.

Given all of the above, blockchain is not likely to affect the association industry qua associations significantly in the near term, with the possible exception of credentialing, as you'll see in our Central New Mexico Community College case study. However, it will significantly affect the professions and industries associations serve, although it won't affect all industries and professions equally. Our job, as association executives, is to help our members prepare for the changes that are about to impact them, which is the focus of the remainder of this monograph. ✨

Interview with Tim Haynes (cont'd)

Blockchain isn't magic. It's a tool, which means that it might not be the right tool for your job. If there are other systems that can do what it does equally well but are tried and tested, faster, and equally secure, there is no reason to move into using it right now. On the other hand, if you need to use the buzzword to get your board to approve funding for innovation, do what you need to do to get the investment of resources you need to move forward with your ideas.

If you're interested in this (and you probably should be), a good way to start is to hire an outside expert to come in and facilitate a strategic conversation with your senior team and/or board of directors. This is a low-cost way to educate them and help them see some of the possibilities.

As a next step, identify someone on your staff who's interested in learning more about blockchain and free up time for her to study this, particularly news about the latest applications and regulatory changes.

If you identify something that might be a viable project, set up a sandbox project through IBM or have your staff expert create an account on CryptoZombies (<https://cryptozombies.io>), which is a terrific free resource for learning how to code smart contracts on the Ethereum platform. Tell her to stop work at 3 p.m. on Fridays and play on the platform for a few hours a week. ✨

How Will Blockchain Affect Your Members?

Where does blockchain currently fall in the technology maturity cycle? Our best guess is it is about to conclude its “incubation” stage. Like many new technology solutions, a lot of preliminary hard work has to go into thinking about applications of the technology and then into building the structures necessary to support those applications. Once those structures are built, technologies “break out,” expanding and being adopted in an exponential manner.

Blockchain is not quite there yet, so it is difficult to predict how it will affect the association industry. What we can predict is that blockchain is going to affect the industries and professions association represent, although at different times and levels in different professions and industries. Your members need to be aware of the current uses of blockchain. From those examples, you and your members can begin to draw inferences and make some educated guesses about how blockchain could potentially affect them.

From a systems thinking perspective, the indicator will be: How quickly is blockchain making significant inroads into three major systems that affect every individual and business on a fundamental level—finance, contracts, and education? These systems are incredibly complex, so if proponents can fully implement blockchain in these critical areas, there will almost be no limit to its applications outside them.

Obviously, we can’t address every industry and profession in this paper, so we have chosen some key examples that give a good sense of blockchain’s potential. The following short accounts illustrate what we have discovered about different uses, or potential uses, of blockchain technology. What you will notice is the systemic nature of blockchain. Each of these examples are interconnected in some way. Once blockchain is solved for one piece of the system, say finance or education, the other pieces are almost compelled to implement blockchain in a holistic way to gain the greatest benefit for the individuals or companies that are involved in its application.

Blockchain in Education: Credentialing

What’s the problem?

If your association runs any type of certification, accreditation, or credentialing process—or if you’ve ever hired someone whose credentials you need to verify—you are already intimately aware of the problem: verification. Verification is expensive, time-consuming, and subject to fraud.

According to GetEducated.com:

“Only about 34 percent of employers check the educational qualifications listed on resumes, according to a 2004 study by the Society for Human Resource Management—even though the association found that 25 percent of people inflated their educational achievements on resumes. Among the minority of employers who do check college credentials, most only check a student’s attendance or graduation dates. Almost none check whether the university itself is properly accredited.”¹⁸

In fact, a more recent study found that fully one-third of credentials listed on LinkedIn profiles are faked.¹⁹

Even for those with legitimate credentials, proving them can be complicated, because, while the individual earns the degree or certification, it is owned and can only be confirmed by the credentialing organization. That generally involves filling out paperwork and submitting a payment to the credentialing organization, then waiting while they process that request and send a sealed copy of your transcript, certificate, degree, or license to the third party that requires verification.

18. <https://www.geteducated.com/life-experience-college-degree/305-linkedin-professionals-found-listing-life-experience-degrees-on-resumes>

19. <https://www.studyfinds.org/linkedin-profiles-fake-study>

How does blockchain help?

Because it's a public ledger, credentials are immediately verifiable. If I claim to have a degree or certification on my LinkedIn profile or resume, a prospective employer can immediately see what the credential is, whether I actually hold it, what the credentialing organization is, whether that organization is a valid credentialing source, and whether my credential is still valid. As the credential holder, I control who can see information about my credential and what specific information they can see. This allows me to share granular information as well. Not only can I share that I hold a particular degree from a particular university with a prospective employer, I can, where relevant to the position, share the specific courses I completed, the grades I earned, and the competencies I have demonstrated as a result of that learning.

(For more specifics on how this works, see the Central New Mexico Community College case study on page 26.)

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

This is going to have a major impact on any association that offers or verifies credentials (like certifications or accreditations) and on any industry that hires people based on credentials (like valid, current licenses), probably sooner rather later.

The most important thing you can do right now is to pay attention to what's happening in higher education. They are leading the way on student-owned and -administered degrees that are recorded on and verified through blockchains. Don't make the mistake of assuming it is only fringe educational institutions that are experimenting. Well-known institutions are heavily involved in this nascent movement. Massachusetts Institute of Technology (MIT) has been deeply involved in creating an open blockchain for education and, in October 2017, issued 111 diplomas to students via a smartphone application.²⁰ In 2018, MIT issued 2,000 certificates via blockchain.²¹ We have no reason to assume it will not continue to scale.

Begin educating yourself about some of the potential platforms on which credential verification is likely to live. As we've discussed elsewhere in this whitepaper, the blockchain platform ecosystem is still very much in flux, but consensus is beginning to form around some of the specific blockchain platforms in this space. For instance, EchoLink has been specifically constructed to focus on the problem of resume verification. IBM and Columbia University have also formed a partnership, the Columbia-IBM Center for Blockchain and Data Transparency.

Educate your board of directors and professional development committee members about this topic. They will obviously not have to work out the details of the technology, but in the near future your association may need to move quickly to provide credential verification through a blockchain, and your leaders will need to be prepared to make quick decisions to support that.

20. <http://news.mit.edu/2017/mit-debuts-secure-digital-diploma-using-bitcoin-blockchain-technology-1017>

21. <https://iblnews.org/2019/02/15/mit-issues-2000-blockchain-based-certificates>

HOW BLOCKCHAIN CAN TRANSFORM HIGHER ED

DATA MANAGEMENT

1

"Digital identity" is now being thought of as a basic human right. Blockchain technology would allow individuals to have control over their own personal data and would eliminate the need for costly data management systems and personnel. Digital transformation of paper-based tracking systems would increase efficiency and control over data sharing at personal, business, and industry levels.

CREDENTIALING

2

As higher ed moves to a model of lifelong learning and upskilling to keep up with a changing world, new ways of verifying learning, both formal and informal, are needed. Blockchain would allow for immediate and accurate verification, no third party needed. Theoretically, tracking down professional and educational achievements would be via the blockchain in a standardized way.

FINANCIAL AID

3

Higher ed institutions are starting to explore alternative financial options like allowing tuition to be paid via cryptocurrency like Bitcoin or Ether. An idea perhaps a bit farther down the road is the notion of "repayment contractors" such as employers who would not charge tuition up front, but guarantee payment to providers in the future.

CURRICULUM

4

Most people have no expertise in blockchain technology. With usability being a challenge, many institutions are starting to offer courses, boot camps, and even degrees in blockchain or cryptocurrency. Teaching blockchain technology represents the essence of interdisciplinary learning since it combines elements of business and commerce, IT and cryptography, policy and law, etc.

INTELLECTUAL PROPERTY

5

Higher ed institutions have historically been the gatekeepers to knowledge. With the blockchain, the idea of the "meta university" is made possible. Professors would be able to track the usage of their intellectual property by making it fully open via the blockchain but undeniably tied to the rightful owner. This has implications for open and collaborative learning that exist outside of one institutional entity.

Further reading on this topic:

- The Columbia-IBM Center for Blockchain and Data Transparency: <https://engineering.columbia.edu/press-releases/columbia-ibm-center-blockchain-data-transparency>
- EchoLink website: <https://en.echolink.info>
- EchoLink whitepaper: https://github.com/EchoLinkTech/EchoLinkService/blob/master/EchoLink_github.pdf
- The Blockchain Revolution and Higher Education, EDUCAUSE Review: <https://er.educause.edu/articles/2017/3/the-blockchain-revolution-and-higher-education>
- Blockchain in higher ed moving from idea to reality, Education DIVE: <https://www.educationdive.com/news/blockchain-in-higher-ed-moving-from-idea-to-reality/527879>
- What is the blockchain, and how can it transform higher education? <https://www.academicimpressions.com/blog/what-is-blockchain-higher-education>

Infographic reprinted with permission Alicia Miranda, Academic Impressions

Original source: <https://www.academicimpressions.com/blog/what-is-blockchain-higher-education>

Blockchain in Engineering: Construction Risk Management

What's the problem?

If you've ever been through the process of building a new house or making significant renovations on your office building, you know the complexities involved in construction projects. You need to secure an architect to draw up plans, which will then likely go through multiple revisions. Those plans must be approved by your local government, which will then issue a permit, which is such a headache-inducing process that "permit expeditor" is a lucrative profession in many areas. You then need to contract with a general contractor, who in turn has to procure all the materials and line up subcontractors. Those materials then have to be transported to the work site. Only then can the construction or renovation start. Meanwhile, it's common to make changes to the original plans along the way. Then, when construction concludes, your local government will need to come out and inspect before issuing a certificate of occupancy. All of those are instances where "friction" can create enormous delays and complications.

How do we accelerate this process while reducing risk in engineering and construction?

How does blockchain help?

Blockchain is already being deployed in engineering and construction. One example is a project that has been started by The Integrated Engineering Blockchain Consortium (IEBC). This system creates a holistic model that connects engineering firms, insurance firms, and banking and other financial institutions to ease the transfer of responsibility for risk at the various stages of large-scale construction projects. It helps engineers measure their contributions to the economy "in terms of risk eliminated from physical systems."²²

The Professional Engineering Protocol, which governs the licensure of professional engineers in the United States, was established in part to ensure private and public financing of large infrastructure projects are handled in the best interests of all. As a recent article from Engineering.com points out, "integrating blockchain with the PE Protocol can result in a digital currency backed by professional engineers," one that values risk management as highly as ROI.²³

Blockchain would help large-scale construction projects to be sequenced in a more organized and efficient manner, allowing documents to be signed more quickly and in the correct order, and contracts to be time-stamped in real-time, reducing the risk of human error. Blockchain for construction would also reduce the risk of potentially using sub-standard components, as their provenance would be securely, immutably, and reliably tracked. Blockchain could also make it easier to insure large construction projects, by reducing, if not entirely eliminating, many of the significant risks these projects entail.

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

Most associations are not involved in large-scale infrastructure construction projects, so you may be thinking, "Why should I care about what is happening in the engineering blockchain?" We believe the answer lies in the concept of how engineers are adapting the blockchain to default to transparency as a way to reduce risk.

22. <https://coengineers.io>

23. <https://www.engineering.com/DesignSoftware/DesignSoftwareArticles/ArticleID/17102/What-Do-Blockchain-and-Engineering-Have-in-Common.aspx>

Associations take on insurable risks with activities like conferences and chapter meetings and events. As it becomes more common to have contracts on the blockchain, your insurance needs—whether D&O insurance for your board or property-casualty, cyber-risk, or event-cancellation insurance—may be moved onto the blockchain. Your premiums may go down if you're able to develop blockchain-based systems to evaluate board performance, event planning and hotel contracts, and cyber security compliance.

Further reading on this topic:

- National Society of Professional Engineers whitepaper, “Blockchain Technology: Implications and Opportunities for Professional Engineers”:
<https://www.nspe.org/sites/default/files/resources/pdfs/NSPE-Whitepaper-Blockchain-Technology-2016-final.pdf>

Blockchain in Government: Persistent Identity

What's the problem?

If you lose your documents or your papers are destroyed, how can you prove who you are?

This is not something most of us ever think about. We have multiple forms of identity—birth certificates, social security cards, driver's licenses, and passports—stored in multiple locations. And we enjoy stable state and federal governments, so that if, say, an original birth certificate is lost in a move or a passport gets stolen on travel, there's a mechanism for replacing those critical proofs of identity.

But what if you're a refugee? Or homeless? People in dire life circumstances lose their documents all the time, and when their lives are unstable it's often impossible to get them back. This means refugees are unable to access food and medical assistance. Homeless people can't collect social welfare benefits to which they're entitled—or even get off the street, as renting an apartment or landing a job generally requires being able to prove who you are.

How does blockchain help?

Because information is immutable once it's written to a blockchain, you can never lose your papers, because there are no “papers” to lose. Proof of your identity is persistent and controlled by you.

The UN Refugee Agency is currently using blockchain-enabled technology to allocate resources to Syrian refugees in camps in Jordan. Not only does this make it easier for the refugees to access their food allowances and other types of support and care, it may also be able to help them re-establish their legal identities, even though their documents were left behind when they fled their homes.

Blockchain can also cut down on waste, fraud, and abuse in the distribution of aid resources. We've all heard stories of aid resources that are stolen, misappropriated, or even left on the tarmac or in a warehouse to spoil because the aid agencies were unable to determine who should receive them. Blockchain ensures that the resources go to—and only to—the people they're intended to help.

There is a problem, though. Now we're talking an immutable record of people rather than things, and that may not always be desirable. What if you need to disappear, either for spy-thriller, mafia-informant type reasons or for the sadly much more common need to escape intimate partner violence and domestic abuse? Or less drastically, what if you've written GDPR-protected information to a blockchain? How do you delete it? Right now, there is no answer, other than deleting the entire blockchain, at least back to the point that data was first recorded, which is not an acceptable solution.

Nonetheless, all kinds of nations and international groups are launching initiatives that depend on persistent identity:

- The Swiss are using blockchain to prevent vote hacking.²⁴
- The Danes are doing this as well.²⁵
- South Korea is using blockchain to verify customer identity for banking purposes, which allows Korean banks to more easily comply with international laws regarding identity and source of funds that are designed to prevent money-laundering by organized crime syndicates and terrorist groups, while at the same time speeding up cross-border transfers of funds.²⁶
- After a rash of cyberattacks, the government of Estonia moved government data onto the blockchain to ensure integrity and prevent ransomware attacks.²⁷
- China is aggressively moving in the direction of developing a virtual blockchain identity for its citizens to ostensibly improve access to and delivery of services associated with social insurance programs.²⁸

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

Associations don't often need to irrefutably confirm identity. We're mostly fine with accepting who our members say they are, and in fact it's good practice not to ask for identifying information like a social security number or passport information for data security reasons.

However, if your annual meeting regularly draws presenters or attendees from countries that are not part of the U.S. visa waiver program, you are well aware of the challenges and delays they can face acquiring a visa to enter the U.S. What if that process could be run through blockchain? Your presenter, controlling her own identity data, could share the relevant pieces with the U.S. government. Meanwhile, your association could share the relevant data about what she's been invited to the U.S. to do, and those could be seamlessly and instantaneously tied together. It wouldn't obviate every visa problem every presenter or attendee ever has, but it could substantially speed up and simplify the process for many, drastically reducing last-minute session cancellations.

Does that sound too far-fetched? Dubai is already on target to launch entirely digital entry into the country using a combination of blockchain and biometrics by 2020, creating the world's first "gateless border."²⁹

To begin preparing, pay attention to what's happening in the persistent identity and government use of blockchain sectors. Educate your board of directors about the issues your association is likely to be facing. Alert your membership and meetings staff, and begin educating the committees that oversee their work, so that when quick decisions need to be made, all the critical players are ready to make them.

Further reading on this topic:

- Inside the Jordan refugee camp that runs on blockchain: <https://www.technologyreview.com/s/610806/inside-the-jordan-refugee-camp-that-runs-on-blockchain>

24. <https://www.ethnews.com/swiss-city-zug-to-trial-voting-through-blockchain-technology>

25. <https://tech4parties.org/case-studies/denmark-liberal-alliance-blockchain-secure-online-voting>

26. <https://www.coindesk.com/korean-banks-can-use-blockchain-to-verify-customer-ids-from-july>

27. <https://e-estonia.com/solutions/security-and-safety/ksi-blockchain>

28. <https://technode.com/2018/07/02/chinese-government-blockchain>

29. <https://www.ccn.com/dubai-airport-blockchain-passport>

Blockchain in the Law: Ensuring Contract Compliance

What's the problem?

In both our personal and professional lives, every person reading this whitepaper (and its two authors) enter into contracts of all sorts all the time. According to the U.S. Bureau of Labor statistics, there are over 1.3 million attorneys in the U.S. tasked with ensuring those contracts are properly enforced and complied with by all parties, and with assisting in resolving disputes when they aren't.³⁰

How do we ensure that contracts are executed correctly, that all parties understand them, and that they remain safe and secure?

How does blockchain help?

After the financial sector, "smart contracts" are probably the most mature application of blockchain technology. "Smart contracts" are designed to self-execute once all the signing parties agree that certain provisions have been met. The idea is that blockchain will allow individuals to create and execute contracts on the internet without the involvement of third parties, like attorneys and courts.

A number of companies in the market right now are working to create a new way to form, sign, and execute contracts between parties, typically building on the Ethereum blockchain. Since contracts are fundamentally documents that outline terms and conditions around transactions, many of those terms and conditions are already fairly standardized.

Typical transactions that are currently (or soon will be) governed by "smart contracts" include:

- Purchase agreements for homes, cars, or other goods.
- Rental and lease agreements.
- Independent contractor or other agreements with service providers.
- Insurance policies.
- Copyright protection for authors, musicians, and other artists.

There's a problem, though: The contract is only as good as the code, and vice versa. Over time, as more code is generated for different scenarios, these contracts will become more straightforward. Right now, it is still the case that parties to smart contracts benefit from attorney assistance with the negotiation process on the front end and dispute resolution on the back end.

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

There is concern that smart contracts will eventually eliminate the need for attorneys, but at least for now the emphasis seems to be more on adaptation on the part of the legal profession. In fact, many applications are actually geared more toward giving the attorneys themselves new tools to use on the blockchain, to increase their efficiency and reduce human errors.

The American Bar Association is doing an excellent job of keeping an eye on these developments and the potential ramifications for the legal profession and providing information to its members through workshops, articles, books, and other publications. ABA is reacting in a measured and reasonable way to a technological advancement that could potentially revolutionize the legal practice globally.

30. <https://www.bls.gov/ooh/legal/lawyers.htm#tab-6>

In an article published on the website of the American Bar Association on April 25, 2018, author Victoria Walker had this to say:

“Self-executing code by itself does not pose a threat to the work of attorneys. The legal profession should consider exploring, and even embracing, this form of technology. A smart contract is essentially a set of tools (blockchain and self-executing code) that facilitate performance or implementation of a legal agreement. Smart contracts create efficiencies that translate into cost-savings (i.e., fewer middlemen, distributed storage, consensus), but attorneys are still needed. The substance of any contract, including smart contracts, does not exist in a vacuum and is subject to constraints existing laws impose.”³¹

Further reading on this topic:

- Unchained, a story of love, loss, and blockchain (a somewhat dystopian fictionalized account of the potential impact of smart contracts on relationships from MIT's *Technology Review*): <https://www.technologyreview.com/s/610831/unchained-a-story-of-love-loss-and-blockchain>

Blockchain in Manufacturing: Supply Chain

What's the problem?

As anyone who had to alter their Thanksgiving menu at the last minute after having to throw out romaine lettuce can attest, global supply chains are massive, complex, opaque systems with all kinds of inherent challenges. Provenance of goods can be difficult to establish, which creates problems in everything from food safety to ethical sourcing. Goods change hands so many times in so many different locations with so many different rules, regulations, and laws that those goods are regularly lost, stolen, or spoiled. Shippers waste enormous amounts of time dealing with official paperwork, increasing their costs, which in turn increases consumer costs. There are enormous environmental costs to these delays as well, and as ethical and responsible sourcing becomes more important, not just to end consumers but also as part of the UN Sustainable Development goals,³² so does being able to confirm responsible production of goods.

How does blockchain help?

“The global transport and logistics market is both huge and hugely valuable. Even small improvements in efficiency can have an extraordinary effect on prices and profits.”³³

Remember that one of the goals of blockchain technology is to reduce “friction” in transactions involving items of value. As we've discussed elsewhere, removing ALL frictions from ALL transactions is not an unalloyed good. However, reducing the friction in supply chains, not only related to speed of transfer of goods but also related to transparency, would be highly useful.

31. https://www.americanbar.org/groups/young_lawyers/publications/tyl/topics/resources-technology/blockchain-cryptocurrency-contracts

32. <https://sustainabledevelopment.un.org/?menu=1300>

33. *The Future is Decentralised*, pg. 22

Speeding up the transfer of goods reduces the cost of those goods and also their environmental impact, through reduced fuel consumption, whether for transport or storage, and reduced spoilage. Maersk, the world's largest shipping company, has partnered with IBM on TradeLens, an effort to move the entire global supply chain to blockchain for precisely these reasons. "In a trial in 2014, Maersk found that a single shipment of refrigerated goods from East Africa to Europe could go through nearly 30 people and organizations and result in more than 200 different interactions and communications among them."³⁴ Moving those transactions to blockchain will dramatically speed up those transfers.

Certainty of provenance of both ingredients or components and finished products reduces the human impact of those goods and improves safety. Everledger seeks to guarantee that the diamond you buy is not a "blood diamond" and that consumers can know what a rancher means when she claims that a particular steak is from a "humanely raised and slaughtered" cow and be assured that it meets that criteria. Rather than recalling all the romaine lettuce in the entire country, farmers, processing plants, and consumers could know exactly which heads of lettuce are tainted and which are not and are safe to eat. That's why IBM has partnered with Walmart and a host of other retailers and food companies on Food Trust, a blockchain for the food supply chain.

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

Does your industry deal with supply chains in any way? If so, blockchain is already affecting your industry and your members.

Educate yourself about some of the platforms mentioned above, like Trade Lens, Food Trust, and Everledger (which, by the way, is being applied to more goods than just diamonds). IBM is obviously a major player in many of these initiatives. It offers a free quick-start blockchain developers guide³⁵ and has created a membership-based blockchain sandbox platform to allow developers to begin testing applications.³⁶

Familiarize yourself with the UN Sustainable Development goals.³⁷ Although they are not directly related to blockchain platforms, blockchain is likely to be a critical technical piece of achieving many of them. Considering that all UN member states are ostensibly co-signers to these 17 goals that are focused on ending poverty, improving health and education, reducing inequality, and encouraging economic growth while also addressing global climate change, they are absolutely going to impact how your association, and the profession or industry you serve, does business in the coming years.

Ask your members if any of them are already participating in any of these initiatives. If you are a supply chain-dependent or -driven industry, chances are, they are. Interview them and share their stories on your website, in your e-newsletter or magazine, at your educational events, and through your social channels.

34. *Forward Together*, pg. 22

35. <https://www.ibm.com/developerworks/cloud/library/cl-ibm-blockchain-101-quick-start-guide-for-developers-bluemix-trs/index.html>

36. <https://www.ibm.com/blockchain/platform>

37. <https://sustainabledevelopment.un.org/?menu=1300>

Further reading on this topic:

- UN Sustainable Development goals: <https://sustainabledevelopment.un.org/?menu=1300>
- Digitizing global trade with Maersk and IBM: <https://www.ibm.com/blogs/blockchain/2018/01/digitizing-global-trade-maersk-ibm>
- Trade Lens: <https://www.tradelens.com>
- Everledger: <https://diamonds.everledger.io>
- Walmart is betting on the blockchain to improve food safety: <https://techcrunch.com/2018/09/24/walmart-is-betting-on-the-blockchain-to-improve-food-safety>
- Food Trust: <https://www.ibm.com/blockchain/solutions/food-trust>
- IBM Blockchain 101: <https://developer.ibm.com/tutorials/cl-ibm-blockchain-101-quick-start-guide-for-developers-bluemix-trs>
- IBM Blockchain Platform Starter Plan: <https://www.ibm.com/blockchain/getting-started>

Blockchain in Real Estate: Proving Ownership

What's the problem?

Even in advanced post-industrial democracies with stable state/provincial and federal governments, establishing and transferring ownership of land can be a hassle. One of this paper's authors recently had a death in the family, a grandmother who owned a small log cabin on about 35 acres in north central Pennsylvania. There was no mortgage on the property, and her uncle (one of her grandmother's three children) agreed to take sole ownership of the property as his portion of the inheritance. Both siblings agreed. This all sounds like it should be a relatively simple transaction, right? Get an appraisal to value the property appropriately and sign the deed over to the uncle.

Not exactly. The property had never been properly surveyed, so it wasn't clear exactly what land was being transferred, which, since it abuts state land, was a problem. The grandmother had constructed a complicated (and legally dubious) ownership trust involving every blood relative over the age of 18, which required more attorney's fees to untangle. The family still had to contract with a title search company to ensure there were no outstanding liens or other claims on the property. A transaction that seems like it should've taken an afternoon stretched on for months and involved significant expense and time for everyone involved.

What if you're in a country that lacks stable government with reliable record-keeping? What if your local or national government is corrupt? How do you easily buy and sell property, and how can you prove you own your land or place of residence?

How does blockchain help?

In many countries, it is difficult for individuals to prove ownership of land or assets. In some cases, government entities or other powers have falsified ownership documents and stripped land and homes away from individuals because there was no way for them to prove they actually owned the property in question.

In a more fair and equitable world, purchase and transfer of ownership of such important assets would be recorded on blockchain, where everyone could see if an individual, or group of individuals, was being deprived of his or her rights and property without due process. In terms of transactions in more stable societies, the process of title transfer via blockchain would no longer require identity verification through an attorney or notary, nor the sometimes onerous and slow-moving paperwork processed by governments and other entities to verify and complete the transfer of titles, deeds, rights, and interest between parties.

How Will Blockchain Affect Your Members?

In July 2018, a blockchain provider by the name of Propy announced the first sale of 10 acres of land in Southern California on its platform. Although Bitcoin was involved in this particular transaction, once these types of transactions become more prevalent, the currency type will no longer matter. According to Propy's press release:

“The property deal in California is the first complete transaction fully-executed on the Propy Transaction Platform, where every step was initiated by smart contracts and respectively recorded on the blockchain registry. The transaction was anchored and verifiable on distributed ledger technology, which gives complete security to the deal. By using smart contracts, Propy guarantees that the flow of transactions is executed according to regional regulations.

“We believe that blockchain technology can truly revolutionize the real estate purchasing process and the management of public records,” said Natalia Karayaneva, CEO of Propy. ‘Propy streamlines a complicated process into a simple online transaction, and we’ve seen significant traction in the industry already — buyers and sellers are increasingly turning to blockchains and cryptocurrencies. We’re excited to facilitate more property transactions, and reach more milestones in our goal to automate the real estate industry via blockchains.’

“Transactions executed on the Propy Transaction Platform are legally binding, provide additional proof of ownership, and safeguard the transfer of ownership via traditional legal instruments. The Propy Blockchain Title Registry is available for deed recording by any customer, broker, or title agent wishing to duplicate the encrypted information on the globally distributed Ethereum

network. High demand is observed and acts as a driver for this service as the international community is eager for an additional safeguard for property records from hacking, corruption, or natural disasters.”³⁸

How will blockchain affect my members in this industry? What does my association need to do to help them prepare?

Any association that deals with real estate, mortgages, title and escrow, or other services related to the buying and selling of real estate needs to pay close attention to how the blockchain is beginning to be used in the market. Any individual who has gone through the process of buying or selling a home would welcome an easier, faster, less expensive way to manage those transactions. With blockchain used to mitigate risk, execute contracts, and handle title transfer, an easier and more secure way to navigate home sales and other real estate transactions might be just around the corner.

Further reading on this topic:

- The United Kingdom is using a blockchain platform called Corda for property records: <https://www.gov.uk/government/news/hm-land-registry-to-explore-the-benefits-of-blockchain>
- The nation of Georgia is also keeping land records on blockchain, on the Exonum platform: <https://exonum.com/napr>
- Ancillary industries, such as companies that issue title insurance, are likely not at risk of immediately being replaced, but blockchain may revolutionize their role in real estate transactions: <https://www.forbes.com/sites/forbesrealestatecouncil/2018/06/22/will-the-power-of-blockchain-mean-the-end-of-title-insurance-companies-in-20-years> ✨

38. <https://www.businesswire.com/news/home/20180723005199/en/Propy-Announces-California-Property-Sale-Blockchain>

CASE STUDY:

Central New Mexico Community College Blockchain in Education

“We’re transforming the learning credential process.”

Feng Hou, Chief Information Officer and Chief Digital Learning Officer,
Central New Mexico Community College

In 2017, Feng Hou led an initiative to implement a student-owned digital certificate and degree solution on the blockchain, which made Central New Mexico Community College (CNM) the first community college in the nation to use blockchain technology to provide students with digital credentials.

According to Hou, “CNM currently has several strategic technology priorities, one of which is to convert college-owned technology to student-owned technology, so they are armed with the knowledge and experiences they need to get good jobs when they graduate. One component of this was creating a student-owned digital degree.”

CNM investigated a number of potential solutions but chose to build its solution on blockchain rather than working with an existing digital diploma issuer, as those are all proprietary platforms that require both students and potential employers to pay to use their custom portals. CNM wanted a distributed, decentralized platform that would allow the college to create a totally student-owned credential, one in which the students could control what they want to share, when, and with whom. “Historically, when a student applies to a four-year college or for a job, she’s asked to provide official transcripts and proof of degree, which means she has to fill out a form, pay, then wait to get a print or PDF copy she can send. This process is prone to delay, error, and fraud,” said Hou. “With blockchain, that student can download her verified credentials to her smartphone and send them to her prospective employer through a simple, free yet highly secure process that takes about ten seconds to complete.”

CNM is part of a pilot group of colleges and universities that are working together to develop digital badges on blockchain. This is for two reasons. One, said Hou, is that “digital badging allows for incremental credentialing. Northeastern University, for example, is experimenting with offering one badge per credit hour—that is, a three-credit class provides three digital badges.” The other reason is the power of the network. “CNM just completed a design thinking workshop that also included the University of New Mexico and a major local healthcare employer, because merely creating a digital badge is not enough. We also need to build the community of four-year colleges and employers that will accept the badge in order for it to be of practical use for our students.”

Obviously, there’s been a learning curve for both students and the institutions to which they might be sending proof of credentials. But the new blockchain-based system has exceeded expectations for both student adoption rate (more than 60 percent) and unique verification rate (more than 40 percent). “When I talk to students about their past experiences trying to get learning credentials verified versus the blockchain-based system, they’re drawn to this because it is so fast, easy, and free,” said Hou. “There’s an element of ‘hype’ to blockchain, and we were worried our audiences would think it was just a fad, so we’ve been really happy to see students and employers willing to adopt this.”

What advice would Hou offer for other credentialing organizations (like associations) looking into blockchain for credential verification?

“It has to be a strategic priority for the organization. CNM’s president, Katharine Winograd, is an innovative change agent, which is not always common in higher education. Additionally, we have a Presidential Fellow and an academic dean leading the blockchain charge. It’s critical that this not be seen as just another IT initiative,” said Hou.

“We also have to be willing to partner,” added Hou. “Credentialing organizations have to get out of the habit of developing everything on our own. Blockchain is a community-based technology that requires collaboration to be successful. The more educational institutions work together, the better, stronger, and more valuable this community will become.”

“If you look at the trends in higher education and employment, everything points to a move away from traditional degrees and towards skills-based learning and credentialing. We have to think about how we can embrace those changes. Blockchain-based credentials can help students build smart pathways to employment. Instead of putting in multiple years pursuing a degree, we can build credentials that are awarded upon completing individual courses—or even modules of courses—that confirm that students can do certain things or have certain skills based on what they’ve learned. Competency-based education helps students achieve their goals faster, and blockchain is a tool that can help us realize that great potential,” concluded Hou. 🌟

Feng Hou’s seven criteria for blockchain solutions for education

1. Start with a business priority to create a blockchain solution; avoid using blockchain just for blockchain’s sake.
2. Optimize the business process first with a well-defined governance structure.
3. Understand the nature of decentralization and globalization, and create the blockchain community to incentivize participation.
4. Team up with the right partner to develop the app while also developing internal technical expertise.
5. Design seamless data integration and secure data transactions. This is imperative.
6. Understand the functions of tokens before creating the smart contract.
7. Be value driven (low cost, security, privacy, speed, open source, etc.).

Conclusion: Preparing for Blockchain

We hope, after reading this whitepaper, you now have a better understanding of what blockchain is, how it works, and what its potential applications are and are likely to be. The truth, we think, lies somewhere between Silicon Valley utopian “it’s going to revolutionize EVERYTHING” and dismissive “it’s just a fad.” We hope you’re persuaded of that as well.

We’ve referenced two particular monographs frequently throughout this whitepaper, IBM’s *Forward Together* report and Wigley and Cary’s *The Future Is Decentralised*. There are a few more points made in each we’d like to bring to your attention as we wrap up this overview of the potential of blockchain.

“The need for trusted intermediaries may become obsolete.”³⁹ This statement is, frankly, concerning for associations, since associations’ historical role is to be exactly that—a trusted intermediary for the profession or industry each serves. Blockchain is likely to disrupt association operations, just as the arrival of the internet and social media did. Does that necessarily mean that blockchain will put associations out of business? Well, no. The internet has been a thing for more than 25 years and social media has been around and widely adopted for more than a decade, and we’re all still here. But, in a blockchain-enabled world, our members are going to need different kinds of services from us than they have in the past. The challenges they face and the goals they’re trying to achieve are going to shift, and we need to be ready to shift with them. That’s why a lot of our advice on “How will blockchain affect my members in this industry? What does my association need to do to help them prepare?” comes down to: Start educating your board of directors, senior staff, and other key decision-makers, because the blockchain-related changes that come to your particular profession or industry are likely to happen not at all and then all at once—the networked nature of the platform practically requires that—and your association will need to be nimble to respond well and in a way that is of service to your members.

Now, the good news. A rising tide lifts all boats. In the blockchain ecosystem, what that means is: “On platform-based business models, strength begets strength. ... Peers on blockchains start at the same level of security, transactional transparency, control, and understanding of the underlying blockchain technology. Their interactions then determine the strength and success of the resulting blockchain network.”⁴⁰ In other words, blockchain networks create additional incentives to want all the parts of the network to do well, which precisely aligns with the overall association business model. We don’t serve particular individuals or entities; we serve the entire community of our professions and industries, and we work to strengthen and support them all.

Is your association ready to start experimenting with blockchain?

You can set up at a sandbox with:

- **Amazon Web Services**
<https://docs.aws.amazon.com/blockchain-templates/latest/developerguide/blockchain-templates-getting-started.html>
- **CryptoZombies**
<https://cryptozombies.io>
- **IBM**
<https://developer.ibm.com/tutorials/ci-ibm-blockchain-101-quick-start-guide-for-developers-bluemix-trs/>
- **MIT**
<http://blockchain.mit.edu/how-blockchain-works>

39. *Forward Together*, pg. 11

40. *Forward Together*, pg. 19

Even “Explorers,” which IBM defines as “those organizations that are already experimenting with, piloting, or implementing blockchains,”⁴¹ have admitted that they mostly don’t know how to collaborate, rather than compete, with the other entities that would make up appropriate nodes on their blockchain networks. “Eight in ten [Explorers] admit they aren’t accustomed to collaborating, even selectively, with their competitors. Lack of experience working with competitors is at present a handicap shared by all.”⁴² This represents a huge opportunity for associations. We can help competitors figure out how to collaborate effectively—that’s what we’re built to do. In fact, “seven in ten Explorers selected industry consortia as important to their blockchain projects.”⁴³ That is a clarion call to action for associations.

Despite blockchain’s obvious potential, there remain significant barriers to adoption, and they’re not just cryptocurrency’s instability and sketchy reputation. *The Future is Decentralised* lists a number of them:

- Lack of appropriately advanced telecom infrastructure.
- Regulatory environments that vary widely from country to country.
- Cyber attacks. (Remember, it is only impractical, not logically impossible, to hack blockchain ledgers. In fact, as this monograph was going to layout, MIT’s *Technology Review* reported on instances of blockchains getting hacked.)⁴⁴
- Traditional management that is insufficiently agile to keep up with and take advantage of fast-moving technology.

- Customer education necessary to generate demand.
- The ability of the technology to evolve and mature to meet that demand.⁴⁵

As Wigley and Cary observe, “Despite the success of the case studies we have presented, blockchain technology is, if not in its infancy, still far from mature.”⁴⁶

Other challenges on the horizon also include new technologies that will have a potentially significant impact on all digitized systems, including blockchain. For example, the advent of quantum computing, with all its promised capabilities, means quantum computers could be deployed on either side of the blockchain, potentially being integrated as a security measure on the inside or posing a hacking threat from the outside.⁴⁷

Further, there are enormous ethical implications to the use of this technology, and Silicon Valley power players have proved themselves to be poor stewards of this responsibility. Due to their lack of diversity, tech firms and the venture capitalists who fund them have myopic views of the world and its problems and how their inventions contribute to or can ameliorate those problems.

To stay up to date on the latest in blockchain developments across various applications and industries, sign up for MIT’s free *Chain Letter* newsletter at <https://go.technologyreview.com/newsletters/chain-letter>

41. *Forward Together*, pg. 3

42. *Forward Together*, pg. 20

43. *Forward Together*, pg. 21

44. <https://www.technologyreview.com/s/612974/once-hailed-as-unhackable-blockchains-are-now-getting-hacked/amp/>

45. *The Future Is Decentralised*, pp. 33-34

46. *The Future Is Decentralised*, pg. 34

47. <https://www.nature.com/articles/d41586-018-07449-z>

Wigley and Cary identify the following ethical standards blockchain projects should adhere to:

1. Do no harm. While technology providers are eager to push out solutions as quickly as possible, ethical concerns surrounding privacy and the rights of the individual ought to be at the forefront of considerations.
2. Design ‘with’ not ‘for’. If we are for keeping rights and interests of the individual front and centre, it makes sense that the role of the individual should inform the design of any block chain initiative. This should be coupled with the resources necessary to ensure adequate awareness of what data is being recorded, transmitted, stored and used, and also the rights of the individual over that data.
3. Power dynamics. Any decentralised solution concerning data, transactions or asset tracking is likely to impact power dynamics in a community. Understanding who will be affected and how will help to ensure popular uptake.
4. Policy implications. From the very outset, continued reference to the existing systems and ways of working will help foresee, overcome or avoid specific policy implications of integrating block chain technology in a given sector. This is somewhat connected to the previous point but, equally fundamentally, it may help in understanding how a given service or a policy or a process may look entirely differently when the new technology is applied. Blockchain technology is not merely digitisation; it can have profound effects on how a system or process operates.⁴⁸

It remains to be seen whether an industry that has been cavalier with individual rights and privacy, particularly of historically marginalized groups, and has often operated in willful ignorance of power and policy dynamics in society can overcome its “move fast and break things” ethos and become a responsible and ethical partner in the development and deployment of innovative technology in service of human flourishing, rather than in service of accumulating obscene wealth.

Throughout this paper, your authors have highlighted ways that certain blockchain implementations interact or will interact with the larger systems that run many aspects of our lives. We have seen clear examples of how blockchains of persistent identity, purchasing, financing, and contracts can be mixed and matched to fit the transactions in question. This is what gives blockchain its true power—its potential to reach into and affect all of the myriad ways we interact in the socio-economic system in which we currently live. 

48. *The Future Is Decentralised*, pg. 34

Questions for Reflection

Why is our association looking into this topic right now?

This is the first question you should discuss with your team because it will help you figure out where to go next. If, for instance, it's because blockchain is a tech trend about which you're curious, reading this whitepaper and maybe digging into a few of our sources might be sufficient. If, on the other hand, blockchain is already significantly impacting or about to impact the industry you serve, you'll need to get deeper than this whitepaper, and fast.

Assuming you need to go deeper right away, the next series of questions you should ask yourself and your team are those we mentioned previously, from *Blockchain for Dummies*:

- Do we need to track transactions that involve more than two parties?
- Is the current system overly complex or costly, possibly due to the need for intermediaries or a central point of control?
- Can the network benefit from increased trust, transparency, and accountability in recordkeeping?
- Is the current system prone to errors due to manual processes or duplication of effort?
- Is the current transaction system vulnerable to fraud, cyber-attack, and human error?

Don't forget to ask CompTIA's question, too: **Are there non-blockchain solutions that are available and effective?**

Following that, you and your team should consider questions like:

- Where is blockchain being used, or going to be used soon, in our profession or industry? Who among our members is already working on blockchain implementations? How can we engage them in helping to educate the rest of our members and our larger professional on industry community?
- Who on our staff is interested in this topic and wants to begin learning about it? How can we free up some of their time to start a sandbox project?
- How are we going to educate our board of directors and other volunteer leaders about this technology and the issues it raises for our profession or industry, so that, when our inflection point hits, we're ready to make quick, informed decisions?

Additional Resources

A Blockchain Guide to the Benefits, Frameworks, Initiatives, & More for the Public Sector. (2018).

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About Shelly Alcorn

Shelly Alcorn is the Chief Operating and Curriculum Officer at Ubiquity University and a Principal in Alcorn Associates Management Consulting. In her dual roles, she specializes in operations, curriculum development, and programming for Ubiquity University and all aspects of nonprofit trade associations and professional societies with Alcorn Associates.

Shelly stands at the intersection of technology, the education-to-employment system, and the organization of the hypercomplex future. She conducts strategic, leadership, and staff retreats and speaks on critical issues faced by society.

She has published numerous articles in trade journals, and she blogs at the Association Forecast. Other works she has co-authored include: *“xPresso Ed - The Association Leadership Series,” “42 Rules for Engaging Members Through Gamification: Unlock the Secrets of Motivation, Community, and Fun,”* and *white papers including “Associations, Generation Y and Millennials: What You Need to Know About Your Next Generation Members,”* and in August 2016 *“The Association Role in the New Education Paradigm.”*

About Elizabeth Weaver Engel

Elizabeth Weaver Engel, M.A., CAE, CEO and chief strategist at Spark Consulting LLC, has more than 20 years of experience in association management. Although her primary focus has been in membership, marketing, and communications, her work has been wide-ranging, including corporate sponsorship and fundraising, technology planning and implementation, social media and internet strategy, budgeting, volunteer management, publications, and governance.

Spark provides strategic membership and marketing advice and assistance to associations that have the willingness and capacity at both the staff and board levels to ask themselves tough questions and take some risks in service of reaching for big goals. Forget settling for incremental growth by making minor changes to what you're doing—we're going to uncover and solve the root problems that are holding your association back!

Elizabeth combines a focus on asking the right questions and finding and implementing creative solutions with a broad understanding of the association sphere. Throughout her career, she has excelled at increasing membership, revenue, public presence, and member satisfaction while decreasing costs through a focus on the efficient and effective use of data, staff, and technology to serve organizational goals and constituents.

Prior to launching Spark, Elizabeth consulted in online campaigns and marketing and internet and social media strategy for Beaconfire Consulting and in a wide range of subject areas in association management in the not-for-profit consulting practice at RSM McGladrey, Inc. She has also served associations directly in a variety of positions, including director of member services and IT, director of marketing and sponsorship, vice president of marketing, and acting CEO.

Elizabeth is a certified association executive (CAE) and holds a master's degree in government and foreign affairs from the University of Virginia.