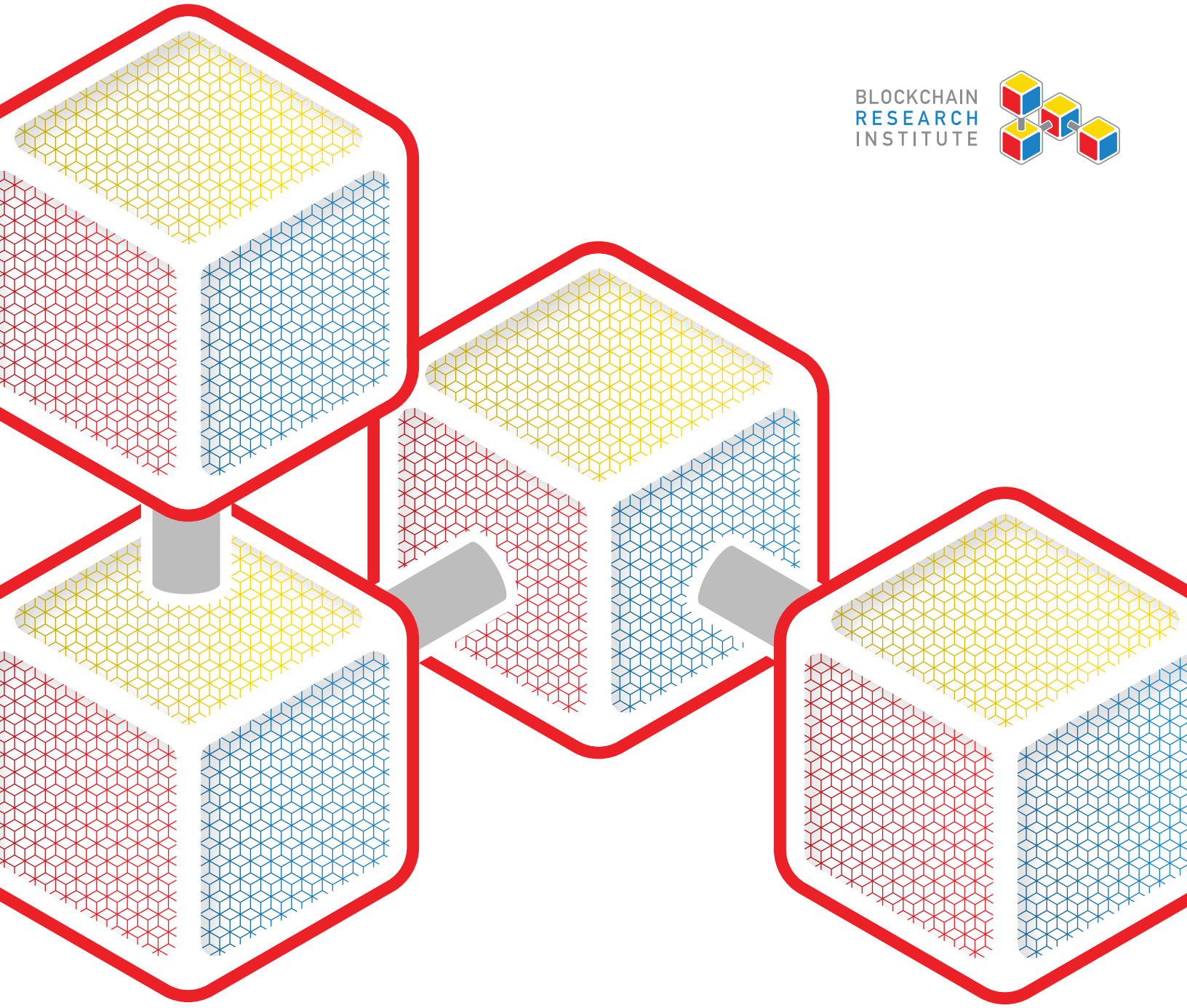
BLOCKCHAIN RESEARCH INSTITUTE



BLOCKCHAIN AND THE CFO

How Distributed Ledger Technology Is Changing the Profession

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ColliderX

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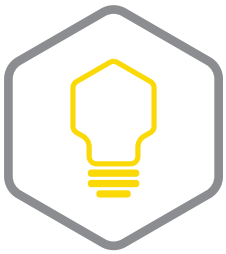
A BLOCKCHAIN RESEARCH INSTITUTE BIG IDEA WHITE PAPER



Realizing the new promise of the digital economy

In 1994, Don Tapscott coined the phrase, "the digital economy," with his book of that title. It discussed how the Web and the Internet of information would bring important changes in business and society. Today the Internet of value creates profound new possibilities.

In 2017, Don and Alex Tapscott launched the Blockchain Research Institute to help realize the new promise of the digital economy. We research the strategic implications of blockchain technology and produce practical insights to contribute global blockchain knowledge and help our members navigate this revolution.

Our findings, conclusions, and recommendations are initially proprietary to our members and ultimately released to the public in support of our mission. To find out more, please visit www.blockchainresearchinstitute.org.

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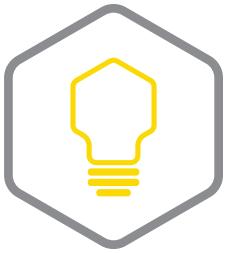

Foreword

In *Blockchain Revolution*, Don Tapscott and I took a close look at how blockchain would affect financial services, what we dubbed "the world's second oldest profession." What we saw was an unstoppable technological force in blockchain on a collision course with what seemed like an immovable object of the financial industry—and we expected fireworks.

The chief financial officer (CFO) sits at the intersection of the corporate world and the financial industry and so must understand the profound changes in store. The financial services industry is the lynchpin of the global economy. Its leaders have been dubbed "masters of the universe," albeit with tongue firmly in cheek. Before the pandemic hit full force, it was moving trillions of dollars a day and serving billions.

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Now the global economy has contracted by a third—the steepest decline since World War II—and experts expect this wave of COVID-19 infections to continue as officials reopen businesses and schools.[1] No one is feeling particularly masterful right now. While governments acted fairly quickly—the International Monetary Fund continues to track the economic policy responses of some 196 administrations around the world—the lack of transparency in their response has been called into question.[2] In the United States, for example, the Brookings Institute just published a report, "Addressing the Other COVID Crisis: Corruption," with a call for action: "The need for oversight of Trump administration coronavirus spending has reached an inflection point."[3]

In the Blockchain Research Institute's pandemic report, we suggested how blockchain innovation could help on both sides of the equation, not only supporting public health initiatives but also lubricating our economic engines, expediting payments to households and small businesses, and doing so in a transparent and auditable way.[4] Finance as an area of expertise has a special role to play—not just as an industry but within the enterprise—and its leaders have a real opportunity to up their game. Consumers, entrepreneurs, and start-up business owners have begun to see through the sleek user interfaces masking the kludge of old technologies, processes, and systems.

Though such a challenge might seem daunting to those outside finance, it shouldn't be. Basically, the industry performs nine essential functions that keep the economy humming: *authenticating* identity and account value; *moving* this value as well as *storing*, *lending*, and *exchanging* it; funding and *investing* in assets and businesses; *insuring* value and managing risk; and *accounting* for and *reporting* on all these activities.[5] (For more in-depth coverage, please see our new book, *Financial Services Revolution*.[6])

Blockchain is fundamentally transforming each of these functions. Consider accounting. For centuries, we have used a system of double entry bookkeeping—invented by Italian polymath Luca Pacioli during the Renaissance—to record, organize, and analyze financial information. Blockchain is giving rise to an alternative, triple entry bookkeeping, where financial information is recorded instantly in a secure, immutable, and entirely digital medium, making it easier to audit and harder to cheat.[7]

Consider HSBC's blockchain pilot project, "FX Everywhere," designed to synchronize payments across the balance sheets of its operations in multiple countries. The project "demonstrated that the technology worked to automate manual processes, decrease HSBC's dependence on technology vendors, and cut foreign exchange transaction fees to the Continuous Linked Settlement service system."[8] That's the kind of internal innovation that CFOs can drive.

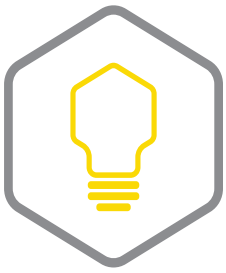
Blockchain is giving rise to an alternative, triple entry bookkeeping, where financial information is recorded instantly in a secure, immutable, and entirely digital medium, making it easier to audit and harder to cheat.

Accounting is but one of dozens of essential building blocks at the CFO's disposal. Today's CFO is not the stereotypical green-shaded bean-counter of the movies, but one of the main leaders inside the enterprise. Indeed, the CFO role encapsulates everything from managing risk and deploying new technologies to developing long term financial and strategic plans.

Today's CFOs are already rethinking age-old business processes. In a March 2020 survey of CFOs and COOs, 78 percent agreed that blockchain will reduce fraud by at least half within five years.[9] Another "83 percent of organizations leveraging blockchain technology within finance applications expect a significant return [on their investment] within one year."[10] Nearly a third are already using blockchain to improve their financial systems, and 36 percent will launch a finance-related pilot project in the next 12 months for data forensics (58%), payment processing/funds transfer (58%), and payment dispute resolution (49%).[11] CFOs understand the urgency to cut inefficiency and make the most of every asset.

Iliana Oris Valiente was one of the first people we invited to participate in the Blockchain Research Institute. She is a practitioner—she founded Rubix by Deloitte Blockchain and is now the blockchain innovation lead at Accenture. She is also a community leader, the founder of ColliderX, a crowdsourced research and development hub for blockchain technologies. In this project, she draws on her experience to describe the blockchain landscape for the CFO and suggests how it will change in the CFO's future.

ALEX TAPSCOTT
Co-Founder
Blockchain Research Institute



Idea in brief

- Blockchain is changing business processes across industries, and enterprise investment is increasing. Leading organizations are seeing blockchain's true value as a catalyst for business ecosystem transformation. Within each industry, distributed ledger technology (DLT) is influencing the value chain and the role of a CFO.

- The CFO function has been evolving for a while now, shifting from an accounting orientation to a broad strategy orientation, where the CFO serves more as the CEO's business partner. The CFO must understand blockchain technology because of its strategic impact on the business, not just its financial and operational impacts.

- Adopting blockchain technology could catalyze enterprise change in the near term (horizon 1) and longer term (horizon 2):

  - *Horizon 1 opportunities related to finance function.* Horizon 1 use cases include blockchain impact on taxation, accounting and audit processes, and payments: digital asset payments at merchant stores, digital asset payments for employees, and corporate cross-border payments.

  - *Horizon 2 enterprisewide opportunities.* Horizon 2 use cases include businesswide transformation leveraging DLT, that will require CFO input to make the business case for investment and will affect the finance function down the line. This section briefly covers the effects across industries, including consumer packaged goods, supply chains, insurance, and public sector domains.

- Since CEOs expect CFOs to explore new technologies that might drive an organization's return on investment, CFOs need to develop knowledge around DLT, including the basics of decentralized technologies, token economics and initial coin offerings, and blockchain-based analytics. They also need to cultivate agile ways of working.

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Understanding distributed ledger technology

For CFOs to harness the power of blockchain technology, they must first understand how it works.

For CFOs to harness the power of blockchain technology, specifically DLT, they must first understand how it works. At its most basic level, blockchain is a new type of database system. How it records and maintains data allows multiple stakeholders to share access to these data confidently and securely. Transaction data are stored in a ledger that is distributed among interested parties in an established network of computers. Several individual users, called *nodes*, independently check the blocks of data and reach consensus on each block before appending it to the chain, in effect providing a cryptographic audit trail. In permissioned ledgers, only stakeholders who need to see the data have access. If any party tries to tamper with, duplicate, or alter any part of a record, all stakeholders will see. And so blockchain would be useful in contexts where multiple parties need to:

- Continually reconcile data
- Collaborate among themselves and others
- Maintain or validate data that they share
- Have verified records or an audit trail
- Rely on intermediaries for one or more of the above

Once blockchain is in place to enable these capabilities, the parties can deliver value across their ecosystem through process efficiencies, improved data quality, and transparency.

Man Looking at Marketing Analytics *by Progressive Insurance, 2015, used under Unsplash license, accessed 3 Aug. 2020.*

Here we focus on the enterprise applications of distributed ledger technology and cryptocurrency-related concepts only as they relate to the responsibilities of the CFO's office.

Whereas the discourse in popular culture focuses on the *cryptocurrency* applications that hit the public consciousness in 2009, and more mainstream media in 2015, here we focus on the *enterprise* applications of DLT, and we look at only those cryptocurrency-related concepts that relate to the responsibilities of the CFO's office.

DLT has the potential to rewire an industry or value chain completely—just as the Internet did—moving well beyond the walls of an organization and involving collaboration or coopetition from the start. As a result, groups of organizations have formed consortia to tackle a joint challenge or a shared opportunity. Two major consortium models have emerged:

- **Peer networks:** Formed by competitors in an industry, this model helps members to realize efficiency and value gains marketwide rather than drive competitive advantage for any one participant. As more parties join, the benefits to members multiply.
- **Market leader:** In this model, one party largely drives member efforts to develop and deploy a blockchain solution that enables other stakeholders in the ecosystem to interact and ensures the security and accuracy of the ecosystem's data.[12]

At its core, an organization requires a network of participants to transfer information or value before it fully can adopt DLT. According to those adopting blockchain in the insurance industry, "distributed ledger technology is a team sport," and so its "value will come not just from the technology. It will also come from the ability of companies across complex ecosystems to align behind shared economic incentives and robust governance structures."[13]

The shift to the role of strategic digitization advocate

Multiple technologies, such as artificial intelligence, predictive analytics, and robotic process automation, are primed to change the CFO's function—along with DLT.

The CFO function continues to evolve, expanding well beyond traditional accounting-related issues. "From the 1950s to the 1980s, CFOs were essentially accountants," according to Accenture. "Then, from the 1990s to the 2010s, they ascended to the level of business partner. By 2020, CFOs will increasingly be strategic enablers, going beyond a supportive role to a proactive one."[14] Multiple technologies, such as artificial intelligence, predictive analytics, and robotic process automation, are primed to change the CFO's function—along with DLT.

CFOs have competing priorities and limited time, encountering multiple challenges in the process. Today's finance realities include:

- Limited enterprise-level adoption of automation
- Financials that are historical and not real time
- Assembling the right data takes a considerable time
- Managing reporting systems as required by various suppliers and business partners further complicates internal accounting accuracy
- Challenges connecting with other business units; intercompany transaction reconciliations are legally sensitive, time intensive, and prone to errors[15]

Poor information leads to poor decisions.

These obstacles are connected, and we can assess them in the broader context of issues CFOs face. Above all, poor information leads to poor decisions, compounded by a lack of inherently digital processes and the difficulties of managing data flows inside the organization and outside with key partners. In a hybrid analog and digital world, legacy systems are often not yet in line with the latest user experience requirements.

Person Using Laptop Computer on Table *by Startup Stock Photos, 2015, used under Pexels license, accessed 3 Aug. 2020. Cropped.*

Forward-thinking CFOs recognize the opportunity to digitize finance functions and are aware of the benefits of such digitization.

Forward-thinking CFOs recognize the opportunity to digitize finance functions and are aware of the benefits of such digitization, particularly of data, which allows for increased automation of the basic financial reporting functions and processes. As good data becomes real time, it will be increasingly effective for the types of modeling and financial analyses that lead to proactive strategies.

In 2019, Accenture found that "76 percent of CFOs agree that without 'one version of truth' across business units, their organization will struggle to meet its objectives."[16] The DLT industry also used the phrase, "single source of truth," as an alternative to siloed databases with unreconciled information.[17]

CFOs know that the digitization of the finance function affects the rest of the organization and vice versa. According to Accenture, 34 percent of traditional finance tasks are already performed by technology and "the standard to-do list of the finance department is shifting dramatically as automation continues to sweep in to reduce costs, improve productivity, and allow employees to use critical thinking and creativity to drive value and profits."[18]

Seventy-five percent of CFOs said that finance was best positioned to help businesses drive the model underpinning new technology investments.

In addition, "CFOs have to think about life after automation. If we believe that 80 percent of the finance function could be digitized in some way, CFOs have to ask the question: 'what's left?' They have to reinvent themselves."[19] Already, 75 percent of CFOs said that finance was best positioned to help businesses drive the model underpinning new technology investments.[20]

CFOs are more involved in determining which technologies their organization should invest in and take on. Some of these investments will be specifically made because they affect the finance function, meanwhile others could be leveraged by the finance function and the broader organization.

DLT is one of the emerging technologies that is positioned to have a significant impact across the board in rewiring business models and ecosystems. According to research and advisory company Gartner, the blockchain industry could be worth $3.1 trillion by 2030, generating excitement around projects in this domain.[21]

In late 2018, the World Economic Forum (WEF) projected that blockchains could account for as much as 10 percent of the world's gross domestic product by 2025.[22] In its July 2019 report, WEF stated, "When done right, blockchain is all about rethinking business models, rethinking relationships between companies and between companies and customers, and is, at its heart, a strategic change effort."[23]

As CFOs define their DLT best-practices approach, they will discover innovative ways to engage collaboratively with multiple stakeholders inside and outside their organizations, such as business partners, competitors, and regulatory bodies.

As CFOs think about the necessary skills and knowledge needed to make informed decisions, they should consider gaining an understanding of the various DLT platforms available and use cases that other organizations are exploring, beyond digital assets or cryptocurrency.

DLT is a transformative technology. CFOs need to remain open to new and emerging business models and think creatively about possibilities to create novel business value propositions. Such growth is critical to implement DLT at scale. Moreover, adopting blockchain technology could catalyze enterprise change in the near term (horizon one) and longer term (horizon two):

Finally, as CFOs define their DLT best-practices approach, they will discover innovative ways to engage collaboratively with multiple stakeholders inside and outside their organizations, such as business partners, competitors, and regulatory bodies.

Horizon one: Direct finance office applications

Aspects of DLT adoption have the potential to influence the core of the business of the CFO. DLT use cases that are operational in nature could affect an organization's audit, taxation, and even innovation related to cryptocurrency payment mechanisms.

Audit and financial reporting

The application of blockchain is in its early days. As it relates to the finance function, we can expect it to run into "significant hurdles that sit at the core of modern accounting practice and audit methodology," according to Dr. Joshua Coyne of the school of accountancy at the University of Memphis.[24] Changes to the regulatory landscape is one of those hurdles, and regulators around the world are currently attempting to address this space appropriately. With widespread adoption of DLT, professional accounting associations expect there will be an impact on both the internal and external audit function.[25]

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Will auditors still be required?

Yes. The public looks to auditors to enhance trust in companies they audit and help capital markets systems function with greater confidence. Auditors practice under strict regulations, professional codes of conduct, auditing standards, and are independent of the entities they audit.[26] They apply objectivity and professional skepticism to provide reasonable assurance that an entity's financial statements are free of material misstatement and, depending on the engagement, that a company's internal controls over financial reporting are operating effectively.

Some publications have hinted that blockchain technology might eliminate the need for auditors of financial statements altogether.[27] If all transactions are captured in an immutable blockchain, effectively creating a digital triple-entry accounting ledger, then what is left for an auditor to do? We argue against that hypothesis.

Traditional audit procedures can be a logical foundation, but the move toward DLT requires returning to first principles and mapping out the new procedures to apply for internal and external audits. While traditional auditing services will remain important, the auditor's actual role and approach may change, and this will have a downstream effect on the CFO's office.

How might audit and assurance evolve with blockchain?

Each audit begins with different information and schedules that require an auditor to invest considerable planning time. In a blockchain world, the auditor could have near real-time data access via read-only nodes on blockchains. This may allow an auditor to

obtain information required for the audit in a consistent, recurring format.

As more entities and processes migrate to blockchain solutions, accessing information in the blockchain will likely become more efficient. For example, if a significant class of transactions for an industry is recorded in a blockchain, it might be possible for an auditor to develop software to continuously audit organizations using the blockchain. This could eliminate many of the manual data extraction and audit preparation activities that are labor intensive and time consuming for an entity's management and staff. Speeding up audit preparation activities could help reduce the lag between the transaction and verification dates—one of the major criticisms of financial reporting. Reducing lag time could offer the opportunity to increase the efficiency and effectiveness of financial reporting and auditing by enabling management and auditors to focus on riskier and more complex transactions while conducting routine auditing in near real time.

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However, even for such transactions, the auditor must consider the risk that the information is inaccurate due to error or fraud. This will present new challenges because the blockchain network likely would not be controlled by the entity being audited. The auditor will need to extract the data from the blockchain and consider whether it is reliable.

This process may include considering general information technology controls related to the blockchain environment.[28] It also may require the auditor to understand and assess the reliability of the consensus protocol for the specific blockchain, including whether anyone could manipulate the protocol.

Gray Auto Bill Counter *by Pixabay, 2008, used under Pexels license, accessed 3 Aug. 2020.*

With blockchain-enabled digitization, auditors could deploy more automation, analytics, and machine-learning capabilities, such as automatically alerting relevant parties about unusual transactions on a near real-time basis. Users could encrypt and securely store links to supporting documentation—contracts, agreements, purchase orders, and invoices—to a blockchain. Once auditors have access to unalterable audit evidence, they can improve the pace of financial reporting and auditing.

With blockchain-enabled digitization, auditors could deploy more automation, analytics, and machine-learning capabilities, such as automatically alerting relevant parties about unusual transactions on a near real-time basis.

As more organizations explore the use of private or public blockchains, they will generate a new source of information for financial statements that they will need to incorporate into the financials and subject to audit. The possibility of a financial overview process that becomes more continuous in nature—allowing for more near real-time information for decision making—would benefit the management team.

In short, auditors will need to consider how to tailor audit procedures to take advantage of blockchain benefits as well as address incremental risks. Any change to the auditor's approach will require the CFO to be tuned in to the changes.

The CFO's team will need to be aware of these changes and understand how to maintain correctly records of transactions that may include use of cryptocurrencies for payments—or for processes that use DLT in the back-end, but have an impact on a company's financial results.

Tax function

Taxation per se wouldn't change through the blockchain adoption, but the technology could affect the reporting, classification, collection, and remittance of taxes. In the future, blockchain could enable real-time tax payments.[29] In both Mexico and Brazil, the government has started to implement taxation payments at the source. According to *SAPInsider*, "Mexico continues to push through the most comprehensive electronic invoicing initiatives in the world. The newest addition transitions its invoice tracking for tax payments from registration to collections. In other words, Mexico is now tracking the money."[30] It also implemented real-time electronic audits "to speed up the auditing process and minimize the time it takes for taxpayers to correct compliance errors, therefore increasing the likelihood that they will pay the appropriate taxes and fines."[31] In a blockchain environment, a government taxation entity could be a node on a network with tax dues automatically flowing as part of a transaction that effectively collapses the new step introduced by Mexico into a flat, single transaction.

Blockchain adoption could affect the reporting, classification, collection, and remittance of taxes. Imagine streaming tax payments in real time.

Additionally, increased cryptoasset adoption does pose interesting questions from the perspective of reporting and classification, as well as collections. Some governments, such as the town of Innisfil in Canada and the territory of Bermuda, have publicly stated their intent to consider accepting cryptocurrencies as a valid form of paying taxes.[32] These decisions come in a time of inconsistent

treatment of cryptocurrencies themselves across jurisdictions: some regions or countries consider them property, and others treat them as currency.

For example, Lukka (formerly known as Libra, not related to Facebook initiative) was the first start-up company to tackle blockchain audit and tax reporting, with a product that it initially geared toward personal taxes. The premise was simple: record the purchases and dispositions of cryptoassets for government reporting. Building on its initial success, Lukka has broadened its service offering by providing enterprise services to transform "distributed and decentralized data into auditable business information that enterprises use to improve operations, create financial statements, and provide regulatory reporting and transparency."[33]

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Payments innovation with digital assets

As we move the discussion from theory to practice, let's consider three scenarios that have a more immediate impact on the role of the CFO. These are "horizon one" impacts focused on payments innovation with digital assets or cryptocurrencies:

1. Merchants offer options to consumers to buy goods using cryptocurrencies

2. Employees request to receive compensation in cryptocurrencies

3. Corporations opt to use cryptocurrencies to transfer funds across borders

In the next section, we review each scenario and look at the significance of these trends, offering some examples, challenges, and questions for the CFO to consider.

Merchants offering new payment options to consumers

Although stats are difficult to come by (because of the self-reporting needed and the global, decentralized nature of this technology), more than 11,000 businesses are estimated to accept cryptocurrencies for payments.[34] Numerous brands, such as Whole Foods, Microsoft, Expedia, Overstock, Intuit, and Shopify, have announced their intention to accept bitcoin or are already accepting it, but adoption is still not widespread and many of the merchants listed on Coinmap are smaller in size.[35] According to a 2017 *Bloomberg* report, "Bitcoin is accepted at just three of the top 500 online merchants tracked by the e-commerce news and analytics publication *Internet Retailer*, down from five last year."[36]

Numerous brands have announced their intention to accept bitcoin or are already accepting it, but adoption is still not widespread.

Though difficult to quantify firmly, we could argue that the use of cryptocurrencies for purchases are relatively small. In terms of volume, Bitpay (a cryptocurrency payment processing company) alone processed more than $1 billion of bitcoin transactions in 2018,

continuing significant growth from prior years.[37] Many digital assets or cryptocurrencies are marketed as being specifically designed to be the currency for Internet transactions, whether purchasing merchandise online or participating in such online activities as gaming or using prediction marketplaces.

Person Holding Black Card Holder *by Lukas Blazek, 2018, used under Pexels license, accessed 3 Aug. 2020.*

Why would a user choose an alternative to fiat for an online transaction?

I purchased some clothing online from a boutique company Hodlmoon, which specializes in crypto versions of the ugly Christmas sweater.[38] As a purchaser, I can be cautious when interacting with a small independent merchant online. Will my product arrive? Will I compromise my personal financial security if I provide my name, address, and my credit card information? While paying in cryptocurrencies doesn't solve for the risk of nondelivery of the sweaters, I was guaranteed that the merchant didn't have any sensitive payments details. Hodlmoon provided an address to send funds to, and I sent the funds via my wallet where I owned the private keys. Getting product delivered to an address other than my residence ensured that identity theft becomes less of a possibility—which was the premise of simple digital transactions behind cryptocurrencies. And my sweaters arrived after all!

Why are merchants considering adopting cryptocurrencies? The lack of chargebacks, lower fees, and global access to new customers, to name just a few.

From a merchant's point of view

Why are merchants considering adopting cryptocurrencies? The lack of chargebacks, lower fees, and global access to new customers, to name just a few. A common challenge for the use case of cryptocurrencies by merchants is the view that a retailer or service provider has enough variability in the core business without the added currency fluctuation impact. A merchant is primarily

concerned about having the right products, selling the products at a profitable margin, and customer satisfaction. Payment processing is not a core activity, but an enabler. To address this pain point, a new crop of crypto payment processor companies is responding to merchant acceptance concerns and enabling them to accept crypto as a payment mechanism without dealing with the back-end complexities.

BitPay is the world's largest bitcoin payment processor and its business model is based on a transaction fee structure.

BitPay is the world's largest bitcoin payment processor and its business model is based on a transaction fee structure. According to the founding team:

> *We started BitPay [in 2011] because we wanted to make it easy for businesses to accept bitcoin payments. We are currently the largest bitcoin payment processor in the world, serving industry-leading merchants on six continents. We've created a seamless, secure bitcoin payment experience used daily by hundreds of thousands of users.*[39]

What does a CFO need to consider for online payments?

If an organization decided to accept alternative payment mechanisms next month, the CFO would need to consider:

- Whether to accept payment directly or via a payments processor, including any costs and compliance requirements.
- What type of reporting to do in this scenario (i.e., creating a finance policy to record income on the appropriate basis).
- How to manage change, for example, through training and skills development for frontline staff and accounting departments.

Employers offering new payment options to employees

Blockchain start-ups may pay employees in cryptocurrency because they have had trouble opening bank accounts.

Blockchain start-ups may pay employees in cryptocurrency because they have had trouble opening bank accounts.[40] In Estonia, for instance, even licensed crypto businesses have struggled to get traditional financial services and found themselves paying salaries in crypto.[41] *Forbes* covered a trend that has emerged since 2015: the adoption of cryptocurrency-based payments for employees and contractors, primarily those working remotely.[42] "We're already moving past the 'what if' stages of paying in cryptocurrency," *Forbes* reported.[43]

In 2017, for example, the Japanese technology giant GMO Internet announced a plan under the leadership of CFO Masashi Yasuda to offer its 4,000 employees the option of receiving some of their salary in cryptocurrency, starting in February 2018.[44] It was a pilot program to gauge the option's popularity and the legal and technical challenges of such an offering, with an eye toward rolling out the opportunity to employees of the GMO Group's other 40 some subsidiaries.[45]

Depending on how jurisdictions define cryptocurrencies, labor laws may prevent the use of cryptocurrency for payroll.

For companies looking to hire the best talent wherever they are or to expand into jurisdictions where the value of local currencies fluctuates, offering to pay staff or freelancers in cryptocurrency could be a competitive advantage; and individuals working in the crypto space may prefer it. Still, some HR experts consider it a risky proposition for the workers themselves.[46] We can assess this value proposition from the perspectives of the employee and the employer (Table 1, below).

How would cryptocurrency-based payroll work?

A new generation of technology companies such as Bitwage, Chrono.tech, and Papaya Global has recognized the opportunity in the market and emerged to offer cryptocurrency-based remittances, 401(k)s, and other components of compensation packages to employees and contractors. Initially, this rise in cryptocurrency payroll transaction processing correlated with the demand for blockchain skills, and blockchain companies were the predominant users of software such as Bitwage. In the *Mitchell Hamline Law Journal*, Rebecca K. Webster explained why solutions like these might be attractive:

> *Some companies, such as Bitwage, are offering to run payroll for employers and allow employees to designate how much of their paycheck they would like to convert to bitcoins. Again, this solution would successfully shift an employer's liability and taxation issues because the employer is not holding the cryptocurrency in its own business accounts.*[47]

Depending on how jurisdictions define cryptocurrencies, labor laws may prevent the use of cryptocurrency for payroll.[48] For example, the US Fair Labor Standards Act requires employers to pay their workers in cash or its equivalent.[49] While US tax law defines cryptocurrency as property, not as a negotiable instrument payable at par, it recognizes crypto payment to contractors and employees as income.[50]

Table 1: Employee and employer perspectives

From an employee standpoint	From an employer perspective
» Contractors and freelancers are drawn toward the digital nature of payments in cryptocurrencies and their ease of use and portability across country borders. » Individuals who work in the cryptocurrency or blockchain industry often want to buy products using cryptocurrencies. » The process of converting fiat to crypt via an exchange or other means can be time intensive, and it's preferable to receive the funds in cryptocurrencies directly.	Particularly for smaller, digitally enabled companies, the convenience of a global currency for a globally distributed team, with simpler administration than setting up a fiat-based payroll system, has been a primary driver of this trend. Common payers include: » Blockchain specialized news outlets » Cryptocurrency exchanges » Blockchain start-ups

Founded in 2014, Bitwage is striving to become the cryptocurrency equivalent of ADP. According to co-founder Jonathan Chester, in 2017, Bitwage handled $30 million in wages for 20,000 users, among them staff from "Google, Facebook, Philips, the United Nations, and the US Navy."[51] Bitwage provides a simple interface to issue payments, leveraging cryptocurrency rails on the back-end system. It's gaining traction with individual users in multiple countries, now supporting seven currencies for invoicing clients and employers.[52] It's also offering employers the option of including bitcoin in their employees' 401(k).[53]

Bitwage provides a simple interface to issue payments, leveraging cryptocurrency rails on the back-end system. It's now supporting seven currencies for invoicing clients and employers.

A second start-up is Chrono.tech. Founded as ChronoBank in 2016 in Australia, Chrono.tech offers businesses a cryptocurrency payroll solution called PaymentX, which allows for payment in multiple cryptocurrencies.[54] A third is Papaya Global, an automated workforce management platform founded in Israel in 2016. It also enables companies to pay some portion of a worker's or contractor's wage in bitcoin, more as a means to remain competitive in attracting blockchain talent.[55] According to LinkedIn Learning, blockchain tops of the list of most in-demand skills.[56]

The gig economy is growing, and the ratio of contract workers to regular employees in corporate America is shifting. In a recent study, the ADP Research Institute concluded there were "six million more gig workers today than a decade ago," with half that growth reflecting a shift of labor from traditional employment to contract work across sectors and within large organizations.[57] The largest type of freelance work is skilled services such as computer programming and information technology, according to Edelman Intelligence; "the median skilled freelancer earns more per hour than 70 percent of workers in the overall economy."[58] Services like Bitwage enable contractors located anywhere in the world to invoice their clients in cryptocurrency and be paid in the coin of their choice without their client's carrying any kind of digital money.

What does a CFO need to consider for cryptocurrency-based payroll?

As employees shift to contract work that's global in nature, the freelance labor market is projected to grow. Assuming paying employees in cryptocurrencies was a desirable business objective, CFOs would need to consider these questions:

As employees shift to contract work that's global in nature, the freelance labor market is projected to grow.

- Is the cryptocurrency selected considered legal in the sending or receiving jurisdictions?[59] New Zealand was the first country explicitly to legalize payment of salaries, wages, and bonuses in cryptocurrencies.[60]
- How will relevant jurisdictions deem the conversion of fiat into cryptocurrency and the transfer of it across national borders? Will some see it as a money services business activity, triggering the necessary reporting?
- How will we handle remittances of tax at source withholdings? Countries such as the United Kingdom and the Netherlands

have provided some guidance on taxation of non-cash payments to workers.[61]

» How will we address valuation risk, primarily downside risk? For example, if a cryptocurrency's value fluctuates such that a payment falls below the legal minimum wage, will a country's labor laws require companies to make up the difference?[62]

CFOs should consider the impact that trends may have on their organization, their risk policies, and the use of cryptocurrencies in payroll.

Integrating a service such as Bitwage's will fall onto the work plate of the payroll team. Beyond financial reporting, a disproportionate number of people in the technology space are contract workers rather than full-time employees.[63] CFOs should consider the impact that these broader trends may have on their organization, their risk policies, and the use of cryptocurrencies in payroll.

Bitcoin Statistics *by Chris Liverani, 2018, used under Unsplash license, accessed 3 Aug. 2010. Cropped.*

Corporate cross-border payments

Senior executives in corporate treasury departments across industries have been intrigued by the possibility of using cryptocurrencies to handle financial transactions with customers or counterparties in exotic countries (defined as countries with low currency liquidity or capital controls). Local funds are converted to bitcoin, bitcoin is then sent to another country where it's converted back into fiat and used to pay suppliers. Using bitcoin is necessary because there aren't sufficient established market makers in those currency corridors.

For example, a large consumer packaged goods (CPG) company converted from fiat currency to bitcoin in certain jurisdictions. According to its former chief information officer and shared services leader, "Limited access to hard currency poses a cash liquidity challenge that impacts business operations."[64] As part of a pilot in

2018, the company focused on its Nigeria-based operations, where repatriating funds for goods or services was a challenge due to low dollar/euro liquidity. Some of the currency constraints in Nigeria included a cap on hard currency exchange, which was insufficient to manage payments to suppliers where products come from outside the country. Multinational companies commonly apply a variety of countermeasures with banks and suppliers to get funds in and out.

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The CPG company partnered with BitPesa, launched in Nairobi, Kenya, and now a subsidiary of AZA Finance. Through BitPesa, the company leveraged the Bitcoin blockchain's payment rails and payment providers to transfer value. Local Nigerian operations continued as usual: payments for services rendered locally were handled in Nigerian currency. To reimburse international suppliers, the company's Nigerian office would pay the invoice amount to global entity by using the blockchain rails to pay with local currency. The benefits were twofold: the company met its liquidity needs with full bank guarantee, and it reduced its settlement time significantly from 48 hours to six hours, with fewer third-party agents involved in liquidity workarounds.

From a regulatory standpoint, the company approached the pilot with a risk-based model. Throughout the process, the company did not touch alternatives to fiat at all; the company paid and received local currency at both ends and is considering further expansion of this program into its operations.[65]

Horizon two: Enterprisewide blockchain business applications

Referred to as "horizon two implications" in this paper, blockchain applications used in non-audit, tax, or digital asset payment use cases will have significant ramifications that are relevant to the CFO. These longer-term use cases are more strategic in nature and are expected to affect the core operations of organizations in industry, ones in adjacent areas for growth, and others that are still completely transforming the value chain (Figure 1, next page).

Blockchain applications used in non-audit, tax, or digital asset payment use cases will have significant ramifications that are relevant to the CFO.

The impact of DLT has captured the attention of senior executives across industries, including those in financial services, supply chain management and trade finance, life sciences and healthcare, public sector, energy and resources, media, and others.

Horizon two use cases are of relevance to most of the C-suite, and that's where CFOs might find their organizations starting a blockchain journey.

Common industry applications

Corporations are actively exploring use cases across sectors. For example, CPG companies are exploring how blockchain can digitize

Governments are exploring blockchain as a way to support asset registries, such as land, and engaging private sector constituents that are adopting blockchain in key industries.

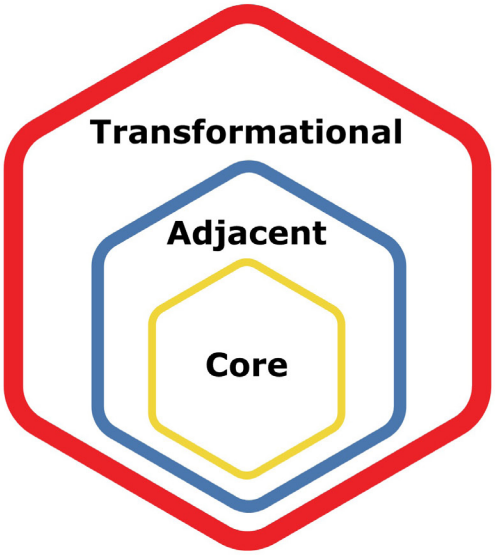
and track the origins and history of transactions in various assets.[66] Life sciences and healthcare organizations are exploring how blockchain can secure the integrity of electronic medical records, medical billing, claims, and other records, while pharmaceutical companies and supply chain partners are progressing on drug provenance among other use cases.[67] Governments are exploring blockchain as a way to support asset registries, such as land, and engaging private sector constituents that are adopting blockchain in key industries.[68] Energy companies are piloting blockchain technology to allow consumers to trade surplus energy through smart-grid technology, thereby making energy a digital asset tradeable among consumers.[69]

What CFOs need to consider for horizon two

Although horizon two use cases may not directly affect a function of the business that a CFO is personally responsible for, they are poised to have a significant impact on the broader business. CFOs are encouraged to look beyond the finance function and identify business opportunities for blockchain application and ask: "What's happening on the business side of the house as it relates to blockchain strategy that will bring up questions addressed to the CFO, whether financial in nature or otherwise?"

As an example, supply chain and trade finance are use cases that have attracted significant global attention from many organizations, and blockchain adoption in these areas will affect every stage of the CFO reporting lifecycle. Supply chain inherently involves multiple parties from the raw materials to production to transportation and retail participants.[70] Complementing this process are corresponding payments among participants either once the products or services are delivered or via derivative financial processes, such as trade finance.[71]

Figure 1: Effects of blockchain on enterprise operations



Companies across industries and in each area of the value chain are building proofs of concept (POCs) and pilots to assess how the use of enterprise blockchain platforms could streamline these processes. Often, this begins with the creation of a digital representation of the physical product or a tokenization of a digitally native asset as well as multiple parties' reaching an agreement around the governance of a network in which they participate. The intention behind blockchain adoption in these instances is to drive efficiencies in the ecosystem.

Though these pilots are usually not financially focused processes, they inevitably have an impact on the financials downstream.

Though these POCs and pilots are usually not financially focused processes, they inevitably have an impact on the financials downstream; and so CFOs have incentive to familiarize themselves with this technology and its applications. At the time of writing, organizations have made limited progress on many of the horizon one use cases, such as audit and tax, since they will realize the full benefits of these only after they have implemented horizon two use cases, such as supply chain.

Often the strategy leaders or the technology leaders of an organization drive the decision to pursue a blockchain use case. The ability to assess investments across all use cases, not just accounting- or finance-related ones, is becoming more essential for CFOs. Some of the most promising blockchain projects in the market require CFOs to react to changes on the business side during blockchain implementation.

The path to blockchain adoption

Once CFOs understand DLT and acknowledge the need for digitization and clean data, they can help their organizations to unlock all of the possibilities in horizon one and horizon two use cases. In any scenario, the core questions facing enterprise leaders are: how do we get started? Do we go ahead and invest in this emerging technology and embrace the required business strategy pivot? Or do we remain focused on our current business model and try to optimize the processes as they are?

Leaders realize that they must start investing in this technology as soon as they see how the model can transform their businesses.

Leaders realize that they must start investing in this technology as soon as they see how the model can transform their businesses. International Data Corporation expects worldwide spending on blockchain solutions by large companies and governments to hit almost $12.4 billion in 2022 at a compound annual growth rate of 76 percent.[72] According to WEF, research and development might start with POCs and value to understand what the technology is, how it works, and how the enterprise and its ecosystem might use it to create value.[73]

An enterprise might run one or more pilots before determining which one to move into pre-production to understand whether it can scale. If it is scalable, then an enterprise might move it into production with its ecosystem partners to determine whether they can transform markets or industries and create new products, services, and markets over time.

To capture insights into the adoption of emerging technologies, Accenture surveyed 6,672 senior business and IT executives: 65 percent reported they were piloting DLT use cases or had already adopted DLT in one or multiple business units. Another 23 percent were evaluating or planning to pilot.[74]

Accenture also found that "more than 64 percent of blockchain initiatives are currently being funded by IT or research/innovation budget—implying that the focus is on technology, rather than on aligning with the main areas of opportunity for the organization."[75] To make responsible and strategic recommendations, the CFO will need to work closely with the CIO, CEO, and CTO and investigate the investment from a whole organization point of view.

To make responsible and strategic recommendations, the CFO will need to work closely with the CIO, CEO, and CTO and investigate the investment from a whole organization point of view.

Crafting the business case

The WEF's July 2019 global blockchain report stated, "When done right, blockchain is all about rethinking business models, rethinking relationships between companies and between companies and customers, and is, at its heart, a strategic change effort."[76]

Hundreds of POCs have been announced and developed in the past few years, and the question is now being regularly asked: how do we quantify the value or return on investment of these blockchain efforts? The adoption of DLT hinged on questions of technology feasibility early on, and now the conversation has shifted toward assessing a quantifiable business case. The CFO must understand *how* this tech will shape core business activities and the bottom line (Table 2).

Table 2: Elements of the business case

What is our goal?	What are the enabling capabilities?	What are the value drivers?
Will this improve profitability and quality?	Automation Control Security Speed/efficiency Tamper resistance Traceability	Auditability Compliance Data management/security Payments Provenance of data/assets Reconciliation Standardization
Will this increase transparency of data among stakeholders?	Shared resource without single owner Shared view of information	Coordination Resilience Transparency Trust
Will this reinvent processes and products?	Decentralized autonomous models Digital identities Tokenization of assets	Authentication Identity management Marketplace creation Product/service innovation Partnership opportunities

Source: "Building Value with Blockchain Technology: How to Evaluate Blockchain's Benefits," World Economic Forum in collaboration with Accenture, July 2019.

What CFOs need to consider when evaluating use cases

CFOs are well positioned to be driving the discussions around investments and costs of POCs and pilots, as well as decisions around consortium-based business models. Regardless of the business-led use case being considered for implementation at any given company, there are many generic questions that the CFO's office will need to address that come from other members of the C-suite. The questions CFOs need to answer fall roughly into two categories: operational and financial, and strategic planning.

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Operations and finance

- How much does the current system cost? What are the sunk costs and the operational costs baked into products or system overhead?
- What are the cost-benefit analyses of status quo versus a blockchain-based system?
- How much will it cost us to build a POC, pilot it, and productionize it?
- Over what time horizon should we expect to see a payback on the investments?
- If transactions are recorded on a blockchain, how will we pull that information into our financial statements?
- How will auditors conduct an audit? Who will pay for the audit in a consortium?

Secretary Glasses Work *by Claudio Scott, 2009, used under Pixabay license of 27 March 2020, accessed 3 Aug. 2020. Cropped.*

Strategic planning

- Should we join a consortium or create a new one?
- If a company joins a consortium and participates in administering technology, how will each company account for *pro rata* share of costs?
- What are the risks and liabilities of joint network operations?
- What are the regulatory and compliance issues that arise?
- How will we manage changes in systems and culture?

CFOs who become blockchain literate will more likely be seen as trusted advisors to other executives and be able to help assess the potential of contemplated investments.

Finance talent

CFOs who become blockchain literate will more likely be seen as trusted advisors to other executives and be able to help assess the potential of contemplated investments.

As CFOs continue to embrace digitization, and spend less time concerned with functions that are now automated, they can reallocate more time toward more strategic areas, such as their role as an advisor on adoption of emerging technologies.

How ready are CFOs to tackle blockchain questions?

At the time of this writing, a search of publications reveals very few documents targeted to or by CFOs. Blockchain conference agendas typically have not included a stream for CFO-targeted topics, and large CFO forums or industry groups have not issued much in the public domain related to blockchain technology. A *CFO.com* article from June 2019 highlighted: "A year ago, the CFO/Duke University Business Outlook Survey found that 78 percent of US finance chiefs said they didn't know whether or how blockchain would affect their company. Only three percent claimed to even understand it."[77]

In off-the-record conversations with senior executives of organizations that have blockchain efforts underway about how active the CFO was in blockchain-strategy discussions, many of the respondents corroborated the views expressed by *CFO.com*, indicating that CFO involvement was minimal. Similarly, in off-the-record conversations with leading industry finance executives, many admit there is more learning to be done before they would feel comfortable making smart decisions in the blockchain space. There is a willingness to learn, though: in 2018, 51 percent of CFOs said they are eager to embrace new digital skills that will be critical for keeping up and succeeding in the years to come.[78]

Several CFOs are actively engaged in strategy. For example, Chris Ballinger, former CFO of Toyota Financial Services, recognized the

potential for DLT use cases in the automotive sector. He realized no single organization could implement solutions alone, and he needed to engage members of the ecosystem. So Ballinger formed a nonprofit consortium, Mobility Open Blockchain Initiative, the membership of which represents 80 percent of the global auto industry.[79]

CFOs can and should be more active in identifying valuable blockchain opportunities and supporting any program implementations.

According to a senior executive at Everledger, a blockchain-based start-up focused on tracking diamonds and in large part servicing the insurance industry, CFOs are actively engaged in their organizations' decisions to collaborate with Everledger and to incorporate its processes. Retailers with fairly small margins have found Everledger's value proposition appealing: it offers diamond lifecycle transparency to increase profitability.[80] Given that the product offering is geared toward law enforcement and insurers, and that financial outcomes are key drivers of the decision to use this platform, CFOs have good reason to participate in the process from the get-go. These examples show that CFOs can and should be more active in identifying valuable opportunities for the organization and supporting any program implementations.

Which skill sets do CFOs need to lead?

Innovative technologies demand new skill sets. Technologies that fundamentally transform the business models of entire organizations, and could transform industry network dynamics, will most certainly require new specialist skill sets.

As with any technology trend, the skills requirements will expand and vary over time, depending on the technology's position on the adoption curve. For example, in 2014 and 2015, corporate adoption

Young Woman Helping ... *by Andrea Piacquadio, 2020, used under Pexels license, accessed 3 Aug. 2020.*

was just starting and, at the earliest stages, the interest in DLT came primarily from the technology leadership teams and the occasional head of compliance or risk. Brian Hendry, a contract CFO, got involved in the blockchain space in early 2016. Reflecting on his early forays in the space, he said, "With few jobs in blockchain at the time [with the exception of encryption experts], I couldn't pursue [it]."[81]

Fast forward to 2020. Numerous established companies have completed POCs, announced or launched pilots, or gone live with their production-ready systems. The conversation has shifted, and more organizations expect senior executives across functions to engage in discussions of technology. Based on Accenture's "CFO Reimagined" research, the aforementioned WEF reports, and general observations, we see the need for CFOs to do the following:

- Deepen their understanding of the business processes of the overall organization, outside of their finance function expertise, to advise better on a company-wide emerging technology agenda that serves the business' interests.
- Engage with their leadership teams proactively, including the board of directors if appropriate, to ensure that an effective DLT strategy is in place.
- Understand enterprise DLT use cases relevant to their industry and take on responsibility for making the business case for investments.
- Support stakeholder groups in multiorganization initiatives or consortia in which their organization takes part, including defining the commercial structure of those initiatives or consortium projects.
- Increase technology literacy and competency skills intentionally and build on their credentials (finance or accounting degrees, MBA, CPA, or CFA style designations) in these areas:
  - The basics of decentralized technologies (computing power, data replication, deliberate redundancy, decentralized decision-making, private key management) and how to apply them in a distributed ledger environment.
  - Token economics, which may be the next frontier of technology evolution, leading to a "tokenization of everything."[82]
  - Blockchain-based analytics skills, perhaps equivalent to proficiency in Salesforce's Tableau, if distributed ledgers become sources of data. According to market research company Forrester, the global market for advanced analytics tools will hit $18.6 billion by 2021.[83] Already companies, such as Elliptic, offer innovative products that glean insights from distributed environments.[84]

CFOs need to engage with their leadership teams proactively, including the board of directors if appropriate, to ensure that an effective DLT strategy is in place.

- Embrace agile ways of working to accelerate the development and evaluation of DLT concepts for long-term impact potential.
- Stay up to date on regulatory developments, including those that affect core business operations, those in audit and assurance, and any taxation standards related to digital assets and DLT.
- Interact with peer groups. Over the past few years, professionals have hosted or formed industry- or skill-specific focus groups, forums, networking events, and communities of practice to share ideas and learn. As of early 2020, few were geared to CFOs.
- Engage with the DLT start-up and vendor community. As maturing start-ups prove their business models, CFOs who are prepared will be well positioned to evaluate possible partnerships or acquisition targets.

Beyond the corporate use cases, many ambitious projects are emerging from the start-up and open-source communities.

Businessman Giving Contract ... *by Andrea Piacquadio, 2018, used under Pexels license, accessed 3 Aug. 2020.*

Which skill does the next-gen CFO need?

Beyond the corporate use cases, many ambitious projects are emerging from the start-up and open-source communities. Research by the Chamber of Digital Commerce Canada and the Blockchain Research Institute showed that venture capital and private investments in blockchain topped $10 billion over the past five years.[85] Additionally, financial research company Autonomous Research estimates that, since 2017, $20 billion was raised globally in blockchain crowdfunding events (i.e., initial coin offerings).[86] As blockchain-focused companies scale, there will be a new market for CFO skills.

The DLT industry is heavily technologist oriented, with a growing user base and slowly gaining acceptance from the governments and regulatory community. Some start-ups are adopting DLT without the types of controls and processes in place at more traditional organizations.[87] Meanwhile, these companies plan to expand and prepare to manage potentially $100+ million of funding.

As entirely new business models emerge, CFOs who are actively involved in shaping DLT and emerging technology efforts will be well situated to add value and embrace new career opportunities.

As entirely new business models emerge, CFOs who are actively involved in shaping DLT and emerging technology efforts will be well situated to add value and embrace new career opportunities. The experience that CFOs have from working with larger, established companies will lend valuable insights to help inform the strategy of both core enterprise and new start-up type ventures.

Conclusions

Blockchain as a technology is here to stay, with significant potential for business model disruption in the long term and with many near-term impacts to CFOs.

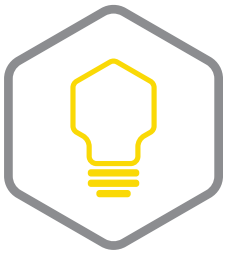
Given the projected growth of blockchain and other emerging technologies, finance leaders must consider how the CFO function will move forward amid ongoing digitization and how to embrace this technology paradigm rather than wait and respond to market movements. It's no longer a question of if but rather a question of when.

CFOs are well positioned to consider use cases that affect their finance function as well as broader company-wide and ecosystem consortia possibilities. The CFO skill set will be critical in articulating the value proposition and business case for investment, though there is still work to be done to get CFOs comfortable with blockchain understanding to a level where they can be most effective.

In the long run, corporate stakeholders will need executives across functions to understand the holistic impact of blockchain use cases within the organization and in concert with a broader ecosystem and move at pace. The CFO should be at the center of those discussions.

Finance leaders must consider how to embrace this technology paradigm rather than wait and respond to market movements.

Untitled *by Markus Spiske, 2019, used under Unsplash license, accessed 4 Aug. 2020. Cropped.*



About the Blockchain Research Institute

Co-founded in 2017 by Don and Alex Tapscott, the Blockchain Research Institute is an independent, global think tank established to help realize the new promise of the digital economy. For several years now, we have been investigating the transformative and disruptive potential of blockchain technology on business, government, and society.

Our syndicated research program, which is funded by major corporations and government agencies, aims to fill a large gap in the global understanding of blockchain protocols, applications, and ecosystems and their strategic implications for enterprise leaders, supply chains, and industries.

Our global team of blockchain experts is dedicated to exploring, understanding, documenting, and informing leaders of the market opportunities and implementation challenges of this nascent technology. Research areas include financial services, manufacturing, retail, energy and resources, technology, media, telecommunications, healthcare, and government as well as the management of organizations, the transformation of the corporation, and the regulation of innovation. We also explore blockchain's potential role in the Internet of Things, robotics and autonomous machines, artificial intelligence, and other emerging technologies.

Our findings are initially proprietary to our members and are ultimately released under a Creative Commons license to help achieve our mission. To find out more, please visit www.blockchainresearchinstitute.org.

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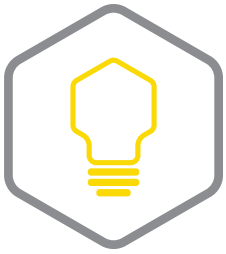

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Iliana Oris Valiente (CPA, CA, CBP) is widely credited for blazing trails in the blockchain space. She was among the first to recognize the tremendous enterprise potential of a technology used predominantly by hackers. Iliana is the global blockchain innovation lead for Accenture's Emerging Tech division, where she oversees numerous blockchain development projects with clients across industries. On the nonprofit side, Iliana is the founder of ColliderX, the world's first open-source, crowd-sourced, and crowd-funded R&D hub for blockchain and related technologies. Previously, Iliana was Deloitte's blockchain catalyst, and she founded the Rubix by Deloitte Blockchain practice in 2014.

Disclosures

The author is not a paid consultant or advisor, board member, investor or shareholder, or family member of founders or C-suite executives of any blockchain companies featured in the paper.

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