Insight

Blockchain for boards

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Introduction

"Blockchain is expected to transform almost every institution and every company. It is only now being imagined, but the expectation is that this is more powerful than the first wave of the Internet." – Ric Asselstine, CEO, Terepac

As the world hurtles forward at unprecedented speeds, organisations, institutions, and governments have not been able to keep up with this pace of change. This is because they were built on outdated systems that never could have predicted the impact of computing or the Internet. Thankfully, our methods for organising ourselves are gradually evolving, and nothing has been a bigger breakthrough in that regard than blockchain technologies, of which can fundamentally change how we manage information as well as organise ourselves.

Blockchain is arguably one of the most talked-about technological innovations to date, and is poised for rapid entry into many different industry sectors. But how might this disruption alter business as usual, and what can leaders do to understand it and necessarily adapt?

This paper examines these opportunities, and how leaders can keep up with the pace of blockchain's expansion.

But first, let us educate ourselves

During Obama's electoral victory around 2008, crises in America's subprime mortgage market precipitated a drastic downturn in economic activity, which led to the Great Recession of 2008-2012. Meanwhile, the elusive Satoshi Nakamoto published a paper on The Cryptography Mailing List at metzdowd.com entitled, "Bitcoin: A Peer-to-Peer Electronic Cash System". It introduced the revolutionary blockchain ledger concept through which Nakamoto proposed peer-to-peer money transfers without any intermediary control.

What is most revolutionary about blockchain is that it enables a distributed check on power, through mass collaboration and clever code as opposed to intermediaries like government and banks. In other words, our systems today rely on centralised authority where trust is given to only a few. Blockchain dismantles these systems with one separate to a central authority.
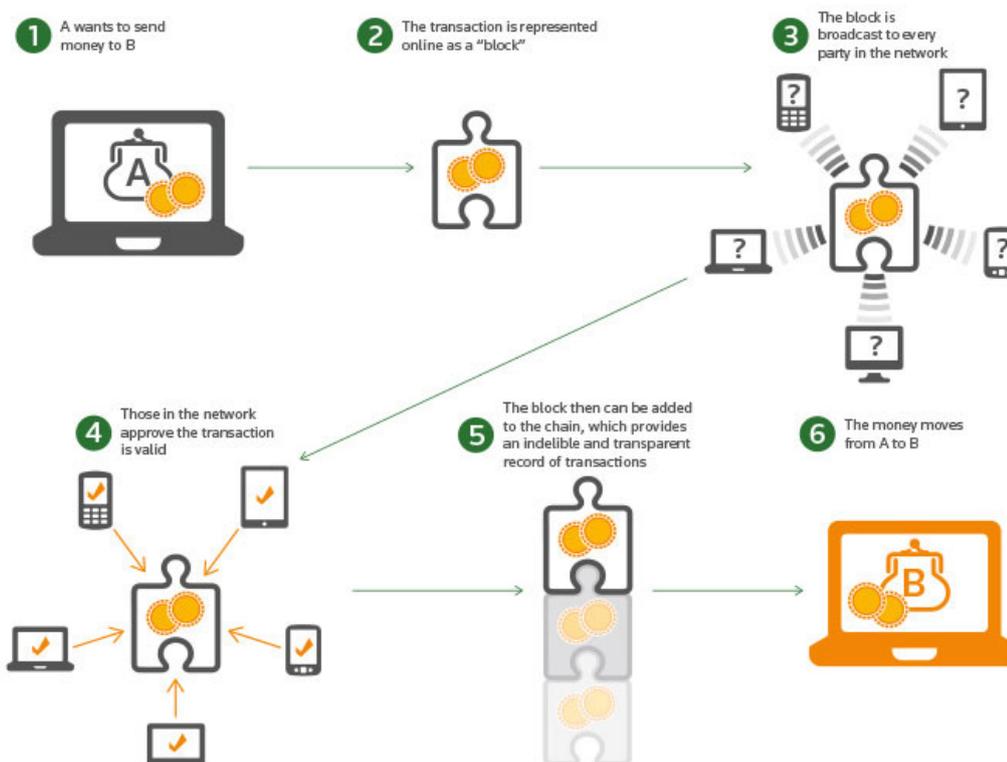
The key to the blockchain is that everything on it is monitored by everything else on it. Using Bitcoin as an example, whenever a bitcoin gets exchanged, that transaction gets checked against every other transaction in the system to make sure it is authentic and then gets tied to the history of that Bitcoin. The entire history of each Bitcoin is stored in an open ledger making every transaction traceable.

Aside from Bitcoin, entrepreneurs and developers have proposed other uses for this ledger, such as writing executable contracts without lawyers and automatically settling the transfer of stocks

and bonds without a clearing house. They are building applications on top of the blockchain that could publicly and immutably record everything from the birth of a child to a transfer of property ownership. Timestamps, ledgers and digital signatures have been around for many years, but this combination has unharnessed many new and consequential innovations.

The building blocks

- There are two types of blockchains: private and public (i.e. centralised or decentralised). A public blockchain allows everyone to see all transactions that have taken place on a distributed ledger, everywhere in the world. A private blockchain only permits a predetermined group of members to access the ledger. It is also possible to use a combination of the two.

- Blockchain has uses beyond sending or receiving value. For example, it is currently used in parts of the world to track ownership and the transfer of assets, including real estate and securities.

1 A wants to send money to B

2 The transaction is represented online as a "block"

3 The block is broadcast to every party in the network

4 Those in the network approve the transaction is valid

5 The block then can be added to the chain, which provides an indelible and transparent record of transactions

6 The money moves from A to B

Source: Financial Times

- In addition to digital currencies, blockchain technology is currently being used by organisations for everything from diamond certification to maintenance of health-care records. Many major international organisations, like PwC, have recognised the potential of the technology and are making significant investments into it.

- Blockchain technology can be utilised to establish a decentralised personal data management system that would enable each individual user to control the use and sharing of personal information. It allows a user to determine when and with whom their personal data can be shared.

- The impact it could have for all industries must not be overlooked. While it is still the early days, those using—or considering using—blockchain technology should deeply understand its potential value(s) as well as the regulations that may need to be navigated.

- The regulation of blockchain will ultimately depend on its use. Where blockchains are used to transfer securities, provisions of securities law will have application. For instance, where the blockchain is used to execute smart contacts for wagering, gambling law and regulation will apply.

The four potential uses of blockchains are:

- Recording Value Exchange

  o Value might be a service, a product or an approval in the form of a Smart Contract

- Administering Smart Contracts

  o A Smart Contract is a computer programme that works on the if / then principle. In this way, the contracts are administered. So, if the plumber has unblocked the drain then he requests that it is inspected. If the person responsible for inspecting the work agrees it's acceptable quality then the plumber gets paid. Smart Contracts can be used for each of these if / then scenarios and recorded on the blockchain. This all happens securely because of the use of cryptography in blockchains to store transactions in blocks of data that are replicated on multiple servers and computers worldwide.

- Combining Smart Contracts to form a Decentralised Autonomous Organisation (DAO)

  o A group of Smart Contracts can be used to create a DAO which is an organisation that is run through rules encoded as computer programs using smart contracts. There is no reason with the Internet of Things (IoT) and the amount of metring and monitors that can be put into buildings that the building itself cannot be set up as a DAO at the beginning of a project, through the construction phase and beyond to the in-use phase.

- Certifying proof of existence for certain data

  o For instance, providing a securely backed up Digital Identification, or Digital ID

Interesting developments are already occurring beyond Bitcoin

- Everledger provides an immutable ledger for diamond identification and transaction verification for various stakeholders, from insurance companies to claimants. This reduces risk of fraud for banks, insurers and open marketplaces

- Kevin Barnes, 20-year US army veteran and founder of Blocksafe Foundation, is prototyping "smart guns." With a promise to provide a technological fix for gun violence, smart guns are firearms which include safety features that allow the firearm to fire only when activated by an authorised user. They can distinguish authorised users in various ways, such as RFID chips, fingerprint recognition, wearable devices, or mechanical locks

- Tallysticks, part of the Barclays' tech start-up "accelerator," leverages blockchain technology to automate invoice and invoice financing processes. The near real-time invoicing reconciliation and settlement makes the process easier, cheaper, faster and more transparent

- Making "the world more transparent and honest," Factom allows the publication of encrypted data (such as a company's IP, or due diligence files) on a blockchain that only the data owner can access. Their document management solutions can reduce audit time, and prevent costly disputes

- In New York City, TransActive Grid helps consumers buy and sell any of their surplus renewable energy directly to their neighbours, with blockchain enabling and verifying the transactions. Similar approaches could eventually be used for computer processing power, network bandwidth and other utilities

- The start-up Filament has created a blockchain wireless network that allows offline devices within a nine-mile radius to transact with one another. This network, which does not require a centralized network authority, could enable industrial equipment with built-in sensors to place orders for maintenance services or new parts. Filament's customers include several Fortune 50 companies across oil and gas, manufacturing, agriculture, and mining

- A recent experiment with Commonwealth Bank of Australia's emerging technology team and Hewlett Packard Enterprise using the R3 consortium's Corda 'distributed ledger' allowed Colonial to eliminate arduous paper application process for managed funds and the three-day wait for the delivery of units.

There is commentary on the benefits of blockchain technology:

Source: 2016 Wired Business Conference

"Over the past two decades, the Internet has revolutionized many aspects of business and society–making individuals and organizations more productive. Yet the basic mechanics of how people and organisations execute transactions with one another have not been updated for the 21st century. Blockchain could bring to those processes the openness and efficiency we have come to expect in the Internet Era."

Arvind Krishna, Senior Vice President, IBM Research

Blockchains will enable new business models, particularly in contract management, financial transaction management and identity management.

Its adoption is accelerating faster than originally anticipated, with government executives identifying key areas and benefits to explore.

Accenture's journal of high-performance business, entitled Outlook, explores the ways in which blockchain may affect strategy, customers and operations:

- Customers

  - Blockchain can make commercial contracts programmatic, triggered by predefined events and conditions. One result? Machines that buy and sell like people. For example, smart meters are currently used to record and report energy consumption. In the future, a blockchain-enabled utility market could allow customers to authorise those meters to buy electricity—even automatically switch providers—on predefined terms. Utility companies could then sell electricity to the highest bidders, whether machine or person. Some promising experiments are moving toward making this hypothetical situation a reality.

  - More broadly, blockchain could enable an autonomous Industrial Internet of Things (IIoT). Accenture's research identifies 84 per cent of executives believing their organisations can create new, service-based income streams from the IIoT. Early steps in that direction have already occurred, though the technology will take time to perfect.

- Operations

  - Companies must coordinate various resources to sell products and services. Several processes underlie these activities, such as accounting, data management and workflow approvals. Blockchain could streamline many of these processes, especially those that rely on rule enforcement, reconciliation and verification. Take invoicing, for example. This process can be complex and error-prone, requiring cumbersome (and time-consuming) reconciliation between the transacting parties. Such solutions could increase accountability, while reducing corruption, fraud and forgery across the business landscape.

  - Because of the ease of transfer of information, and the automated tracking of every transaction, blockchain can simplify and partially automate elements of accounting and compliance, making it easier to do business with new global customers and enabling elements of the audit process to be completed with even greater accuracy. Auditors will therefore be able to focus attention on non-automated elements of the audit.

From a governmental point of view, the technology allows for direct democracy where every citizen could vote on issues themselves, rather than just electing representatives to make decisions on our behalf. In addition, if national currencies began using blockchain-backed systems, each citizen would be able to track exactly how each of their tax dollars gets spent. It has within it the promise of a world that is incorruptible, completely transparent and one in which anybody who wants to participate can have equal say in how society chooses to order itself.

The IBM Institute for Business Value explores the potential of building trust in government with blockchain. Virtually all government organizations surveyed thus far intend to invest in blockchain by 2018, and a small group of pioneering "Trailblazers" that are setting a fast pace and new direction with blockchains has been identified.

Trailblazers (14% of the survey) expect to have blockchains in production and at scale by the end of 2017. They are prioritizing blockchains to help reduce innovation roadblocks and inaccurate or incomplete information across their organizations. Trailblazers are focusing on blockchains to help reduce time, cost and risk in four areas:

- Regulatory compliance

- Contract management

- Identity management

- Citizen services.

The impact of blockchain on specific industries

Many experts speculate that blockchain is nothing less than the second generation of the Internet. It will change every institution, in some ways more so than the first generation did.

It will change every institution, in some ways more so than the first generation did. The basic idea is that for the last 40 years we've had the Internet of information, and that's been a medium for publishing information.

Consequently, problems with intermediary organisations have arisen; 2008 was evidence of that, where they almost brought down the global capitalist system. Suppose there was not just an Internet of information. What if there was an Internet of value, a globally-distributed ledger or database where anything of value, from money to music to votes, could be managed, transacted, and exchanged privately and securely?

Here are a few examples of the impacts blockchain may have on certain industries:

- Financial Services

  o The disruption—or transformation, depending on how this area is approached—could seriously disrupt the financial services sector. Although many financial institutions are investing billions in blockchain technology, there is much uncertainty with the returns on these significant investments.

  o There is an increasing demand of better services from financial institutions, and many of them struggling with this due to old legacies and old technologies. Conversely, newer, younger, and smaller companies deliver a better experience in a better service. These vast amounts of change revolve around service, products and availability.

  o The sheer complexity of existing financial systems create risk. A new decentralised financial system made possible with cryptocurrencies could be faster and easier by removing layers of intermediation. This insures against risk and could open more possibilities for different types of financial products.

  o Cryptocurrencies could open up the financial system to those excluded by lowering barriers to entry and enabling greater competition. Regulators could remake the financial system by rethinking the best way to achieve policy goals, without diluting standards.

  o Whilst blockchain promises more efficient operations and delivers a better customer experience, society will undoubtedly embrace this. The ramifications, particularly for financial services access and enabling in developed countries, allows more people to engage in financial services and to have access.

  o Ultimately, however, more efficiency may result in fewer jobs. This may have knock-on effects too.

- Construction

  o By relying on Digital ID's, more direct contracts can be formed between client right down to the individuals carrying out the design, monitoring, trade staff and the manufacturers of products. This would help avoid the intermediary cost add-ons that currently exist. Design will happen in much the same way. Contractual arrangements on site is where the change can occur. In effect, it would be possible to buy materials directly from the factory and employ people on a labour-only basis.

  o By using Smart Contracts and creating DAOs for a project, the administrative load on reporting, governance, monitoring responsibilities and transfer of risk can be reduced.

- Music

  - At least from musicians' point of view, the music industry is a copyright battlefield. Historically, most of the value used to be taken by the big record labels. Then the emergence of entities like Apple, YouTube and Spotify—which took a huge amount of value from what music artists create—left musicians with little to no compensation. But what if the new music industry was a distributed app on the blockchain, where a songwriter could post their song onto the blockchain with a smart contract specifying how it would be used?

  - For example, a recording artist could publish their music on a blockchain music platform, and say that listening to their music is free. However, if you want to put it in a movie or use an excerpt for a ring tone, it will cost a certain amount as per their smart contract.

  - Therefore, many big recording artists will be seriously investigating a whole new paradigm whereby the musicians get compensated for the value that they create. Furthermore, it would give most of the control back to the musicians and their work.

- Government

  - By providing both security and transparency, reducing the risk of foul play and enabling everyone to audit the results, blockchain solutions could reshape the future of presidential and parliamentary elections.

  - The government's ability to marshal this technology in service of its citizens— providing an accessible and self-verifiable source of truth for citizen-state interactions—is worth exploring, and many governments are doing just that.

  - Potential applications include secure e-voting, patient-controlled Electronic Health Records (EHR), and digital property titles. In Ghana, a pilot program is already underway that is enabling citizens to file and digitize land titles via GPS coordinates, register property disputes, and more.

Given the immense potential, uncertainty undoubtedly looms

As blockchain adoption becomes mainstream, there are several challenges it must overcome:

- Scalability

- Length of time it takes to verify transactions

- Transaction cost

- Security

Distributed ledger technologies are so new, so complex, and so prone to rapid change that it's difficult to predict what form they will ultimately take — or even to be sure they will work.

As innovations in technology change the way that money moves around the world, businesses need to keep a close eye on blockchain and be prepared to adapt and transform their services accordingly.

For existing major players in financial and information services, blockchain's internet-based software origins could pose a threat. Leaders in the online space could have an inherent advantage over traditionally offline businesses due to their more established digital networks, business models and customer bases.

Above all, the potential disruption of existing businesses and business models is the biggest threat from blockchain.

Information is power, and blockchain has the potential to vastly increase the amount of information available. New players will find ways to analyse information to identify whole new ways of working, just as has already happened with existing digital technology. Current industry leaders could see their dominant positions challenged. As with any new system of automation, some business services, jobs and career paths could also become obsolete — while new ones could be created.

Therefore, boards should evaluate the opportunities and risks that blockchain present:

CEOs (especially alongside their chief strategy and innovation officers) should evaluate blockchain's potential impact on their company's value chain, customers and operations. Next steps may include identifying and building specific prototypes, as well as investing in start-ups solving industry-specific problems.

Financial services firms have clearly taken the lead on blockchain. Their early adoption of the technology is expected to continue through 2017, with applications maturing by 2025—and other industries are likely to follow suit. In this exploratory phase, many experiments are bound to fail. But blockchain has enormous potential to recast how value is exchanged in the economy. Before the anticipated disruption permeates their industry, CEOs would do well to evaluate the technology's prospective opportunities, as well as the likely threats it poses.

Don't try to convert existing systems to blockchain initiatives right away!

Explore how others might disrupt your company with distributed ledger technology, and how it could be used it to leap ahead instead. Perhaps try pilot projects. Most of the big banks are doing this, but this is true in every industry.

Most of all, link investments to your company's value proposition, and give business partners and customers what they want most: **speed**, **convenience**, and **control** over their transactions. Develop a robust strategy, one in which your company thrives whether blockchain is transformative or not.

Thanks for reading

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