



Blockchain for Enterprise

Introduction

This guide is for executives who want to understand the potential business impact of blockchain technology in their respective industries.

Understanding the historical context of Blockchain technology enables us to appreciate the potential of the technology in business. In 2009 a paper was released titled “Bitcoin: A Peer-to-Peer Electronic Cash System”¹ under the name of Satoshi Nakamoto. This brief paper provided an outline of how Bitcoin could provide an alternative cash system without an intermediary as the trusted third party. The timing of the paper is important. It was released at the tail-end of the Global Financial Crisis. No other time in history had people lost trust in financial institutions. The GFC was a time when the pillars of government and finance had dramatically demonstrated their failure to uphold the trust bestowed on them for financial transactions. Bitcoin was an experiment to demonstrate that third parties were not required as the custodians of trust and the alternative technological solution (blockchain) could deliver greater security and trust between parties using digital encryption that is verified using a decentralised ledger.

At its core blockchain is about peer-to-peer transactions operating without the need of a middleman. The underlying technology is a disruptor to mainstream corporate and government control over legal rights to assets of value. There is no denying that blockchain’s historical roots lie in providing a rebellious alternative to the authoritarian grip held by institutions over the individual. Ten years after the release of the Satoshi paper the underlying technology known as blockchain has matured to the point where corporations can no longer ignore the threat to their legacy business models.

The ecosystem of blockchain is complex. There is no simpler way of putting it. On one side of the equation, there are cryptocurrencies and the trading of these currencies, and on the other side, there is the adoption of blockchain technology to enable corporations to solve genuine business problems, disrupt existing legacy models, or remain relevant in the marketplace. The focus of this paper is on how enterprises and governments are currently utilising blockchain technology. Before we explore the current applications of blockchain in the marketplace, we need to provide some basic understanding of the technology.

¹ <https://bitcoin.org/en/bitcoin-paper>

Key Technology Components for Enterprise Blockchain

There are several key technology components that form the basis for enterprise blockchain. Within each of these components, there are potentially multiple options available for organisations. The various options chosen will depend on the nature of the transaction, the sensitivity of the data, and the organisation's position on data and security. Often the regulatory issues impacting the transaction will also help determine the direction taken. Here is a simplified outline of the key technology components of enterprise blockchain:

1. Blockchain - A mathematical program that uses cryptographic signatures called a hash to record and timestamp transactions. Each new transaction is added in the same manner to create a "chain" of blocks of data code. Blockchain uses a shared database in a distributed ledger to confirm and verify the authenticity of the transaction. The ledger is decentralised so no single authority controls the legality of the transaction. Instead, majority consensus is required from computers hosting the ledger to approve the transaction as authentic.

2. Smart Contracts - These are digital contracts that enable two or more parties to exchange money, property, shares, or anything of value in a transparent, and frictionless way without the need of services from a middleman. Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code. Smart Contracts are core to many enterprise blockchain solutions.

3. Distributed Ledger – A distributed ledger is a shared database that is decentralised to eliminate the need for a central authority or intermediary to process, validate or authenticate transactions. This type of database is spread across multiple sites, regions, or participants. Enterprises use distributed ledger technology to process, validate or authenticate transactions or other types of data exchanges. Typically, these records are only ever stored in the ledger when the consensus has been reached by the parties involved. Blockchain technology requires a distributed ledger to work.

All files in the distributed ledger are then timestamped and encrypted using a unique cryptographic signature. All validated transactions are recorded chronologically and publicly displayed on the distributed ledger. The technology provides a verifiable and auditable history of all information stored on that particular dataset.

4. Tokens and Coins – Both of these are collectively known as cryptocurrencies. However, the only coin that has all the traditional characteristics of a currency is Bitcoin. Alternate coins (Altcoins) introduced

after Bitcoin more closely resemble securities. Alternate coins such as Ripple and Ethereum offer value based on an underlying technology offered in the marketplace. Their value is intrinsically linked to the adoption and commercial return generated from their usage by customers. Unlike Bitcoin, they cannot be directly used to purchase goods and services.

Tokens represent a particular asset or utility. The main difference to coins is that tokens do not usually have their unique blockchain, but rather they sit on top of another existing blockchain such as Ethereum or Bitcoin. They can represent any asset ranging from real estate to loyalty points. They are generally tradeable, and their value can be either fixed or fluctuating. Enterprise blockchain will typically utilise tokens instead of coins when a smart contract is transacted.

Organisations seeking to implement a blockchain solution will need to determine which blockchain platform best suits their particular needs. A plethora of enterprise blockchain platforms exist in the marketplace to accommodate a wide variety of commercial needs.

Enterprise Blockchain Platforms

The design of various blockchain platforms has generated much debate in the Blockchain industry. The primary area of contention resides in whether the blockchain platform utilises a public ledger or a private ledger that requires permission. Blockchain purists would argue that a private blockchain is not a proper blockchain solution since the underlying premise of blockchain technology is to utilise a public distributed ledger to eradicate the need for a middleman in trust-based transactions. The rise of permission-based blockchain for an enterprise has been driven by the knowledge that blockchain technology can substantially reduce costs, speed up transactions, and improve the customer experience. However, the public sharing of transactional data in a public ledger does not sit well with many organisations. Rather than face disruption from start-ups with new business models, some industries have embraced permission-based or private blockchains to address some legacy business issues that are inefficient, costly or unethical.

Control over the transaction and the data remains the key drivers for the utilisation of private blockchains. The implementation of enterprise blockchains often seeks to reduce the reliance on intermediaries rather than eliminating them altogether. Corporations retain control over the transaction in private blockchains at a reduced cost of processing. True peer-to-peer transactions without the reliance of a controlling authority is not the objective of private blockchain solutions.

The comparison between public and private blockchain platforms is provided in the table below:

	Public	Private
Access	<ul style="list-style-type: none"> • Open read/write 	<ul style="list-style-type: none"> • Permissioned read and/or write
Speed	<ul style="list-style-type: none"> • Slower 	<ul style="list-style-type: none"> • Faster
Security	<ul style="list-style-type: none"> • Proof of Work • Proof of Stake • Other consensus mechanisms 	<ul style="list-style-type: none"> • Pre-approved participants
Identity	<ul style="list-style-type: none"> • Anonymous • Pseudonymous 	<ul style="list-style-type: none"> • Know identities
Asset	<ul style="list-style-type: none"> • Native Asset 	<ul style="list-style-type: none"> • Any Asset

Source: [Chris Skinner's Blog](#)

Private blockchains have been popular in the financial services industry, with government, and the healthcare industry. In a private network, all participants verifying transactional data are known to each other unlike in a public network. Private networks work particularly well when there is a pre-existing number of entities trading together such as banks transferring funds across borders or medical providers transferring medical records. Not all enterprise blockchain solutions are built on private networks. A growing number of organisations are also adopting the public blockchain path. The direction taken is largely dependant on how important data control is to the organisation, the sensitivity of the data transacted, and the regulatory environment impacting the organisation. Some of the popular blockchain platforms adopted by enterprises are outlined in the table below:

Public Platform	Private Platforms
Bitcoin	Hyperledger (has multiple variants)
Ethereum	R3 Corda
Ripple	Quorum.
Stellar	Credits
Litecoin	Axcore
Komodo	

The decision to proceed with a particular blockchain platform will be based on many variables considered by the organisation as important to achieve their business goals and satisfy their customers.

Blockchain, like any disruptive technology, is ultimately about how an organisation can deliver new unique value propositions by changing the status quo. If the blockchain solution does not yield new value for the end customer, then we would have to question why it needs to be utilised and if there is a more suitable solution that can achieve the desired outcomes. The business problem being solved needs to be the primary driver behind any blockchain solution.

How are Organisations Currently Utilising Blockchain?

A review of how some organisations around the world are utilising blockchain to create new value propositions helps contextualise the potential of the technology. While many of the projects in this section are still in the testing stage, they do offer some good insights into the types of business problems that blockchain can potentially address.

BNP Paribas	
Country	France, Paris
Industry	Banking
Business Problem	Inefficient paper-based processes to transact cross-border transactions for commodities purchased from third parties. Traditional paper-based letters of credit are costly and generally delay the payments made for goods purchased.
Blockchain Solution	Move letters of credit from paper to a distributed ledger using blockchain to generate smart contracts. Parties can transact more efficiently and reduce the delays in payment.
Blockchain Platform(s)	Concordia, Hyperledger Fabric, Ethereum

Source: Forbes [Blockchain 50](#)

Bumble Bee Foods	
Country	USA, San Diego
Industry	Food
Business Problem	Demonstrate the provenance of its catch of tuna fish to its customers and overcome the issue that the fish were caught with minimal impact to the environment or harm to dolphins.
Blockchain Solution	Utilise blockchain to provide complete transparency to the entire tuna supply chain. Fishermen are required to enter the details of their catch at the time the fish are caught and similar information is captured all the way to the grocery stores in the US.

Blockchain Platform	Multichain
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Source: Forbes [Blockchain 50](#)

HTC	
Country	Taiwan
Industry	Smartphone manufacturer
Business Problem	Digital wallets used to store the ownership of cryptocurrencies has been the key security weakness leading to hackers stealing hundreds of millions of dollars from their rightful owners.
Blockchain Solution	Exodus 1 is the phone released by HTC that cryptocurrency owners a safer way to store and recover their coins using security embedded into the hardware of the phone.
Blockchain Platform(s)	Bitcoin, Ethereum

Source: Forbes [Blockchain 50](#)

Visa	
Country	USA, San Francisco
Industry	Payment networks for banks
Business Problem	Cross-border and business-to-business payments processed by banks are costly and not efficient. Visa, as a payment network provider, is facing a real risk of losing its relevance in the marketplace through innovative blockchain solutions.
Blockchain Solution	Over 50 blockchain patents have been filed by Visa. They aim to launch their B2B Connect blockchain solutions for banks and business at the end of 2019. This solution aims to facilitate cross-border and business-to-business payments.
Blockchain Platform(s)	Hyperledger Fabric

Source: Forbes [Blockchain 50](#)

Estonian Government	
Country	Estonia
Industry	Government Services
Business Problem	Storing sensitive citizen information without the threat of corruption or security breaches. Also, how to effectively and efficiently provide government services to citizen in a secure digital manner.

Blockchain Solution	Estonia developed its own blockchain solution to capture all citizen records and deliver e-government services to its citizens. Estonia is considered the pioneering government in the world to utilise blockchain.
Blockchain Platform	KSI Blockchain by Guardtime

Source: [e-Estonia website](#)

Intellectual Property Australia	
Country	Australia
Industry	Government Services
Business Problem	Registering patent applications, issuing patents, creating immutable records of ownership and enabling IP right owners to license or sell their IP to interested parties easily. Government registry service could be disrupted through an alternative blockchain solution making the department less relevant.
Blockchain Solution	Automation of rights registration using Ethereum blockchain. They transferred 50,830 patent applications using smart contracts in under 40 minutes. Ease of discovery of patent rights for non-exclusive licensing.
Blockchain Platform	Ethereum

Source: [Civic Ledger](#)

Overcoming the Hurdles for Blockchain Adoption

In 2018 PwC surveyed 600 “blockchain-savvy” executives to determine if they would be utilising blockchain in their business. The survey identified that 84% of the executives were looking at using blockchain technology.² The commitment to blockchain in both capital and human resources in the corporate and government sectors is creating the momentum that could see 25% of the entire global economic infrastructure being run on blockchain technology by 2030. Gartner predicts that by 2030 blockchain can generate over \$3 trillion in business value.³ This bullish outlook needs to be tempered with the inherent challenges that still need to be overcome to unlock the value potential offered by Blockchain.

The key challenges facing the mass adoption of blockchain in business can be grouped under the following categories:

² <https://www.pwc.com/gx/en/issues/blockchain/blockchain-in-business.html>

³ <https://www.gartner.com/en/documents/3627117>

Internal Acceptance

The complicated technical aspects of blockchain can make it challenging to gain the support of non-technical executives in the organisation. While many may be aware of the hype around blockchain, they still need to be convinced of its business value. Technically savvy executives may find it difficult to articulate the various components that make up a blockchain solution to non-technical executives. Without senior buy-in, for the business value of blockchain, many organisations may find themselves stuck in pilot or proof-of-concept stages. Rollout of solutions could be delayed.

Interoperability

An enterprise blockchain should have the ability to exchange value or information with other blockchains and integrate with third-party legacy databases use such as Oracle, SAP and SQL. Cross-chain transfers should be seamless and efficient. The ability to integrate with these systems seamlessly without the need for extensive development work is key to the adoption of blockchain solutions in the business environment. Blockchain platforms such as Komodo are working towards providing the enterprise with a blockchain solution to overcome the challenges of interoperability.

Trust amongst all parties

Enterprise blockchain typically involves multiple different parties often in competition with each other or operating in different jurisdictions. For business transactions to operate on a blockchain platform by all parties, there has to be acceptance and trust that the transaction is protected from manipulation, fraud or theft. Intermediaries previously provided the trusted mechanism for multiple competing parties to complete their transactions securely. In a peer-to-peer model, trust has to be reconfirmed by multiple parties before there is an agreement to proceed using the new platform. In the PwC survey, 45% of the surveyed executives identified trust amongst users as a key barrier to blockchain adoption. Rules and standards need to be in place to enable organisations to more easily agree on how the blockchain solution should be designed and operated.

Regulatory Uncertainty

The legal framework for operating an enterprise blockchain solution may be hampered by the lack of regulations or confusion over the legal position of a transaction. Organisations need to know their legal position on such transactions to quantify their risk exposure. Many governments are still lagging implementing a regulatory framework that gives all parties the comfort required around the blockchain transaction. Governments in Lithuania and Switzerland are leading in providing regulatory clarity, but a number of others need to expedite their regulatory framework to enable wider blockchain adoption.

Scalability

The issue of scalability comes into question with the use of public blockchains. Generally, as the blockchain gets larger the longer it takes to verify a transaction in the network. Bitcoin is the oldest blockchain and verification can take up to ten minutes. For many organisations, this length of time would be unacceptable. Many blockchain platform providers are currently working towards remedying the scalability issue in public blockchains.

Consumer Adoption

Many of the enterprise solutions are business-to-business transactions. For mass adoption of blockchain to become a reality it needs to extend to consumers. The adoption of blockchain by consumers presents itself with its unique challenges. Blockchain solutions provided to consumers need to be easy and simple to use without the complications of technical barriers or jargon. They need to be as frictionless as possible. Currently, the adoption of blockchain by consumers is largely reserved for those trading in cryptocurrencies and has not permeated beyond that domain.

Conclusion

Blockchain for enterprises presents an opportunity to rethink how current business processes work. The opportunity is to create new business value by designing new more efficient models that deliver greater speed, transparency and lower costs in service delivery. At its core blockchain provides organisations with the opportunity of providing peer-to-peer transactions without the need of a middleman. Smart contracts and tokens provide the essential means by which the ownership and value of an asset are transferred from one party to the other using blockchain technology.

Adoption of blockchain is being fuelled by large investments from tech companies such as IBM, Intel, Microsoft, and Google. The technology is still maturing, and many organisations are at the proof-of-concept stage testing out potential applications of the technology. There are several challenges that need to be overcome before blockchain solutions are widely utilised in industry. The potential of the technology to solve multiple business problems is promising.

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