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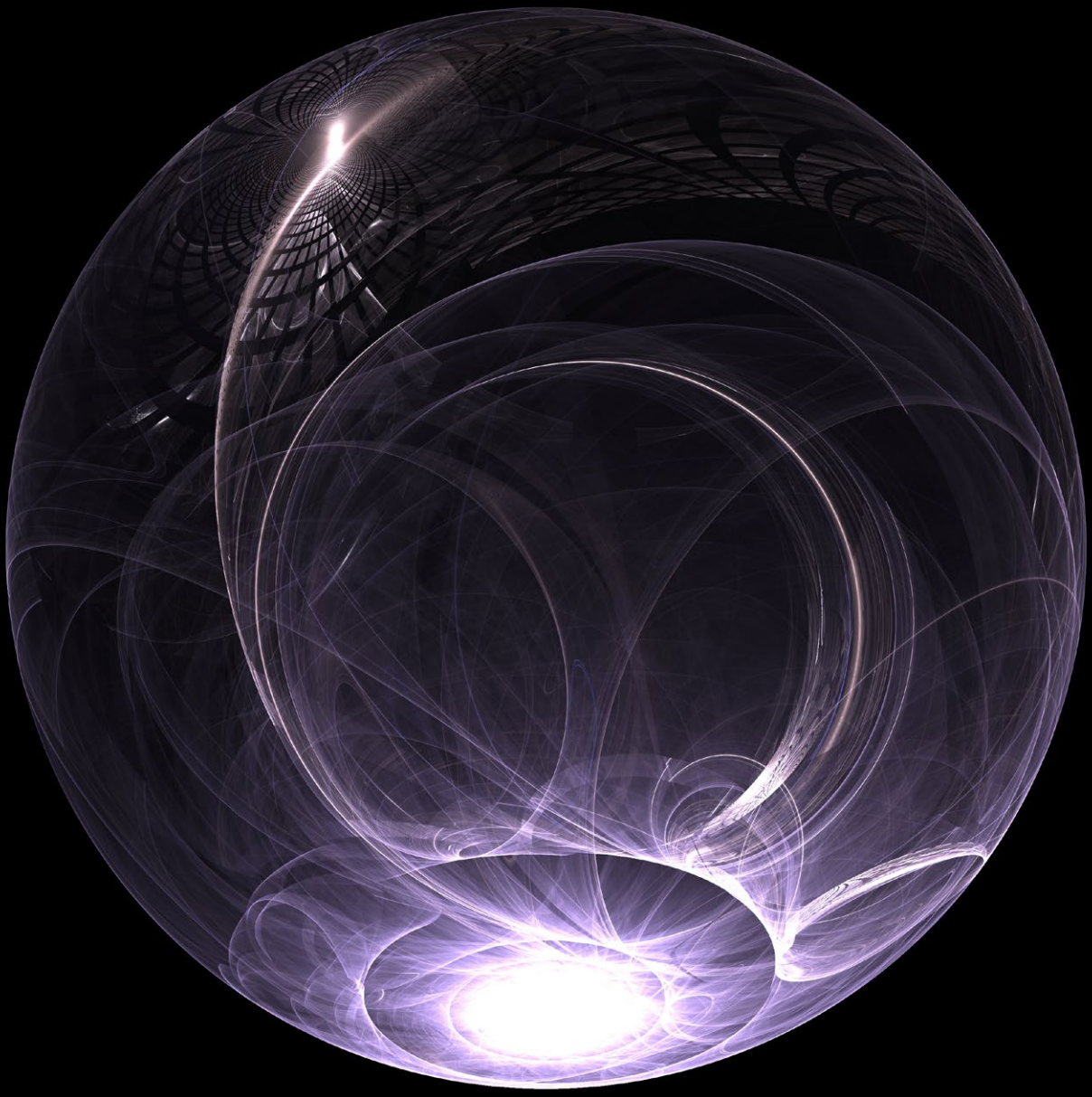


Blockchain

Enigma. Paradox. Opportunity.

#DistinctivelyRiskAdvisoryAfrica

Foreword

You may have read about Blockchain or heard about it at a 'FinTech' conference. Wherever the word has cropped up, fierce debates have often followed. Early adopters passionately claim that Blockchain will remove dependencies on banks and governments. Hardened business tycoons advise that it is just a 'flash in the pan'.

While the debate about Blockchain rages on, researchers have been quietly examining the technology that underpins this and other digital currencies. 2017 is the realm of the Blockchain – a protocol for exchanging value over the internet without an intermediary – and there is a growing buzz about how it might transform not just banking but many other industry sectors, too.

In a recent survey by the World Economic Forum (WEF), a majority of experts and executives in the information and communications technology sector expected at least ten per cent of global GDP to be stored on Blockchain platforms by 2025. And while the WEF does not expect the tipping point for the technology to occur until around 2027, we anticipate that adoption will occur much faster as a multitude of applications emerge in different sectors.

But who can benefit from this technology? What are the key Blockchain applications and how will they work? How do organisations create value from them? And what are the technical, cultural and commercial challenges they will face? In the following pages, we take a close look at the Blockchain and tackle these questions.

In our view, there are new and emerging opportunities for organisations in all sectors to create and deliver compelling services for their customers using the power of disruptive innovation. As they formulate their plans for the coming months, we also hope that this paper helps organisations and public sector leaders understand the cultural and organisational challenges that are inevitably brought by the use of Blockchain technologies, and provides them with the insights they need to overcome them.

We hope that you find this paper useful and we look forward to your feedback.

Introduction

"Obviously a closed platform is a serious brake on innovation."

Sir Tim Berners-Lee, inventor of the World Wide Web

Throughout history, many items have been used as a store of value; even distributed payment networks have existed for millennia. As our understanding of money has matured, so have the methods and modes for exchanging it. The Bitcoin 'experiment', which was started by Satoshi Nakamoto (presumed to be a pseudonym) in 2008, has demonstrated that there can be a viable digital alternative to cash and other mediums of exchange in modern society. And although Bitcoin has had a chequered history, with its association with the dark net and websites like Silk Road, it has also triggered debates about the opportunities that come from the Blockchain – the technology 'backbone' and protocols that Bitcoin and other digital currencies use.

The concept is approaching a tipping point in its adoption, according to the WEF. VentureScanner.com estimates that there are now over 800 new ventures in the global Bitcoin 'ecosystem', which have collectively raised over $1 billion (R13.5 bilion) in funding. These organisations include specialist Bitcoin exchanges, such as Coinbase and Itbit; Bitcoin 'miners', such as Petamine and 21e, which provide specialist computer hardware for validating Bitcoin transactions; Bitcoin wallet and payments organisations, such as EasyWallet.org and CryptoPay; and many other infrastructure, news and related services organisations.

In the African FinTech space, innovation hubs like Rand Merchant's Alphacode and Barclay's Rise have displayed local presence in the Blockchain space both from a conference and startup perspective. One of Barclay's first Blockchain collaborations in Africa is with Consent, a startup who went through the bank's pilot accelerator in Cape Town in late 2015. While Consent originally used Blockchain to improve fidelity with individual medical records across different databases, Consent co-founder, Shaun Conway saw how Barclays could use his system to help comply with Know Your Customer (KYC) regulations in the short term and safe guard customer identities in the long term[1].

Outside Africa, the New York-based financial innovation start-up R3CEV has announced that it is working with over 40 banks to conduct research and experiments with the aim of creating a new industry-wide Blockchain. Separately, Visa Europe, Westpac, the Commonwealth Bank of Australia, RBS and many of the UK's high street banks have all announced that they are working on their own proof-of-concepts using Blockchain. Citi claims to have built three Blockchains and its own cryptocurrency, 'Citicoin', to test them and the first patent for a securities settlement system using cryptocurrencies has been filed by an investment bank.

For consumers, a growing number of mainstream merchants accept Bitcoin as payment for their goods or services. Overstock.com, one of the first major online retailers to accept Bitcoins, made more than R1.9 million in Bitcoin sales on January 10, 2014, its first day of accepting the currency. Recently, Overstock.com became the first organisation to receive approval from the US Securities and Exchange Commission to issue shares using the Bitcoin Blockchain. Understandably, the focus on digital currencies like Bitcoin has created a common misconception that Blockchains are relevant only to the banking sector. "There has long been significant interest in the many different uses for Blockchain technology," says one commentator, "However, the 'non-currency' use-cases have until recently, generally commanded less total mindshare than 'currency' use-cases."

So who else can benefit from a Blockchain?

How does it generate value? And, perhaps more importantly, how can the technology be applied to existing organisations and their current business models?

This paper aims to address these questions and help leaders in different sectors navigate the emerging opportunities offered by Blockchain technology.

[1]Quartz Media: (https://qz.com/618674/africas-big-banks-are-betting-on-fintech-startups-and-bitcoin-to-beat-disruption/)

What is a Blockchain?

"The network is robust in its unstructured simplicity. Nodes work all at once with little coordination."

Satoshi Nakamoto

Simply put, it is a distributed ledger that provides a way for information to be recorded and shared by a community. In this community, each member maintains his or her own copy of the information and all members must validate any updates collectively.

The information could represent transactions, contracts, assets, identities or practically anything else that can be described in digital form. Entries are permanent, transparent and searchable, which makes it possible for community members to view transaction histories in their entirety. Each update is the new "block" added to the end of the "chain".

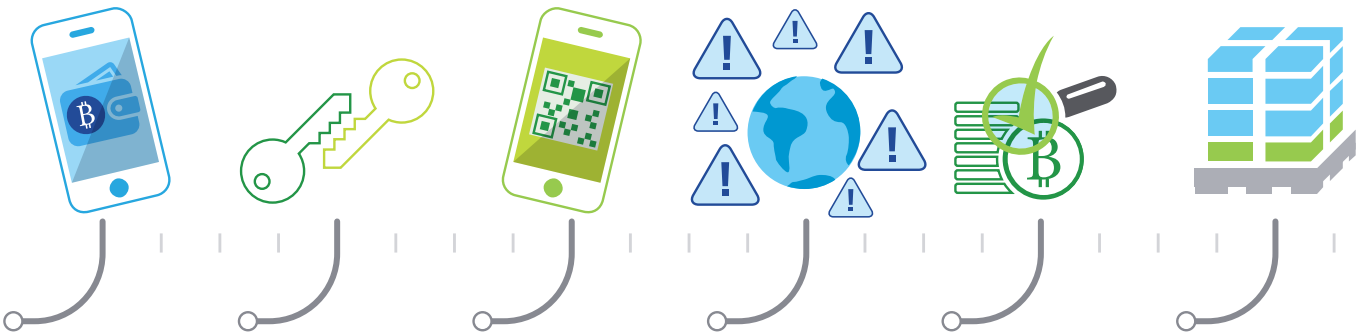
A protocol manages how new edits or entries are initiated, validated, recorded and distributed. With Blockchain, cryptology replaces third-party intermediaries as a keeper of trust, with all Blockchain participants running complex algorithms to certify the integrity of the whole.

How does a Blockchain work?

In his original Bitcoin white paper, Satoshi Nakamoto defined an electronic coin – the Bitcoin – as "a chain of digital signatures" known as the 'Blockchain'. The Blockchain enables each coin owner to transfer an amount of currency directly to any other party connected to the same network without the need for a financial organisation to mediate the exchange.

We can illustrate how a Blockchain works by using Bitcoin as an example, as shown in Figure 1. Bitcoin, like other Blockchains, uses cryptography to validate transactions, which is why digital currencies are often referred to as 'cryptocurrencies'. Bitcoin users gain access to their balance through a password known as a private key. Transactions are validated by a network of users called 'miners', who donate their computer power in exchange for the chance to gain additional bitcoins using a shared database and distributed processing.

Figure 1. How the Bitcoin Blockchain works



Bob owes Alice money for lunch. He installs an app on his smartphone to create a new Bitcoin wallet. A wallet app is like a mobile banking app and a wallet is like a bank account.

To pay her, he needs two pieces of information: his private key and her public key.

Bob gets Alice's public key by scanning a QR code from her phone, or by having her email him the payment address, a string of seemingly random numbers and letters.*

The app alerts Bitcoin 'miners' around the world of the impending transaction. 'Miners' provide transaction verification services.

The miners verify that Bob has enough bitcoins to make the payment.

Many transactions occur in the network at any time. All the pending transactions in a given timeframe are grouped (in a block) for verification. Each block has a unique identifying number, creation time and reference to the previous block.

*Anyone who has a public key can send money to a Bitcoin address, but only a signature generated by the private key can release money from it.

Graphic: Deloitte University Press. Source: American Banker[20]

What is in a Blockchain?

Despite its apparent complexity, a Blockchain is just another type of database for recording transactions – one that is copied to all of the computers in a participating network. A Blockchain is thus sometimes referred to as a 'distributed ledger'. Data in a Blockchain is stored in fixed structures called 'blocks'.

The important parts of a block are:

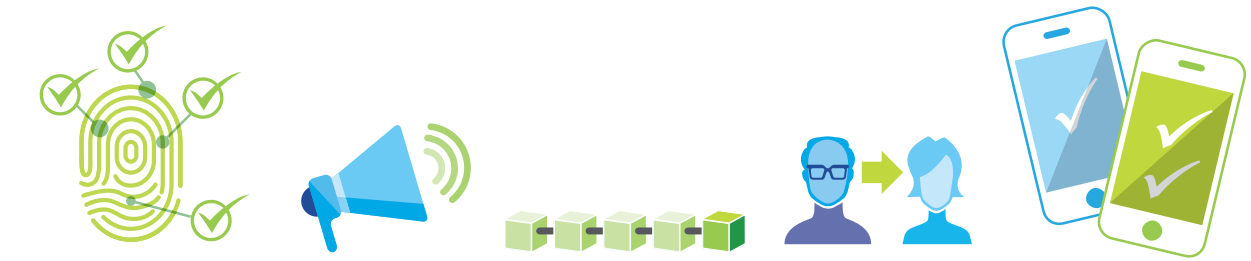
- Its header; which includes metadata, such as a unique block reference number, the time the block was created and a link back to the previous block
- Its content; usually a validated list of digital assets and instruction statements, such as transactions made, their amounts and the addresses of the parties to those transactions.

Given the latest block, it is possible to access all previous blocks linked together in the chain, so a Blockchain database retains the complete history of all assets and instructions executed since the very first one – making its data verifiable and independently auditable. As the number of participants grows, it becomes harder for malicious actors to overcome the verification activities of the majority. Therefore the network becomes increasingly robust and secure.

What elements are common to all Blockchains?

A Blockchain:

- is digitally distributed across a number of computers in almost real-time
- uses many participants in the network to reach consensus
- uses cryptography and digital signatures to prove identity
- has mechanisms to make it hard (but not impossible) to change historical records
- is time-stamped
- is programmable



The new block is put in the network so that miners can verify if its transactions are legitimate. Verification is accomplished by completing complex cryptographic computations.

When a miner solves the cryptographic problem, the discovery is announced to the rest of the network.

The algorithm rewards the winning miner with 25 bitcoins, and the new block is added to the front of the blockchain. Each block joins the prior block so a chain is made – the Blockchain.

Within ten minutes of Bob initiating the transaction, he and Alice each receive the first confirmation that the bitcoin was signed over to her.

All the transactions in the block are now fulfilled and Alice gets paid.

The Internet of Value Exchange

The problem for many organisations at the centre of traditional value-exchange processes, especially banks, or credit card and other types of payment organisation, is that Blockchain technology is a double-edged sword.

How does a Blockchain deliver value?
The way in which many established transaction processing systems work is very different from the decentralised and distributed nature of a Blockchain. For certain applications, the current model of value creation is likely to be improved by faster, cheaper, more reliable and transparent processes enabled by the Blockchain.

However, Jeff Garzik, one of Bitcoin's core developers, cautions against trying to do too much with a Blockchain:
"Do not try to stuff every feature into the Bitcoin protocol. Let it do what it does best. Build systems on top of Bitcoin which use its strengths.... Putting all the world's coffee transactions, and all the world's stock trades, and all the world's Internet of Things device samplings, on the Bitcoin Blockchain seems misguided."

There are clearly both practical and philosophical limits to the scope of applications amenable to Blockchain approaches. But with a little careful thought, linking users and organisations directly together through a shared ledger and distributing processing across a network, we should be able to remove the friction that makes existing transactions slow and expensive. And because a Blockchain breaks many of the rules and conventions that traditional business processes are built upon, it forces organisations to think differently about how they create value.

However, early predictions of the demise of our global banking system or national governments seem hasty and premature in the cold light of day. The reality is that while many transactions will benefit from a decentralised approach, many others will still need to be handled via an intermediary, which can, despite additional complexities and regulation, veto suspect transactions, provide guarantees and indemnities, and deliver a range of associated products and services that consumers cannot yet access on the Blockchain.

Key Challenges

As the Blockchain ecosystem evolves and different use-cases emerge, organisations in all industry sectors will face a complex and potentially controversial array of issues, as well as new dependencies.

Awareness and understanding

The principal challenge associated with Blockchain is a lack of awareness of the technology, especially in sectors other than banking, and a widespread lack of understanding of how it works.

Organisation

The problem with many current approaches is that they remain stove-piped: organisations are developing their own Blockchains and applications to run on top of them. This defeats the purpose of distributed ledgers, fails to harness network effects and can be less efficient than current approaches.

Culture

A Blockchain represents a total shift away from the traditional ways of doing things – even for industries that have already seen significant transformation from digital technologies. It places trust and authority in a decentralised network rather than in a powerful central institution. It has been estimated that a Blockchain is about 80 per cent organisation process change and 20 per cent technology implementation.

Cost and efficiency

Decisions about implementing Blockchain applications need to be carefully thought through. The returns to individual processing nodes – either individuals in a public Blockchain or organisations in a sector-wide Blockchain – may diminish as the network grows in size. This means that Blockchain applications must harness network effects to deliver value to consumers or to sectors at large.

Regulation and governance

Regulations have always struggled to keep up with advances in technology. There is thus a strong argument for Blockchain applications to work within existing regulatory structures, not outside of them, but this means that regulators in all industries have to understand the technology and its impact on the organisation and consumers in their sector.

Security and privacy

While cryptocurrencies like Bitcoin offer many potential applications of the Blockchain, clients and industries require smart transactions and contracts to be indisputably linked to known identities, and thus raise important questions about privacy and the security of the data stored and accessible on the shared ledger.

From Vision to Reality

Some bold predictions suggest that the organisations at the centre of current transaction systems will cease to exist in just a few years. Others are more conservative, positing a relatively low impact in the short term for Blockchain applications other than payments. The reality is likely to be somewhere between these two extremes. And different markets will also move at different speeds, particularly where the role of central organisations is less dominant.

Today, performing an online transaction – such as paying for goods or services – is almost impossible without involving a third party, such as a bank or credit card organisation. When these transactions work, they are taken for granted. When they fail, the complexities, fragmented nature and opacity of the systems used to handle the exchange are often exposed.

As the Blockchain ecosystem steadily builds, the prospects of more significant change occurring within the next decade will increase. Organisations that fail to create a vision and adopt a 'wait-and-see' attitude towards Blockchain are unlikely to develop the expertise or break down the organisational and cultural barriers needed to work effectively with this new technology. Nor are they likely to engage their peers or stakeholders in discussions about how the technology may affect their industry at large.

For start-ups and entrepreneurs, interest in the Blockchain space is growing rapidly. For legacy organisations, particularly large multinationals, the situation is more challenging. These types of organisations can be stirred into action by identifying specific opportunities where the existing modes of value exchange in the sector create bottlenecks and then analysing how a distributed ledger might help address them. By solving concrete problems, organisations can more effectively identify the technical, organisational, cultural and talent changes necessary to realise new benefits – and then scale what works.

Beyond the tactical changes for organisations, it is important to consider the potential magnitude of organisation and process change caused by a shift onto sector-wide Blockchain platforms. Engaging with like-minded organisations to develop and foster these collaborations and prepare for change is vital. Understanding the risks and level of disruption beforehand is also key to the design of effective systems.

Ultimately, the Blockchain is not just about cryptocurrencies and faster peer-to-peer payments. It is also part of an ecosystem of advanced but fledgling technologies, including artificial intelligence, robotics and crowdsourcing, that look set to play a fundamental role in the future of commerce and society. Blockchain will affect the way that individuals and organisations interact, the way that organisations collaborate with one another, the transparency of processes and data, and, ultimately, the productivity and sustainability of our economy.

Key questions every leader should ask:

Awareness and understanding
Is a Blockchain right for my organisation? And, if so, how are we thinking about applying it and what would this mean organisationally and culturally?

Organisation
Will a Blockchain approach still leave a marketplace in which we can compete?

Culture
Have we thought about impacts on our strategy, organisational structure, organisation processes, governance, talent and legacy systems?

Cost and efficiency
What is the organisation case for implementing a Blockchain? How do we make it pay?

Regulation and governance
How do current regulations impact our application of Blockchain?

Security and privacy
How are we applying security to our application and is privacy a priority?

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