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Blockchain – revolutionary change or not?

Cross sector use cases need validation

Blockchain

01. Introduction

If one is involved in the area of Banking Technology, chances are that the word 'Blockchain' no longer sounds alien, but at the same time, possibly triggers more questions than answers. The World Economic Forum estimates that by 2017, 80% of all banks are going to initiate projects concerning Distributed Ledger Technology (DLT)—the underlying technology supporting a Blockchain. In the past three years, FinTech startups working on Blockchain have attracted venture capital funding of over $1.4 Billion. All these statistics point to the unparalleled excitement triggered by a technology whose first contours were defined less than a decade ago, just when the global financial services industry faced one of its toughest challenges in recent history.

02. What is the core technology?

In its simplest form, a blockchain acts like a shared, replicated, append-only database where write access is shared among participants but validation can be performed by all participants in a public blockchain.

Taking the elements common to most blockchain systems, there is:

- A data store, usually containing financial transactions, but could contain any type of data;
- Data replication across a number of systems in real-time;
- Peer-to-peer network topology instead of hierarchical client-server models;
- Usage of cryptography and digital signatures to prove identity, authenticity and enforce read/write access rights; and
- Mechanisms that make it hard to change historical records, and make it easy to detect when someone attempts to do so.

Public and private blockchain concepts and examples:

Public blockchain: A public blockchain is a platform where anyone canread or write on the platform, provided they can show proof of work. There has been a lot of activity in this space as the number of potential users that any technology in this space could generate is high. Also, a public blockchain is considered to be fully decentralized. Some examples:

- Ethereum, a provider of a decentralized platform and programming language that helps running smart contracts and allows developers to publish distributed applications.
- Factom, a provider of records management, records business processes for business and governments.
- Blockstream, a provider of sidechain technology, focused on extending capabilities of bitcoin. The company has started experimenting on providing accounting (considered a function to be done on private blockchain) with the use of public blockchain technology.

Private blockchain: A private blockchain, on the other hand, allows only the owner to have the rights on any changes that

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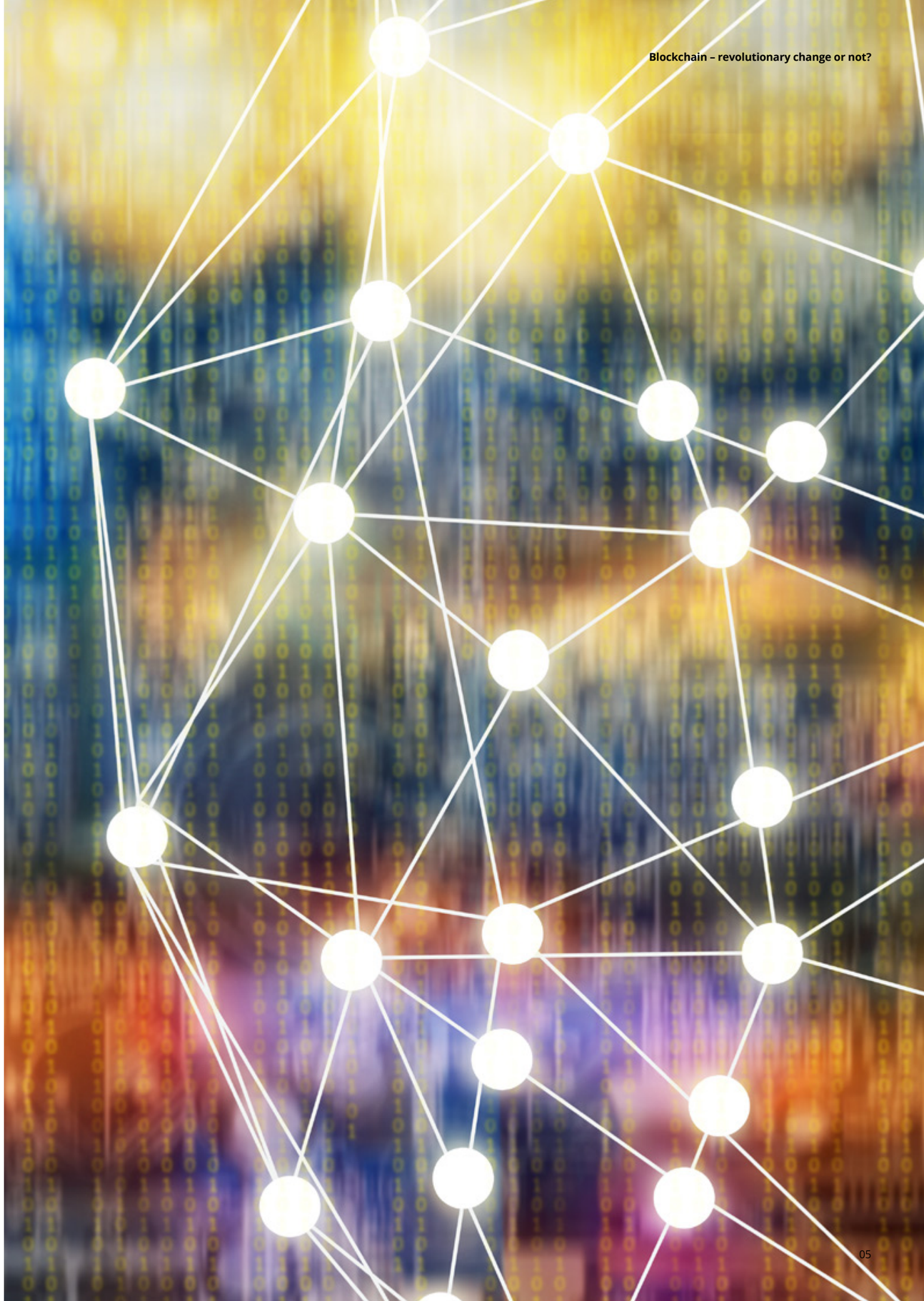


have to be done. This could be seen as a similar version to the existing infrastructure wherein the owner (a centralized authority) would have the power to change the rules, revert transactions, etc., based on the need. This could be a concept with huge interest from FIs and large companies. It could find use cases to build proprietary systems and reduce the costs while at the same time, increase their efficiency. Some of the examples could be as follows:

- Eris Industries aims to be the provider of shared software database using blockchain technology.
- Blockstack aims to provide financial institutions back-office operations, including clearing & settlement on a private blockchain.
- Multichain, provides an open source distributed database for financial transactions.
- Chain Inc., a provider of blockchain APIs. Chain partnered with Nasdaq OMX Group Inc., to provide a platform that enables trading private company shares with the blockchain.

The common wider themethat runs across these diverse applications and platforms is the emergence of a new paradigm where 'trust' will move from having to be owned and certified by central institutions (like banks or governments) to being actually based on computer science and specifically cryptography. And it will lead to us having a peer-based way to share ownership of digital assets and transfer them.

03. When is Blockchain useful?

Many companies are jumping on the Blockchainbandwagon but do not have fully vetted use cases. Blockchainworks best when allof the following conditions are met:

Shared Database	• There is a need for a structured repository of information, whether the data is structured in spreadsheet-like tables or like a filling system • Databases are modified via 'transactions' which represent a set of changes to the database which must be accepted or rejected as a whole
Multiple Writers	• There needs to be more than one entity which is generating the transactions that modify the database • In most cases the writers will also run 'nodes' which hold a copy of the database and retay transactions to other nodes in a peer-to-peer fashion (but not required)
Absence to Trust	• There needs to be a level of mistrust between the entities writing to the database • Mistrust arises between separate organizations, but can also exist within a single large organization, such as between departments or operations in different countries • Mistrust means that one user will not accept the "truth" as reported by another user
Disinter mediation	• There needs to be a lack of trusted intermediary, or central gatekeeper to verify transactions • Blockchains enable databases with multiple non-trusting writers to be modified directly • Transactions can be independently verified and processed by every node which maintains a copy of the database
Transaction Interaction	• Blockchains truly shine where there is some interaction or dependency between the transactions created by different writers • Blockchain transactions can be created collaboratively by multiple writers, without either party exposing themselves to risk

Source: Gideon Greenspan. "Avoiding the pointless blockchainproject." 24 November, 2015.

04. How "Blockchain" can impact the world across industries?

As we found during our research, there is lot of press and hype around how blockchain can impact industries and the broader society. As someone tweeted "We need a ledger to store all the press and hype around blockchain".

Here is a glimpse at the gamut of blockchain applications
The Financial Services industry is witnessing an increasing number of Blockchain-based use cases that yield the potential to drive significant operational and client experience improvements. There are multiple experiments in "Cross-border remittances", "Post trade settlements", "Trade Finance" and even "Loyalty programs" applications from the global financial services giants.

The below infographic illustrates various Blockchain use cases in Financial Services:

Global Money Movement
Facilitate movement of money internationally in (near) real-time with lower friction and costs

Digital Identity
Use digital identity services to meet regulatory needs, prevent fraud and enhance overall client experience

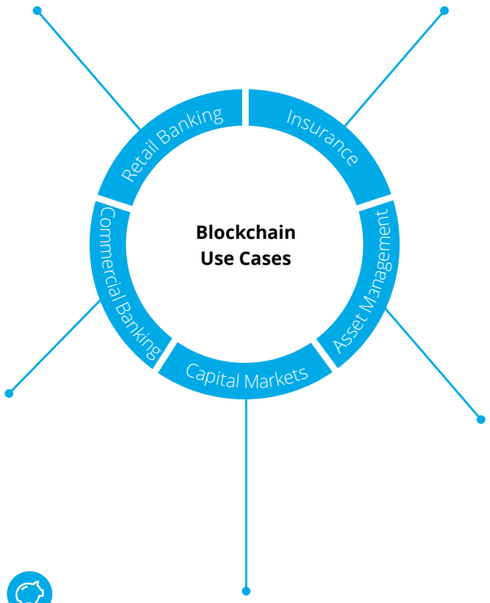
Interbank Settlement
Allows direct settlement between two or, more banks using a distributed ledger (and, optionally digital currency tokens) for improved efficincy

Underwriting
Verify identities, ensure completeness of applications, evaluate risks and complete quoting and binding

Loyalty
Allow customers to earn and redeem loyalty points both internal and external to the organization's loyalty ecosystem

Claims Processing
Smart contracts deliver an improved customer experience and lower costs with transparent & automated claims processing

Payroll Disbursements
Bypass the fees and delays associated with international money transfers



Customer onboarding
Improve customer onboarding experience leveraging digital identities over Blockchain

Trade Settlement
Decentralized settlement of trades powered by multi signature escrow entity allowing for faster settlement

Regulatory Reporting and compliance
Store financial info to eliminate errors associated with manual audit activities, reduce reporting costs and, support broader regulatory activities

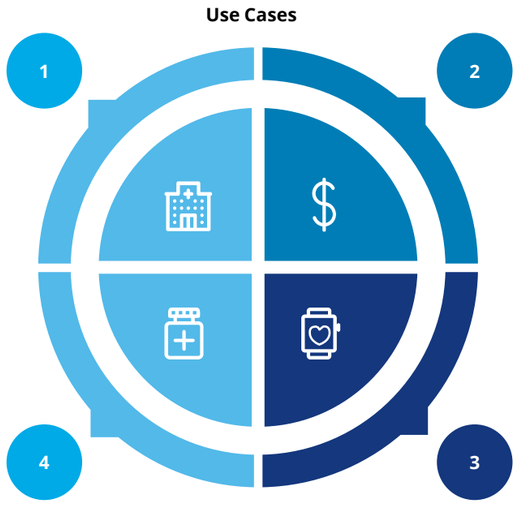
Trade Finance
Streamline and shorten the trade finance process, drive efficiency gains and open up new financing product opportunities

Syndicated Loans
Automate syndicate formation, underwriting and disbursement of funds (e.g. principal and interest payments) to reduce loan issuance time and ops. risk

Asset Re-hypothecation
Track and manage asset re-hypothecation via smart contracts to enable real-time enforcement of regulatory control limits and reduce settlement time

Smart 'legal Contracts
Self executable program that enforces legal agreements without trusted intermediaries and their associated transaction costs

Use cases in other industries such as Life Science and Healthcare are also being explored:



Providers

- **Interoperable** health records
- **Value based care** calculations
- **Pharmacy** RX fulfillment
- **PBM** auditing

Payers

- **Claim adjudication** using smart contracts
- **Dispute management** shadowchains
- **Provider** directories

Life Sciences

- **Pharmaceautical** supply chain
- **Marketi**ng expendture reporting
- **Clinical** trails
- **Genomics** IP & collaboration

Med Tech

- Smart device connectivity

Source – Deloitte Research

Deloitte has developed multiple prototypes across sectors and use cases. We have mentioned a few of these use cases below:

Cross-Border Payments – Cross-border payments volume business to business and consumer to consumer and on the rise ($155bn market). In the current set-up, sending money across the border takes a lot of time (2-7 days on average), ~8%costs on an average as transaction cost (11.2% with banks), the current system does not provide the ability to share rich meta-data, and end-to-end traceability.

Payments on blockchain can be quick (5-10 seconds), cheap (network transaction costs near zero), data rich (enable sharing rich transaction data and sender/receiver information for AML checks), frictionless (paperless front-end; competitive rates delivered by pathfinding algorithms, great customer experience), immutable (tamper-resistant record creates a single source of truth for reporting), transparent (provide end-to-end visibility of funds and ownership), and secure (protected by cryptography & multi-key authorization). It can also open up new business models like micro-payments, etc.

Loyalty Rewards - Loyalty reward programs are currently fragmented, costly and slow. Some of the key problems include:

- High lag between availing of service and credit of loyalty points - customers can't use or even viewpoints instantly
- Inherent inefficiencies with the system (and high associated cost)
- Poor data integrity with significant threat of security and privacy abuse
- Usage of reward points doesn't live up to the potential due to limited redemption options

A blockchain-based loyalty rewards programs can address the above issues. An omni-channel customer loyalty program based on multi-token blockchain can be configured easily (with multiple reward types and reward rules) to near-instantly reward points to customers upon purchase / usage of company products / services. Tokens accumulated can then be redeemed for a variety of reward options by adding new vendors on the blockchain.

Trade Finance – Letters of credit are one of the most commonly used trade finance instruments today and rely on highly manual, paper-based processes. Due to extended processing time in a trade transaction, purchasers and suppliers are not making the most efficient use of their capital as well as the authenticity of trade documents is required throughout the process to prevent fraudulent transactions.

A Blockchain-based solution can capture the details contained in a purchase order, bill of lading, invoice, and tracking of shipment in a smart contract on the blockchain. We created smart oracle to provide shipping tracking information and trigger conditions within the smart contract mechanism (e.g., smart oracles, detect a payment).

Globally, a few non-financial use cases have also emerged to the fore. Abstracts of such use casesare shown below:

Government of Sweden is testing a system for registering and recording land titles that utilizes blockchain in a bid to digitize real estate processes. Lantmäteriet, or the Swedish National Land Survey, is working on a proof-of-concept that investigates how blockchain tech could reduce the risk of manual errors while creating more secure processes for transferring documents.

The project comes as governments around the world are showing growing interest in using blockchain technology to improve the land registry process. In April, bitcoin mining and technology company BitFury unveiled a pilot with the National Agency of Public Registry in the Republic of Georgia.[i]

Gem launches global healthcare blockchain

Blockchain technology platform Gem has launched Gem Health, an initiative for building an inclusive blockchain ecosystem for healthcare. Gem Health endeavors to provide the data infrastructure to support a globally integrated healthcare continuum, said a statement. This includes a community-driven educational component and plans to build a private Ethereum network for developing enterprise healthcare applications.

Medical data is the lifeblood of healthcare, creating a profile for every patient that develops in complexity and scope throughout life. Today, medical history is fragmented and siloed, preventing doctors and patients from building a complete record of health. Gem believes that blockchain networks are a scalable solution for shared infrastructure that keeps critical patient data in the right hands.

In healthcare, these use cases range from claims processing to genomic data management, but at the core of each is the need for data to be shared seamlessly and secured infallibly.[ii]

Blockchain applications in energy trading

Picture a trade floor five years in the future. The robotic trader managing one of the gas desks is about to execute a physical natural gas trade with an industrial customer. One of the robot's trading algorithms scans available market interest and optimizes its search for the best deal to meet the customer's volume and tenor requirements for a given period. Once the robot's proposed deal terms are approved by the customer, the trade is executed and recorded on the blockchain. The deal terms are automatically confirmed and nomination information is recorded on the blockchain and available to the pipeline shipping the gas. As gas flows throughout the month, physical settlement occurs daily with payment initiated immediately. All activity added to the blockchain is readily available to the seller, buyer, pipeline, and bank. Physical title of the gas is also conveyed directly via the blockchain.[iii]

05. Potential challengesto mainstream adoption

Blockchains are not without their hurdles. While blockchain has immense potential to the society, it is also recognized that this is hard to achieve without substantial regulatory will and collaborative effort from all parties involved.

- **Total transparency a double**-edged sword - The demand for change in business processes (transaction processing) will come either from the grassroots demanding that certain data go on a blockchain and form a record which cannot be subsequently edited, or from regulators and policymakers mandating such change.
- **Requires a lot of coordination -** Blockchains can also be used in industry platforms for the sharing of data that is helpful to the industry as a whole. In this case, a majority of players in an industry need to come together and agree on what such a platform would look like, who would pay for it, and what value each participant would get from it.
- **Regulatory clarity over data sovereignty** - Regulatory clarity of on- and off-chain assets is something that is often discussed, in the context of bitcoins and the issues of data governance of a share certificate on a blockchain. What is often neglected is regulatory clarity over data sovereignty. In an industry blockchain, the same data is copied over many data centres, often in different countries. A lot of the data are encrypted so that only the intended recipient can see it.

In some industries this is fine, but in financial services, control of data is heavily regulated. Are banks comfortable sending, receiving, and storing data without knowing exactly what they are storing in their data centres? Are regulators comfortable with banks in their oversight storing unknown, encrypted data? Are banks comfortable with their competitors storing their data, encrypted or otherwise? After all, a blockchain replaces a trusted third party with a network of participants but in the case of an industry blockchain, many participants will be competitors.

06. Conclusion

In many ways, Blockchain today is comparable to where the Internet was in early 1990s. While we have witnessed how the 'Internet of Information' has changed our societies over the past two decades, we are now entering a phase where Blockchain is likely to do the same by ushering ina new paradigmcomprising 'Internet of Trust' and 'Internet of Value'. It is expected to disrupt the way stakeholders would interact in a decentralized framework of trust, thereby increasingly democratizing value. Banks and financial services institutions play a very important role in those wider societal interactions today and Blockchain is therefore forcing them to rethink their roles to stay relevant in this emerging paradigm.

It's early days, but industry leadersare sponsoring a wide range of blockchain use cases supported by industry consortiums. Having seen the potential of this technology and the challenges, we think the opportunity is clear but the blue sky is too far off and companies need to validate use cases and business / technical viability before implementing blockchain.

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[i]http://www.reuters.com/article/us-sweden-blockchain-idUSKCN0Z22KV
[ii]http://www.ibtimes.co.uk/gem-launches-global-healthcare-blockchain-1556850
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