



# **BLOCKCHAIN BUZZ:**

Getting to the  
Bottom of  
Distributed  
Ledger  
Technology

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## 1

# GETTING TO THE BOTTOM OF DISTRIBUTED LEDGER TECHNOLOGY

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The term 'blockchain' is everywhere these days, with what seems to be hundreds of startups claiming that their blockchain product is the solution to all the world's problems, affecting diverse sectors including banking, healthcare, supply chain management and information security. However, while the word 'blockchain' is thrown around a lot, many people aren't aware of its applications — or even what exactly it is, primarily associating it with Bitcoin, the cryptocurrency which is largely responsible for the technology's notoriety. Let's take a closer look at blockchain — or distributed ledger technology — to see what all the fuss is about, beyond the buzz.

A distributed ledger, also known as a shared ledger or distributed ledger technology (DLT), is a consensus of replicated, shared, and synchronised digital data that is geographically spread across multiple sites, countries, or institutions and has no central administrator or centralised data storage. Distributed ledgers have been gaining popularity around the world due to their decentralised control of information and transactions among users, which has the potential to drastically reduce transaction time, and allows for 24/7 services.

Distributed ledger technology (DLT) is an umbrella term to designate numerous multi-party systems that operate with no central operator or authority ('decentralised') despite operating in an environment where unreliable or malicious parties may be present (an 'adversarial environment'). The buzzword 'blockchain' simply refers to a subset of DLT that uses a particular data structure consisting of a chain of hash-linked blocks of data. The conceptual emergence of DLT dates back to 1982, while blockchain's earliest occurrence can be traced to 1991. A distributed ledger may or may not have a 'block' data structure and simply represents a type of database dispersed across multiple areas and participants.

## 2

# BLOCKCHAIN BUZZ – WHAT’S ALL THE HYPE ABOUT?

**Blockchain’s decentralised and immutable ledgers are more secure and convenient for financial transactions, making it a popular choice for digital currencies (also known as cryptocurrencies). Its use extends to utilities including the recording international money transfers and keeping tamper-proof logs of shareholder records.**

The recent hype surrounding Bitcoin triggered a surge in the research of blockchain technology, spurring governments, businesses, economists and enthusiasts to consider ways of its application in different fields. Built on a blockchain infrastructure, Bitcoin is a cryptocurrency that bypasses traditional financial institutions, and allows for near-instantaneous, secure and inexpensive transactions. It gained notoriety as an anonymous form of currency used to conduct illegal business online and for its highly speculative status: its wild fluctuations in price both attract and repel investors. Released in 2009 by Satoshi Nakamoto, the first known commercial transaction with Bitcoin was made by programmer Laszlo Hanyecz, who bought two Papa John’s pizzas for 10,000 Bitcoins (about USD \$30 at the time). At the height of what has become known as the Bitcoin bubble, a single Bitcoin was worth \$19,783. The success of Bitcoin led to the launch of several alternative cryptocurrencies, also known as ‘altcoins’. It remains to be seen whether Bitcoin and/or other cryptocurrencies will eventually supersede the current financial system.

Beyond cryptocurrencies, a growing number of companies are exploring the applications of blockchain in diverse fields including music streaming, social networking, commodities trading and property registries. The April 2019 Forbes list of 50 big companies actively exploring blockchain includes Amazon, Anheuser-Busch InBev, Ant Financial, Citigroup, CVS Health, Facebook, Google, IBM, Intel, JPMorgan Chase, Mastercard, Microsoft, MetLife, Nestlé, Samsung and Walmart. While blockchain and Bitcoins attract most of the attention, the underlying technology — distributed ledger technology — has the potential to completely transform a number of industries.

**Some 61% of high-profile digital companies worldwide are investing in blockchain as of April 2019.**

**Blockchain and cryptocurrency startups raised almost USD \$3.9 billion from venture capitalists from Q1 to Q3 in 2018, which represents a 280% increase in comparison to data from 2017.**

## 3

# WHAT IS DISTRIBUTED LEDGER TECHNOLOGY?

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**Largely popularised by blockchain, distributed ledger technology essentially refers to a decentralised method of record-keeping and processing data, such as transactions. Due to its decentralised nature and the difficulty of altering information, DLT is considered more secure than traditional databases. DLT applications include banking, supply chain optimisation, and asset and information management, among a plethora of other industries.**

A distributed ledger comprises a database that is spread across several computing devices, also known as nodes. The data is replicated and saved as identical copies of the ledger on each node, which updates itself independently. The ledger is independently constructed and recorded by each node instead of a central authority. The nodes then 'vote' on these updates to reach a majority agreement or consensus on one version of the ledger, which is conducted automatically by a consensus algorithm. Once this is completed, the distributed ledger is automatically updated and the latest, agreed-upon version is saved on each node separately.

Blockchains are a form of DLT where the data is grouped together and organised in blocks which are then linked to one another and secured using cryptography. Its append-only structure allows for the addition of data to the database; however, altering or deleting previously entered data on earlier blocks is not possible. This makes blockchain highly suitable for applications such as recording events, managing records, processing transactions, tracing assets or chain of custody, as well as voting.

Distributed ledger technologies help to reduce the cost of trust while mitigating our dependence on banks, governments, lawyers, notaries and regulatory compliance officers. US fintech company R3's Corda is an example of a distributed ledger used in the financial system. It empowers businesses to transact directly and in strict privacy using smart contracts, reducing transaction and record-keeping costs and streamlining business operations.

## 4

# INDUSTRY APPLICATIONS OF DLT

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**Besides its obvious usefulness to the banking and financial sector, DLT has applications in a wide range of fields. Use cases include leveraging the technology to increase transparency in nonprofits and charities, verify academic degrees to minimise fraudulence, verify product quality in the retail industry, solve problems relating to royalties in the music industry, and to generate digital identification for migrants and other undocumented people — among others. For example, blockchain-powered marketplace TEND uses the technology to tokenise the ownership of collectables, allowing investors to partially own luxury items instead of the entire item. The pages that follow look at some of the key industry use cases for DLT.**

## BANKING

In the banking and financial sector, distributed ledger technology can be used to build digital wallets and ledgers that serve as a means to store and transfer valuable assets, record details of business processes and sensitive information. It effectively creates secure records of transactions and serves as a time-stamp that cannot be tampered with, fostering transparency. This helps to shorten the verification process with regards to data concerning financial assets while reducing the cost of processing, increasing convenience, and building trust in the marketplace.

DLT is being adopted by the banking sector in the form of a central bank digital currency (CBDC), which is a digitised version of fiat currency, i.e. the central bank issues new money equivalent to — and redeemable for — its domestic currency. More than 40 central banks around the world are currently, or soon will be, researching and experimenting with CBDC, according to a January 2019 report by the Bank for International Settlements (BIS) in Basel, Switzerland. CBDC has attracted the attention of the central banking community due to its potential to address challenges such as financial inclusion, payments efficiency, payment system operations and cyber resilience.

A number of financial services companies are venturing into DLT territory. J.P. Morgan Chase has been researching the use cases of blockchain technology since 2015 through its 'Quorum' division, which is dedicated to researching and implementing blockchain technology applications. In February 2019, the firm introduced the first prototype of its blockchain settlement product: JPM Coin, which is a stablecoin backed 1:1 by its fiat reserves. A stablecoin is a type of cryptocurrency that is designed to maintain a stable value, rather than experiencing significant price changes, as is the case with Bitcoin. Meanwhile, Bank of America has filed patents related to blockchain technology while Goldman Sachs has introduced crypto options and additionally opened a trading desk exclusively for digital trading.



Dutch bank **ABN AMRO** announced in May 2019 that it will launch a digital blockchain platform to get real-time insight into trade inventories, which often serve as collateral for loans. Named Forcefield, the platform uses Internet of Things (IoT) and near-field communication (NFC) chips to communicate with physical trade inventories, allowing for more effective monitoring. In addition to ABN AMRO, companies that have signed a memorandum of understanding to launch Forcefield include Accenture, Anglo American, CMST International, Hartree Partners, ING Bank, Macquarie, Mercuria and OCBC Bank.



In May 2019, Thailand's largest and oldest bank, **Siam Commercial**, announced that it is experimenting with a blockchain app powered by Ripple. Recently, its plan surfaced online after its users shared images of the Ripple-based app for cross-border transactions on Twitter. It's unclear whether the system will make use of Ripple's XRP cryptocurrency.



In May 2019, global funds network **Calastone** announced the launch of Distributed Market Infrastructure (DMI), which uses blockchain to help its clients (some 1,800 companies) to manage transactions for the mutual fund sector. The blockchain-based market infrastructure will allow all participants across the fund's world to work together and view trading activity in real-time. The UK-based company estimates that blockchain can save the industry some £3.4 billion (\$4.3 billion) per year.

## SUPPLY CHAIN MANAGEMENT

In increasingly complex, often international supply chains — involving numerous stages and stakeholders — there is often a lack of transparency and accountability, which can lead to financial losses. Due to DLT's decentralised nature and its efficient and scalable design, involving it in managing the supply chain and logistics industry is expected to significantly improve operational efficiency, transparency and convenience, helping to streamline processes from warehousing to delivery and payments. Use cases in supply chain management vary from industry to industry. In the food industry, for instance, Walmart uses blockchain to trace the pork that it sources from China from source to shelf. Other companies using blockchain for similar purposes include Unilever, Nestlé, Tyson and Dole. In the mining sector, BHP Billiton uses blockchain to track the mining process and share the data with its vendors in order to increase efficiency and build effective communication with partners. Similarly, in the diamond industry, De Beers uses blockchain to track stones from mining to retail, verifying authenticity and avoiding conflict or 'blood diamonds'.

Another DLT application in supply chain management is in cold chains. Cold chains are supply chains that distribute heat-sensitive products such as medicine and dairy in carefully monitored and temperature-controlled environments. As the process requires a delicate balance of different elements, the resulting distribution system is complex. It analyses, controls, measures, documents and validates products to avoid possible spoilage that has the potential to seriously harm consumers — not to mention result in wastage, profit losses and even lawsuits. Blockchain can be used to assign a cryptographically unique identifier to every single product at the start of the cold chain. Used in tandem with internet of things (IoT) technologies such as wireless temperature and humidity sensors, these can be closely and carefully monitored while documenting the storage temperature and other factors throughout the product's journey. IoT technologies used to this end could include devices that measure environmental factors such as temperature and humidity or even advanced packaging technology that automatically creates logs on the blockchain archive which can be checked by stakeholders and even alert them in the case of abnormalities.

The trucking industry is another potential area of application of DLT. Experts estimate that some \$140 billion tied up payment disputes in the transportation industry every day. In January 2018, IBM and Danish shipping giant Maersk announced that they are teaming up to form a new company — Trandelens — to help shippers, ports, customs offices, banks and other stakeholders in global supply chains to replace related paperwork with tamper-resistant digital records to better track contracts and transactions. The duo performed an experiment by tracking a shipping container of flowers from Mombasa, Kenya, to Rotterdam, the major port in the Netherlands. They found that the refrigerated container went through over 30 different organisations and required over 200 separate communications. Any lost form or delayed approval could result in the container being held in port indefinitely or getting lost and the cargo spoiling.



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100 major Japanese manufacturers including **Mitsubishi Electric** and **Yaskawa Elektrik** are set to share production data with each other to improve efficiency, using blockchain. Set to begin in the spring of 2020, the aim is to improve efficiency, minimise data breach risk, and reduce operating costs. The project will be overseen by the Industrial Chain Initiative, a manufacturers' group launched in 2015 to promote the Internet of Things in Japan.



Swiss luxury watchmaker **Vacheron Constantin** announced in June 2019 that it will use blockchain technology and QR codes to authenticate its watches. The company is piloting forgery-proof digital certificates to provide authenticity to its watches so that they can be easily transferred to new owners.



Starbucks is working with Microsoft to use its **Azure Blockchain Service** to track coffee shipments and bring digital, real-time traceability to its supply chains. Starbucks wants to give its customers access to more knowledge about its coffee products, including details like where the coffee was sourced and roasted.

## HEALTHCARE

Blockchain technology can be used in the healthcare industry for tasks ranging from managing patient files to tracking the supply chain of drugs and managing prescription renewals, helping to combat problems like opioid addiction. Data as sensitive and private as individuals' health records is currently being stored in fragmented and inefficient systems, often in paper files and old computers. This makes the information it contains difficult to access when needed and puts it at risk of being lost or corrupted — or stolen. Using DLT's secure, immutable and easily accessible platform could help to solve this problem, helping to reduce the time to track down information across systems and improve the field of healthcare. This could help to bring about transformative changes in research while empowering patients with the ownership of their data and improve the continuity of care, particularly in medically underserved areas and for undocumented people. DLT could give patients increased control over their data and privacy and additionally help them to use it in conjunction with health tracking devices and apps to gain greater insight into their wellbeing and improve preventative care. Additionally, sending, receiving and accessing medical data becomes cheaper when these are maintained through DLT.

The use of DLT could help resolve trust issues through cryptography as different parties involved do not need to trust one another or third parties and can rely on the immutable data stored in the platform. Implementing a robust system that uses DLT could additionally help to minimise the risk of data losses and cyberattacks that frequently plague the healthcare industry. London-based startup MedicalChain has developed a platform that allows patients to control access to their medical records. Another startup, PokitDok, uses 'DokChain' to facilitate data exchange in the medical field, while 'Mediledger' is using DLT to track the medical supply chain in a similar manner to how other companies are tracking food or aeroplane part supply chains.



**Robomed** combines AI and blockchain to offer patients a single point of care. The company deploys chatbots, wearable diagnostic tools and telemedicine sessions to gather patient data and share it with the patient's medical team. Robomed's Panacea platform engages patients in smart contracts that incentivise them and guide them on the path to better health.



**Patientory's** platform enables patients, healthcare providers and clinicians to access, store and transfer important health-related information via blockchain technology, whose end-to-end encryption ensures that patient data is shared safely and efficiently. Patientory helps the healthcare industry to remove pain points from current healthcare environments.



**Blockpharma** offers a solution to drug traceability and counterfeiting. By scanning and verifying products at each node in the supply chain, the company facilitates complete transparency and prevents counterfeit medications. Its app also allows patients to verify their medicines, allowing them to avoid falling victim to the 15% of all medicine worldwide that is counterfeit.

## INFORMATION MANAGEMENT AND SECURITY

As ever more digitally-stored data is being generated, it is increasingly important for governments, companies and individuals to protect this information from access by unauthorised entities that may destroy or misappropriate the data. Data security — and with it, cybersecurity — is a growing concern for a number of industries and a growing industry in itself. Moreover, in an era of ‘deep fakes’, data veracity or authenticity is a key concern. Distributed ledger technology has the potential to vastly improve data security while reducing the number of checkpoints required for validation. As DLT records are immutable and not controlled by a central system, the authenticity of data points is ensured.

In business, data collected from customers contains their sensitive information, which must be protected from attacks by cybercriminals when stored in centralised storage. Using DLT to decentralise it significantly reduces the risk of a breach as hackers no longer have a single point of entry. Another area where DLT could provide added security against hackers is in the field of data exchanges between connected IoT devices such as doorbells, security cameras and the like.



Speaking at the Korea Future Forum 2019 & Blockchain Tech Show, Seoul mayor Park Won-soon, announced that the city will launch a number of blockchain and AI initiatives. One such initiative will be blockchain-based Seoul citizen cards that will provide citizens with easy access to various administrative services. Seoul already uses blockchain in its e-voting system and its used car selling system is also blockchain-based.



The Russian state of Nizhny Novgorod is reportedly testing a blockchain-based application, ‘City N’, for managing public administration tasks. Using the application, residents will be able to file their taxes on the blockchain-based platform, Vostok. It also allows Nizhny Novgorod residents to verify their identity and tax payments and get involved in ‘participatory budgeting’. The project will be overseen by state-owned Russian holding company Rostec, which has proposed a five-year national blockchain strategy that will purportedly generate some \$25.4 billion.



Alibaba is set to utilise blockchain technology to upgrade its intellectual property system across its global enterprises and brands. The system will purportedly allow electronic deposits from international brands to directly link to the Internet Court through the blockchain-based Ali Intellectual Property Protection Platform, providing a basis for litigation rights protection.



In a partnership with the Decentralized Identity Foundation, Microsoft is reportedly using the Bitcoin blockchain in a new project named ‘Identity Overlay Network’ or ION, to enhance online security. The project will use blockchain to create decentralised identifiers (or DIDs) to represent individuals online, giving them greater control over their data and privacy — instead of being at the mercy of tech giants like companies like Microsoft and Google.

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# IMPACT AND OPPORTUNITIES

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**Regardless of what industry you're in, blockchain and distributed ledger technology are bound to feature significantly.**

In the financial sector alone, DLT is set to cause significant disruption by facilitating more seamless, secure and affordable transactions — particularly on an international level. Whether or not you buy into the Bitcoin hype, cryptocurrency is a game-changer for the banking and finance industry and we can expect to see many more iterations in the future, with the possibility of ultimately arriving at a global digital currency.

Due to its capacity to be used to create smart contracts, DLT will likely see much adoption for the purposes of automation of systems and processes that involve multiple stakeholders. DLT is also poised to completely transform the way we track information and secure important records. Moreover, its use as a tool for promoting transparency and supply chain integrity is still in its infancy and is certain to have a profound impact on a number of industries.

These are just a few of the trends and opportunities emerging in the nascent distributed ledger industry. To find out more about how this industry is transforming and how your company can take advantage of these shifts, contact Lacuna Innovation. Our innovation experts can help you to identify unmet consumer needs and opportunities and help you map a path to implementation.

## ABOUT LACUNA

Lacuna Innovation is a boutique consultancy that helps global organisations to sustainably innovate new products, services and business models by combining trend, insight and commercial expertise in one place. We identify new growth opportunities, immerse ourselves in markets and build in-house innovation capabilities to achieve lasting impact.

Harnessing an environment of tangible tech and creative collaborations, we can help you bring identified opportunities and concepts to life through experimentation and prototyping. With offices in Cape Town, Germany and Nepal, we have global recognition, credibility and reach, which allows us to be at the forefront of Front-End Innovation (FEI).

We are innovation architects in the business of building tangible and sustainable futures. We work with companies to facilitate their innovation efforts, using our proprietary innovation methodology.

We are not a branding or advertising agency. We seek opportunities for our clients to ensure that they remain competitively innovative. We identify and monitor trends that impact our clients' businesses, and assist them in identifying innovation opportunities to be pursued through focused research, a series of workshops, and a unique understanding of the unmet needs of consumers. Our proactive approach to FEI allows us to move beyond concept development to developing Proof-of-Concept design, prototyping and ultimately, commercialisation.

**To find out how we can help you, reach us at [hello@the-lacuna.com](mailto:hello@the-lacuna.com)**

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