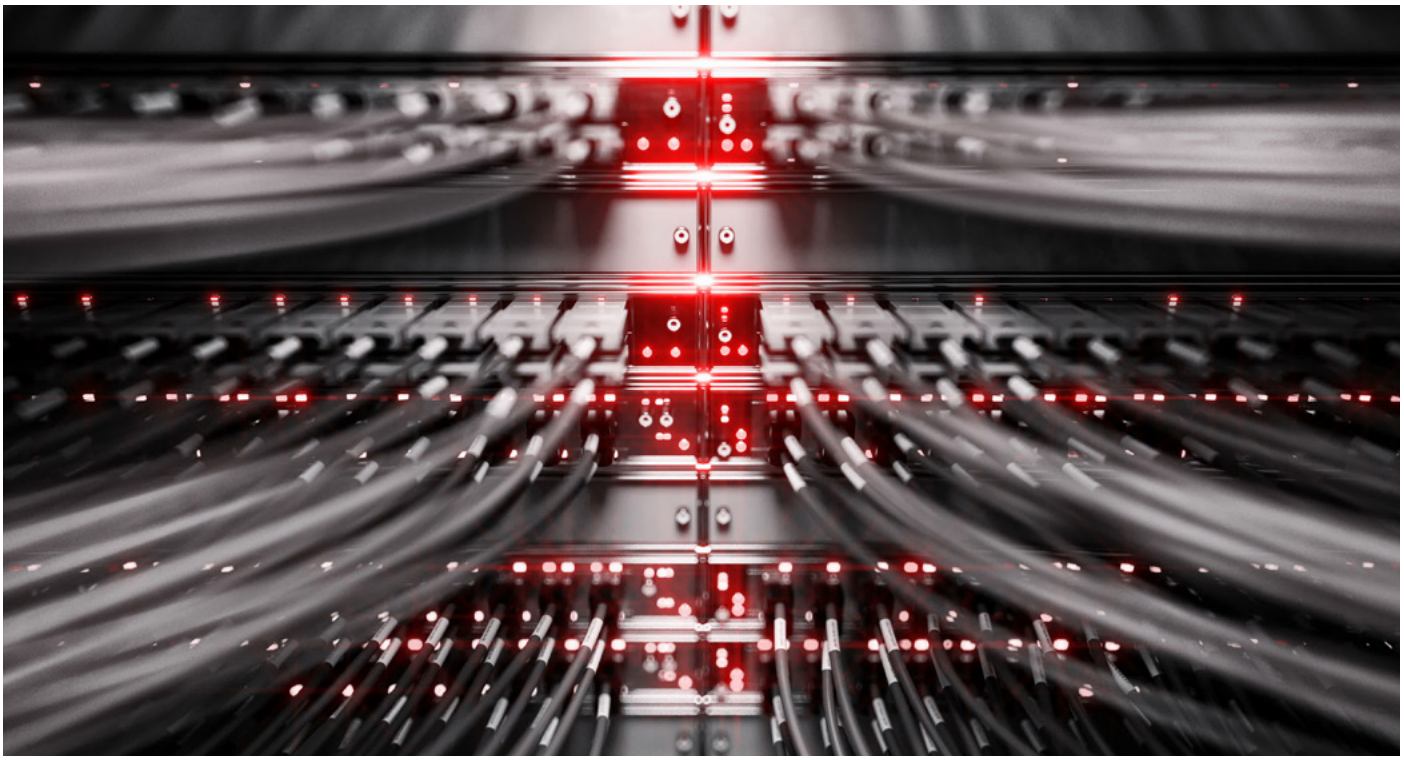
# Blockchain

Blockchain represents one of the most significant opportunities for business to disrupt and innovate since the birth of the internet. This White Paper provides an overview of this complex and evolving technology outlining the opportunities for business leaders.

## What is blockchain?

In simple terms, a blockchain is a database. However, it is a database which is not owned by any central organisation but distributed on many computers across the world; constantly synchronised, updating all parties concerned; and protected from hackers by cryptography. Four elements: a public database, distributed control, synchronisation and cryptographic protection - make blockchains an exceptionally powerful technology with the disruptive potential to fundamentally change our economies and lives.

More often referred to as a distributed ledger, the best-known example of the blockchain in practice is financial through the exchange of online currencies like bitcoin. Traditionally, money exchanges would happen through centralised financial institutions, i.e. banks. Even online payment systems such as PayPal generally involve a bank account. Blockchain is very different, as the technology eliminates the need for the bank by removing the middleman.



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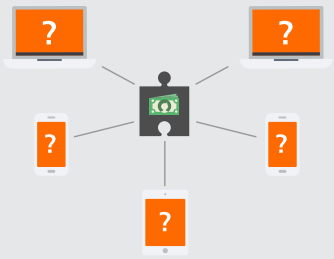
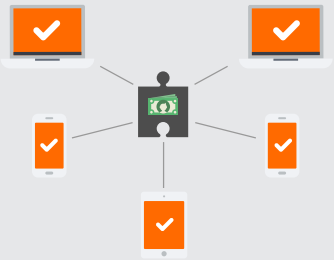
# How does it work


1 Person A wants to send money to Person B.

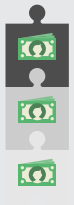
2 Their transaction is represented in an online database as a ‘block’.



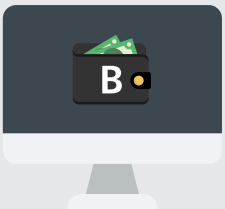

3 The block is broadcast to every party in the network. Each party in the network (which could be thousands) can view and approve the validity of the transaction using a unique cryptographic key.



4 Those in the network approve the transaction as valid.



5 Once the transaction has been verified, the block can then be added to a chain where each block contains information about the previous block, creating a transparent but highly secure record of transactions.




6 The money then moves from Person A to Person B, without the need for a bank to verify identities or record the details of who gave how much to whom. All that information has been checked and recorded in the blockchain and cannot be altered.

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## Beyond bitcoin

The technology has huge implications for financial services. Replacing just a fraction of the global financial services industry with blockchain will result in major disruption and massive increases in efficiencies. However, blockchain is not just about bitcoins and financial transactions. It can be used to securely store, exchange, verify and record any kind of digital information. This is why the potential for the technology is so revolutionary – and why commentators are putting the development of blockchain on a par with the development of the internet.

The non-financial applications for blockchain are enormous and increasing by the day. Some of the more eye-catching uses currently being developed are summarised below.

| APPLICATION | OVERVIEW | COMPANIES INVOLVED |
|---|---|---|
| Ride-sharing | Value system which enables people with private cars to share their journey with others traveling in the same direction | La'Zooz |
| Internet of Things | Platform to link the home network and electrical devices to the cloud | Filament, Chimaera-inc |
| Patient Medical Records | Decentralised patient records management | BitHealth |
| Election voting | Secure and transparent online voting solution | Follow my vote |

## Smart contracts

The development of smart contracts is another example of blockchain evolving within the financial sector and beyond – an area which is of particular interest to the corporate world. Smart contracts are based on computer code that takes the place of agreements between parties where the terms can be pre-programmed; so they can be self-executing and self-enforcing when certain conditions are met.

This means that two parties, who may have never worked together before, can confidently do business with each other, usually over the internet, without the need for a middleman. Traditionally this would replace the need for formal legal contracts, which can be ambiguous and time consuming to manage – although the future is likely to consist of a smart contract, backed up by traditional paper contracts, at least in the short term.

> A smart contract could be used in the music industry where the issue of rights ownership, residual payments and the split of royalties (when music is used) can be complex to administer. A blockchain smart contract would ensure the rights could be securely accessible to all with the transfer of royalties happening in real time and being attributed in agreed proportions to song-writers, performers and record labels avoiding any inconsistencies.

## Business investment

With any new technology, there is always a huge demand for the right skills and blockchain is no exception. Large tech firms like IBM, Microsoft and Intel have led the way and we are now seeing major banks (Barclays has been particularly active) following suit. Other private sector firms such as Visa and Thomson Reuters have heavily invested in the technology and other professional services firms have created blockchain teams to advise their clients while acquiring expertise, including Deloitte's acquisition of blockchain start-up, Rubix. These smaller firms are providing the foundations for the developing technology and are being watched closely by larger acquisitive businesses.

Meanwhile, in the public sector, a report published last year by Sir Mark Walport, highlighted the potential for blockchain to be used by the UK Government with a number of applications, such as tracking student loan payments.

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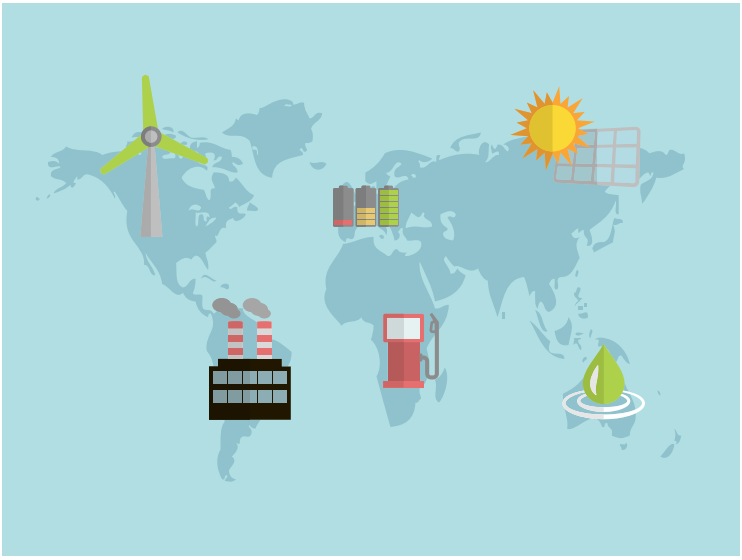
# Three Blockchain sectors to watch

## Banking and finance

With the evolution of digital currencies threatening to disrupt mainstream banking, the industry is investing heavily in other areas where blockchain can revolutionise banking and finance. Easing the burden of regulation is a good example, particularly surrounding anti-money laundering compliance measures which are a significant cost to banks and also delay transactions. Research from Deloitte suggests that 'Know Your Customer' requests, the system used by banks to prevent money laundering, could be automated by using blockchain. This would significantly reduce costly compliance errors and provide an historical record of all documents shared for each client. It would enable banks and regulators to easily identify anyone attempting to create fraudulent histories and prevent criminal activity.

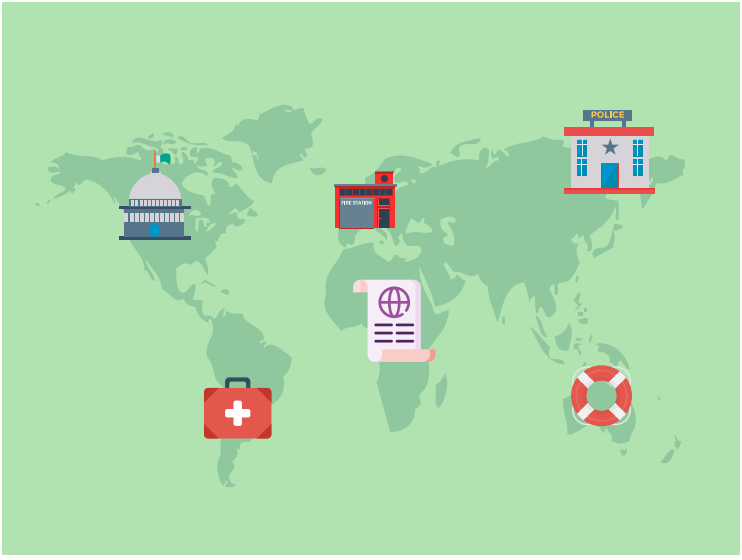
## Energy

In May 2017, energy companies from across the world agreed to set up the Energy Web Foundation with US$2.5 million of funding to develop blockchain technology in the energy sector. Behind this is the realisation that blockchain has the potential to turn traditional energy generation on its head by decentralising the market and empowering the multitude of mirco-power generators, such as solar and wind farms, that traditionally operate on the edge of the power grid. The use of smart contracts and blockchain's abilty to efficiently automate processes could be game-changing for the energy market by allowing peer-to-peer energy trading between millions of energy devices (HVAC systems, water heaters, electric vehicles, batteries, solar PV installations, and so on). For example, an office building, could monitor thousands of electric devices and then interact with the grid via blockchain and smart contracts to engage in energy supply and demand transactions.



## Public sector

The public sector, renowned for its complexity and often criticised for fragmentation and inefficiencies, is an obvious beneficiary of blockchain technology. In an era of austerity, blockchain's potential to streamline government processes, give citizens the rights to their own data and save organisations' time and money is significant. For example, the technology could facilitate voting in elections or serve as the official registry for government assets or privately-owned property. However, according to Cap Gemini, shifting such a large amount of important public data to the blockchain will be no easy feat. Such technological transformations are accompanied by cultural shifts with change management policies needed for all public sector staff operating on the blockchain. This in itself creates significant opportunities for those supplying services to local and national government



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## Demand for expertise

The intense focus, excitement and enthusiasm for the development of blockchain from these sectors and many others has created a huge demand for individuals who can develop and implement blockchain applications: so-called 'blockchain engineers'. The Financial Times describes the market for these blockchain engineers has 'red hot' with demand to create pilot projects and launch products coming from a wide variety of sectors and far outstripping supply.

Primarily, demand is being driven by big corporate and public sector bodies. Previously these large organisations had taken a cautious approach, fearing exposure to fraud, but the potential benefits of the technology to improve efficiencies have become too great for corporates to ignore any longer. Forward thinking organisations should start to recognise the prospective advantages that can be achieved from being an early adopter of blockchain technology, Procorre has the expertise to advise and educate organisations on this exciting subject matter.

## Blockchain engineers

The demand for blockchain expertise comes in all shapes and sizes, from those who are experienced in running distributed ledgers systems, to those who specialise in networking or security as well as user experience experts. Typically, there is a requirement for software engineers who are able to code in a variety of languages, with Java and C++ often pre-requisites. Also those with cryptographic experience are particularly highly sought after. The best and most experienced blockchain engineers regularly command six-figure salaries, at the top end of the remuneration available to consultants working in other 'hot' technology areas such as cloud and artificial intelligence.

Demand has also led to the development of blockchain university courses. US institutions have been running blockchain qualifications for a number of years, with large European universities now beginning to follow their lead.

## What's next for blockchain?

The future for blockchain is changing quickly as new applications and opportunities emerge. However, as we start to understand the technology's potential, it is becoming clearer and more certain that blockchain will make fundamental changes to the way we do business, the way we work and even the way we live.

Early adopters driving blockchain are predominantly organisations in banking and financial services, however more and more companies are joining them with new initiatives and implementation within the energy sector, retail, supply-chain, construction and public/private sectors; to launch exciting and ground breaking new pilots and use cases.

We are working with companies and blockchain engineers around the world to support projects which are contributing to this development and helping organisations make significant efficiencies and disrupt markets. For more information visit www.procorre.com

### About Procorre

Procorre is a global professional services consultancy, which successfully manages the whole life cycle of projects, across a range of industries.

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