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Blockchain: a driver of technological innovation

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Popularised by digital assets and sometimes compared to the emergence of the Internet, blockchain technology may be poised to revolutionise many business sectors. Charles-Edouard Bilbault discusses its key principles and concrete applications.

How does blockchain technology work?

Blockchain technology can be compared to a ledger shared between all its users, allowing them to determine ownership and execute transactions without passing through a trusted intermediary. This database is based on three key principles: it is distributed, decentralised and immutable. Distributed, since operators are grouped together in a network within which each member has a copy of the whole ledger, ensuring data security and transparency. Decentralised, since no central entity needs to certify the accuracy and authenticity of data added to the ledger. And immutable, since any new data, once validated by the consensus, is instantaneously added to the ledger of each operator and cannot be modified or removed.

When was this technology developed?

This technology is based on the theory of asymmetric cryptography, which provides solutions for encoding and decrypting data using a private key. This concept dates back to the 1970s and constitutes the first branch underpinning initial scientific research efforts on the blockchain from the 1990s onwards. However, the widespread adoption of this technology only began in 2008 with the publication of the white paper entitled “Bitcoin: A Peer-to-Peer Electronic Cash System” and the ensuing craze for digital assets.

Do several blockchains exist?

While a few blockchains particularly stand out for their popularity and multiple applications, such as the Ethereum or Solana networks, a blockchain exists for almost every usage case. This is one of the specific characteristics of this technology and, as such, differentiates it from the Internet, as it is not based on a single infrastructure. Some blockchains will be more secure but operate more slowly, while others will prioritise speed of execution or storage capacity. The possibilities depend on their design. Likewise, different consensus algorithms exist, and not all blockchain technologies are dependent on a mining process(1). This solution was used for Bitcoin, since it was one of the few consensus techniques known at the time for operating a decentralised model. The calculation effort was designed to ensure the security of the network.

(1) Mining is the process by which transactions are confirmed and registered on a distributed ledger.

How is this technology revolutionary?

Just as the Internet has revolutionised information sharing, the blockchain has the potential to revolutionise value exchanges and transfers of ownership while ensuring secure transactions. This technology is set to become the backbone of the next generation of digital infrastructures, since it opens up the possibility of simplifying complex value chains and can be used to optimise processes and cut costs. It underpins the development of fundamental technological trends, such as tokenisation, which consists in merging physical assets with proof of digital ownership. The advent of "Web 3.0", a decentralised version of the Internet designed to allow users to replace big technology groups and to regain control of their digital identity, is also expected to involve the application of this technology. Companies and institutions alike have begun in recent years to understand the interest of the blockchain and are developing solutions for their own usage or for their clients.

What are its concrete applications?

Businesses in many sectors, such as manufacturing, healthcare, agrifood or commodities, are investing in blockchain-based tools to improve their operating efficiency and ensure the traceability of their products, resources or carbon emissions. Supply chains also use them for monitoring their logistics, optimising their carbon footprint or supplying real-time audit trails. In the finance sector, the blockchain is revolutionising money transfers and asset exchanges thanks to tokenisation and is opening up considerable opportunities for fintechs. Insurers have been using them for almost the past decade through so-called "smart contracts", whose execution is automated when pre-defined clauses apply. On the institutional front, central banks have already begun implementing currency substitution strategies dubbed CBDC[2]. These digital currencies make it possible to lower brokerage fees, ensure better traceability of capital flows, develop financial inclusion or stimulate the economy in a targeted manner. More generally, blockchain technology can be a solution for all issues relating to flow management or the management or physical or intellectual property.

Are companies set to develop their own blockchains?

Some companies have indeed developed their own blockchain. IBM, for example, has used the Hyperledger open source model[3] to work with some of its clients. This is a private blockchain in which members of the network and operators that validate blocks, nodes or transactions are selected. An internal company network can also fully function using blockchain technology. The GAFAM[4] have invested at various levels of the value chain, from Cloud structuring activities to data storage, digital assets or payment systems.

The Nike group has acquired a French NFT[5] company called RTFKT to roll out some of the brand's products in a metaverse[6]. This marketing strategy demonstrates the company's capacity to innovate and capture new clients. It is easy to imagine that within a few years customers who buy a product will be able to acquire an NFT that has the advantage of not degrading over time. The company's business model may evolve since NFT generally generate royalties. Each time they are resold, it could receive a share of these royalties.

What opportunities does this technology open up?

In the future, the blockchain ecosystem may foster the emergence of a new generation of companies that reshape the value creation models and service offer of many sectors. Investors are starting to identify market opportunities in this area, but it is still not easy to assess its impact or potential to disrupt the established order. The blockchain is simply a conduit for innovation. The number of companies seeking new applications for it is expected to grow over the coming years, while the technology itself will continue to be developed.

(2) Central Bank Digital Currency.
(3) Software whose source code, and hence scope for development, is free to access.
(4) Google, Apple, Facebook, Amazon, Microsoft.
(5) Non Fungible Token.
(6) Permanent virtual world.

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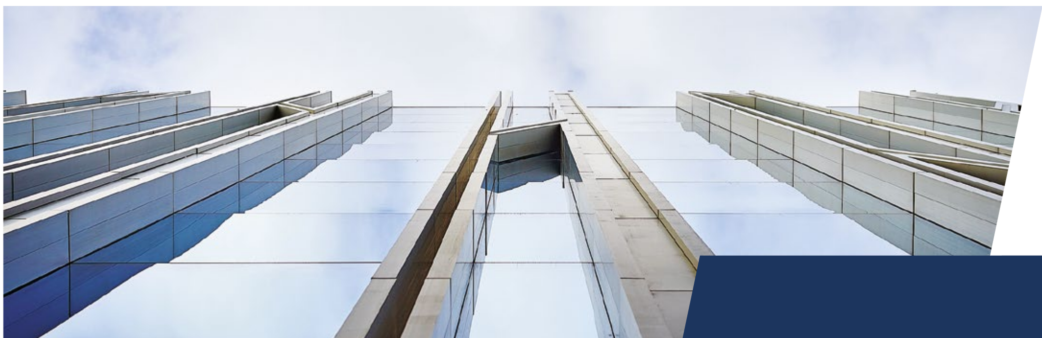

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