

Blockchain: A Digital Solution for Modern Democracies?

by Jesse Colzani

Over ten years ago, an anonymous programmer known by the pseudonym Satoshi Nakamoto created Bitcoin – the very first cryptocurrency.

As a response to the 2008 financial crisis, Nakamoto also published a highly technical whitepaper outlining his promise for an alternative financial system that could empower individuals by developing a fair and transparent currency that no government or bank could control.

Bitcoin is based on a technology – “robust in its unstructured simplicity”¹ – that was later called blockchain. Blockchain is a decentralised peer-to-peer network that relies on cryptography to verify transactions and track them on a chronological ledger.

Many argue that blockchain will touch upon, if not entirely disrupt, every major

¹ Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, March 2009, p. 8, <https://bitcoin.org/en/bitcoin-paper>.

industry, altering the way people and societies interact.² The World Economic Forum estimates blockchain’s value at 3 trillion US dollars by 2030, also forecasting that 10 per cent of global gross domestic product will be stored using blockchain technology by 2025.³

After the initial enthusiasm, many realised that there has been a lot of hype around cryptocurrencies and blockchain, which also present a number of challenges and potentially negative applications. For instance, the Internet experience taught us that non-regulated distributed networks can easily be overtaken by centralised

² Doug Galen et al., *Blockchain for Social Impact. Moving Beyond the Hype*, Stanford, Stanford Graduate School of Business Center for Social Innovation and RippleWorks, 11 April 2018, <https://www.gsb.stanford.edu/node/459996>.

³ World Economic Forum (WEF), PwC and Stanford Woods Institute for the Environment, “Building Block(chain)s for a Better Planet”, in *WEF Reports*, September 2018, p. 11 and 8, <https://www.weforum.org/reports/building-block-chain-for-a-better-planet>.

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market forces. Blockchain's intrinsic incompatibility with data protection regulations – such as the EU's GDPR – or its potential misuse by authoritarian governments or criminal networks are further concerns that cannot be ignored when approaching this issue.⁴

To better comprehend blockchain's potential it may be useful to briefly compare it to the Internet.

The Internet has transformed not only the speed but also the means in which information is shared. Yet, it cannot ensure secure and independent transactions, since it only involves sharing copies of a file. Meanwhile, valuable assets – such as money or patents – are required to be in their original form to be securely exchanged.

This is why there is so much reliance on third parties – such as email providers or banks – to verify transactions on the Internet. In addition, much of this data is stored in an inefficient and centralised way, making it vulnerable to cyber-attacks or unethical use by third parties. It is in this domain that blockchain promises to be a revolutionary technology.

In the same way the Internet facilitates direct exchanges of information,

blockchain can facilitate the direct exchange of value between parties. Blockchain is transparent, neutral, non-hierarchical, accessible, non-manipulative and, therefore, a highly secure technology.

Blockchain is nothing more than a database. As any other ledger, its only function is to store information. However, differently from other databases, it presents the following three features that make it special.

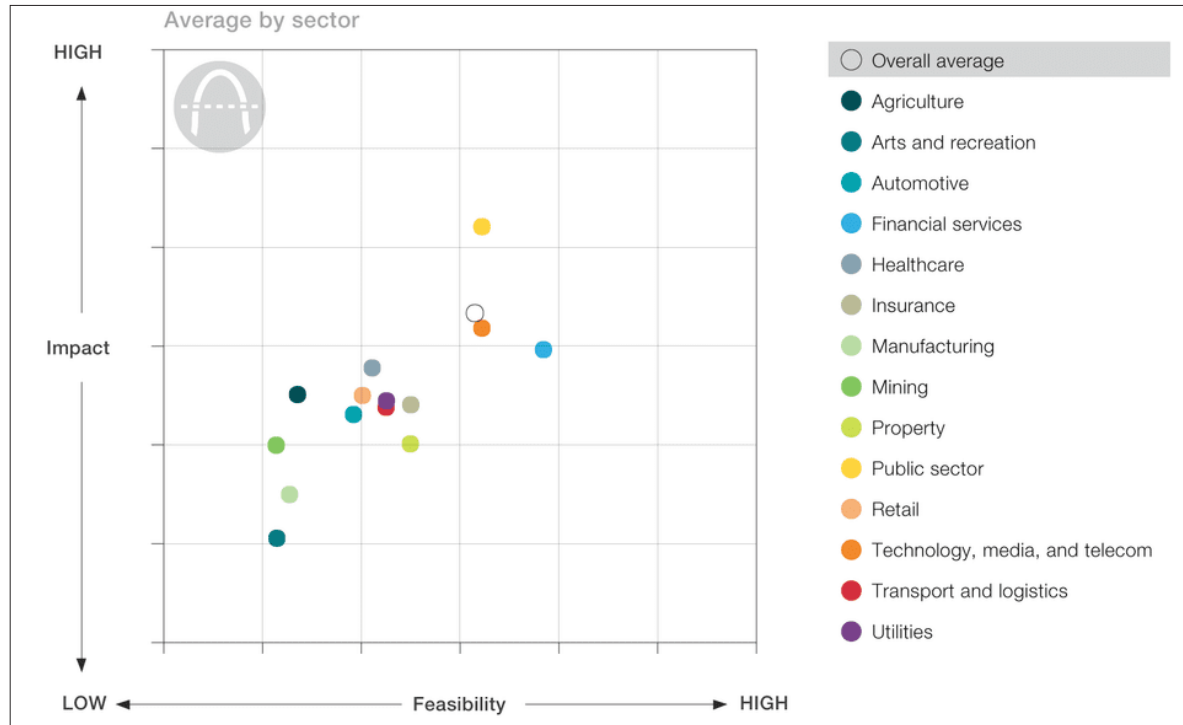
Firstly, it is decentralised. Information is shared within a network of computers and therefore owned by the users, not by a centralised authority. Secondly, it is immutable. Since data is stored through cryptography in a sequence of blocks linked to each other – in a (block)chain –, it is almost impossible to retroactively modify information contained in this sequence.

Finally, it is secure, since a combination of the above features makes blockchain incredibly difficult to hack or attack from a cybersecurity perspective.

Taken together, these features could empower individuals, strengthening the social contract while reducing popular mistrust in decision makers. Since the economic crisis and the rise of social media, there has been a growing demand for transparency and participation in the democratic process. Yet, bureaucratic inefficiency prevents governments from achieving transparency, while civic participation is shifting to new globalised and digital spheres.

⁴ For a more in-depth analysis of blockchain's potential challenges, see "Limitations", in Melanie Swan, *Blockchain. Blueprint for a New Economy*, Sebastopol, O'Reilly, 2015, p. 81-90; and "Challenges and Interoperability", in Garrick Hileman and Michel Rauchs, *Global Blockchain Benchmarking Study*, Cambridge, Cambridge Centre for Alternative Finance, 2017, p. 67-77, <https://www.ey.com/gl/en/industries/financial-services/fso-insights-global-blockchain-benchmarking-study-2017>.

Figure 1 | Blockchain opportunities by industrial sector



Source: Brant Carson et al. "Blockchain Beyond the Hype: What Is the Strategic Business Value?", in *McKinsey Articles*, June 2018, <http://bit.ly/2JZyqyx>.

Moving to the applicability of blockchain, a first important dimension is that it can ensure traceability. By providing a means to easily track any type of transaction, blockchain has the potential to empower citizens and consumers. For instance, blockchain could be used to design an automated system where citizens would be able to trace where their taxes are being spent and what public services they are contributing to.

One could also envisage a system where products are labelled with reliable and easily accessible information regarding country of origin, employment conditions, environmental impact and production standards. Blockchain could also allow individuals to track

money they donated to charities or help citizens prove ownership rights. A further important application of blockchain relates to the digitalisation of the public sector. Through blockchain, this effort can be implemented more efficiently and with a higher level of security. Here, concrete applications could involve domains such as digital identity, privacy protection, cybersecurity and e-voting.

A blockchain-based digital identity could eliminate most of the identification procedures for governments, while drastically reducing the amount of administrative procedures for individuals. Estonia was the first country to implement a blockchain-based system in this sense, and similar

regional and national applications can be foreseen during the next decade.

Since the Russian 2007 cyber-attacks on Estonia, the country has emerged as a leading laboratory for new technologies and e-government experimentation.⁵ In the years that followed, the former Soviet republic has digitised its entire health, judicial, legislative, security and commercial code systems using blockchain technology. The efficiency and security of the Estonian model has inspired NATO, the US Department of Defence and the EU.⁶

Blockchain can also improve efficiency and security for electoral purposes. In March 2018, it was used during the national election in Sierra Leone, providing a method of transmitting electronic results that could not be hacked.⁷

In June 2018, West Virginia became the first state in the US to deploy a mobile voting application, allowing about 144 international voters to record their ballots anonymously through blockchain.⁸ The same is expected to happen with 4,000 voters during the May 2019 elections in the city of Denver, Colorado.⁹

⁵ "A Cyber-Riot", in *The Economist*, Vol. 383, No. 8528 (12 May 2007), p. 42, <https://www.economist.com/node/9163598>.

⁶ See e-estonia website: *Success Stories*, <https://e-estonia.com>.

⁷ Daniel Finnan, "Sierra Leone Tests Blockchain Technology for Tallying Election Results", in *RFI*, 15 March 2018, <http://rfi.my/2OEM.T>.

⁸ See West Virginia Secretary of State, *Warner Releases Unofficial Results for General Election*, 6 November 2018, <https://sos.wv.gov/news/Pages/11-6-2018-A.aspx>.

⁹ Andrew Kenney, "Denver Will Allow

Blockchain's greatest impact on society will probably be in terms of disintermediation. Being a decentralised and immutable ledger, blockchain technology allows users to register transactions without a third party having to verify them, saving time and money in the process. Since transactions that require the authentication of a trusted party – be it a notary, a bank, a lawyer, an electoral authority, a public officer or an international court – can be registered in blockchain independently, this will have huge impact on the tertiary sector of economies.

Financial institutions will be negatively impacted, losing out on lucrative commissions and oversight powers, but other sectors, such as the legal and real estate ones, can also expect significant changes.

In this respect, blockchain facilitates the introduction of alternative economic, social and political models, based on the principles of a shared economy and cooperative systems. While transformative, blockchain is not a disruptive technology and will actually not undermine or replace existing models in the short-term.

Rather, it is a foundational technology, since it can potentially help resolve a number of problems in different domains, creating new foundations for our current social, political and economic systems.¹⁰

Smartphone Voting for Thousands of People (But Probably Not You)", in *The Denver Post*, 7 March 2019, <https://dpo.st/2JOFTBA>.

¹⁰ Marco Iansiti and Karim R. Lakhani, "The Truth About Blockchain", in *Harvard Business*

Useful applications of foundational technologies require time to emerge, and it will take decades for blockchain to adapt to existing societal structures while integrating those that are still being developed – artificial intelligence or the Internet of Things, for example.

In this regard, it is important to keep in mind that blockchain is simply a tool. Like gunpowder, social media or nuclear power, its use and applicability is dependent on human variables. Without proper risk analyses and efforts to develop shared regulatory frameworks, this technology could easily backfire and be used for antidemocratic purposes.

To mitigate these risks, governments, citizens and economic actors should fully comprehend the applicability and transformative potentials of this technology, including its potentially negative applications. Achieving digital literacy will be crucial. Citizens should be educated and included in the discussions, not simply be introduced – or forced – onto a new system they do not understand.

If managed properly, blockchain can have a huge impact on the relationship between governments and citizens, saving tremendous amounts of resources, reducing mistrust in politicians and offering new avenues for citizen participation. In this respect, blockchain can indeed strengthen democracy, transparency and accountability, introducing new modes of societal interaction and governance.

It will not, however, substitute politics or power relations and will continue to be subject to human use (and abuse), making blockchain a potentially transformative technology, but one that may also be a harbinger of future risks and challenges.

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