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Blockchain policy inertia: Where's the disruption?

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Blockchain has been framed as a technology that could alter the shape of the world dramatically in the coming decades, influencing how we act and govern ourselves as a society, as the decentralised nature of Blockchain means that these networks wouldn't be controlled by one person, group, corporation or government. Reuters [1] expects blockchain to be disruptive, to move from simple applications to displacing central market competitors, in many areas such as healthcare, tax and accounting, politics and entertainment. In healthcare for example, the nature of blockchain means it can be used in patient records, to increase consistency, remove duplication and aid in sharing information between relevant authorities.

However, the relationship between technology and governance is reciprocal, as technology may enable new forms of governance, but it is also defined and constrained by the regulation and actions of governments. In this article, the dynamic between the two will be explored to explain the lack of policy or uptake of Blockchain into government services, even though it is hailed as such a potentially significant advancement. The very interplay between policy and technology in this instance is because of the keen social and political implications Blockchain could have, meaning that the two areas have reached a stalemate, slowing the uptake and the current potential of the technology.

What is Blockchain?

Blockchain, also known as distributed ledger technology (DLT), is a decentralised networked database and way of recording transactions between the members of the network [2].

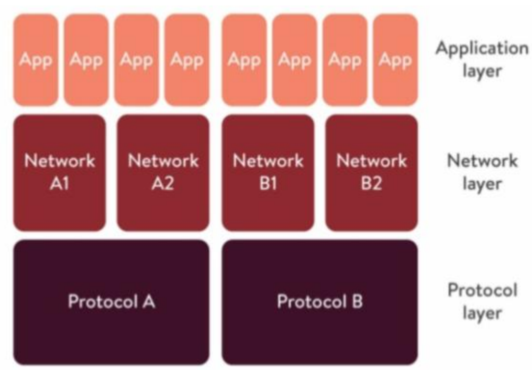

Figure 1. Source: [3] This shows the three layers of DLT, and the protocol layer is the significant base on which future layers are built. Each protocol layer sets out the expected behavior in the subsequent networks built on it.

There are three layers of DLT: the protocol layer, the network layer and the application layer [3]. The protocol comprises the main building blocks of the network, and developers of this layer are likely to influence further layers in the stack, as they are the foundation on which subsequent layers are built. The protocol layer differs from traditional internet protocol layers, such as HTTP/HTTPS. Traditional internet protocol layers allow computers to communicate effectively, but require a large amount of descriptive addition by applications such as Google or Facebook to enable the user to interact with the data. This setup means that centralised corporations own the data and require sensitive information, such as bank details, to be entered each time a purchase is made.

DLT uses cryptographically secure protocols to govern the rules, operations and communication on the networks, however, these protocols are much more specific and descriptive of the niche networks that can operate on them. For example, Etherium is an open-source protocol used in smart contracts [4], while R3's Corda is specialised for use to record financial agreements between regulated financial institutions. Other significant protocols include the Hyperledger, Bitcoin and Ripple Consensus network [5, 6, 7].

The network layer is made up of a custom blockchain network, or multiple networks, for users, built on existing protocols and governed by the network operator. Examples of these networks include the IMB Blockchain Platform [2, 5] (built using Hyperledger Fabric) and Mosaic [6]. The application layer comprises of all the custom applications built on the network. These applications can be built and run by the network operator or by third parties. Examples of DLT apps include cryptocurrencies and online contracts. One benefit of DLT at the application stage is that, as the server is shared between all network participants, and built on this, anyone can create applications which share data, but if compromised do not affect others in the network. Traditional server architectures require every application to run on a separate server and code, which run in isolated streams. This not only makes sharing data difficult, but when a single application is compromised, this affects many other applications.

How does it work?

Blockchains organise the data into immutable blocks, or records of transactions, uniquely referenced to the block that came before it. The use of chronological sequences makes issues such as data changing or tampering near impossible as changes to block information have to be agreed upon by members of the network. How transactional information joins the chain is highlighted by the example below based on cryptocurrency.

Why does it matter?

Blockchain, in theory, removes trust issues during transactions and offers a way to accurately keep records free from unauthorised alteration or misinformation. The most common and well-known use of Blockchain is in cryptocurrency, following the whitepaper proposal of Bitcoin in 2008. The financial industry, including central banks, has the most interest in DLT technology, with the majority of start-ups using the DLT being based in this sector [3].

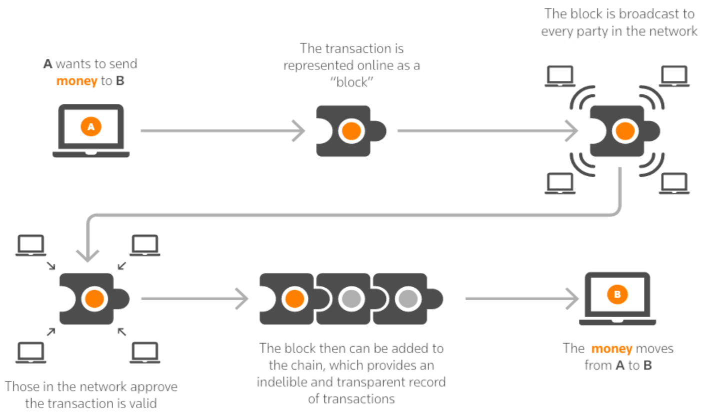

Figure 2. Source: [1] Using money as the example, this shows the steps required to add information to a blockchain. The decentralised authority is highlighted as the network highlights the vailidity of the transaction. Once verified, the information joins the sequence and is near impossible to tamper with.

This industry has substantial process inefficiencies and a massive cost base issue. Legacy financial systems often have large premiums for transactions, as well as a complicated and poorly integrated matrix of operational infrastructure.

Additionally, the financial crisis highlighted the accountancy errors and difficulty in tracing the correct present owner of an asset, especially over a substantial chain of buyers within global financial transaction services. For example, when the US investment bank Bear Stearns was acquired by JP Morgan Chase in 2008, the number of shares offered was far larger than the shares recorded in the books of Bear Stearns. It was not possible to clarify the accounting errors and JP Morgan Chase had to bear the damage from excess (digital) shares [8]. This would be resolved using DLT, as each asset is verified and cannot be duplicated or altered.

Government and public sector services could benefit from DLT as its adoption could increase transparency and accountability, and allow e-governance and voting, increasing public participation. The Global Blockchain Benchmarking study found that 63% of Central Banks, as well as 69% of other public sector institutions, have been investigating the use of Blockchain in their operations [3]. Additionally, the use of DLT can be applied to physical assets or supply chain management, such as in internationally sold produce, which could be traced through all stages of transaction and the final customers identified, should a product be deemed defective or dangerous. With the potential advantages of use evident in almost all sectors, the question is posed as to why there has there been very little or slow uptake of DLT technology?

Policy inertia:

It has been 10 years since the whitepaper proposal for Bitcoin, which offered a new use of cryptographic techniques and consensus mechanisms as a new way of running a cryptocurrency. From this, DLT more generally has been recognized as a disruptive technology which has application potential in all sectors. However, the lack of significant disruption and movement in DLT use and in policy to regulate the technology is notable. The benefits and risks of using DLT are tied to the technological design, governance and regulation applied to it. Blockchain, essentially, is the "protocolisation" of computer software, providing much greater structure and rules to interactions between network nodes than the typical IP protocols. This makes the protocol layer, and setting standards therein, especially important as the first point in establishing internationally accepted standards for creating and regulating DLT technology, which would have comparative and political advantage. However, the risk of taking the first move is also amplified. This dynamic has created a standoff, in effect, between the regulators and developers. Without the oppositional force in place to indicate possibilities, both regulators and developers of the technology face potentially significant losses if the wrong protocol choice is made.

The advantages of implementation in, for example healthcare, even in supply chain management of medicines, could be significant. Through the nature of the technology, and the entering of each asset into the chain, would mean that if a single batch of a medicine is found to be contaminated, or out of date, then the individual boxes could be traced to the patients that have been supplied with them. Rather than a recall of all the medicine made on a day or dispensed from a pharmacy. The efficiency and specificity of DLT means much greater clarity in the supply chain. However, the system created would also need the right permissions for parties able to see the data, verification of data security as healthcare records are especially sensitive. Furthermore, for this to be efficient it would also need to be to scale, system wide, so the risk of implementing something

For regulators and policy initiatives, the decentralized nature of DLT means that the locus of power has been challenged. The data we share with companies could be controlled individually, rather than by a central entity such as Google, Facebook or governments. Additionally, cryptocurrencies, which are ungoverned and decentralised, have the latent possibility to undermine state-backed currency such as the US Dollar or Pound Sterling. Conversely, the use of DLT in government services could increase participation, reduce inefficiency, ensure security, as well as offer the potential for a government-backed cryptocurrency. As an example, the Estonian government is currently using DLT to support public services, such as documenting health records and is one the leading digital societies [9]. Whilst cryptographic technology is foundational for this project, it hasn't yet set the standard or expectation of DLT use. There is still opportunity for developers and states to be part of the dominant protocol movement. This will determine the difference between founding the next Facebook or, conversely Bebo (a social networking site that has lost all popularity).

Moving forward with Policy

The UK Government office for Science released a whitepaper on DLT [10] that suggested that effective regulation is key for implementation, but it is difficult to understand one without the other. Incremental development, therefore, is what has been seen surrounding DLT on both sides of the coin.

DLT may be disruptive, and change the way we in which we do business, governance and international transactions, however, the complexity of setting international standards and protocols that are innately linked with this technology has proven DLT to be different to other revolutionary technological advancements [11]. Rigorous regulation may still not be established within the next five, even ten, years and a likely scenario is that the emergence of this regulation will be such that Blockchain evolves by international agreement as trade develops, but that the pioneers of the protocols, and the authorities that govern them, have yet to be established. Estonia have made a strong start in using DLT for government services, working within the European Union and other international agreements. It is yet to be seen however, how this development will impact on state authority and the way in which international systems operate.

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About the Author

Aisha is an MPhil student in International Relations and Politics at the University of Cambridge. Her research focuses on the interaction of technological development and politics. Her MPhil dissertation is looking at the relationship between cyberspace and US power. She will be beginning a PhD focusing on smart city technology in Singapore and the reciprocal relationship this new mode of living has with inequality in October. In identifying the aspects of smart cities that interact negatively with inequality, she hopes to work towards inclusive use of technology.