POLICY BRIEF #55

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How can blockchain impact public values?

A playing-field-analysis

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Contracts, transactions, and the records of them are among the defining structures in our government and public sector. Yet these critical tools and the bureaucracies managed by public institutions operate still much the same way as decades ago. At the same time, governments face challenges in the digital age and must find new ways in how to create trust in their systems while handling societal challenges. In this context, blockchain and other Distributed Ledger Technology (DLT) applications in various public sectors have experienced a lot of attention in recent years because of their potential to enable effectiveness, trust and transparency. Still, the future of DLT implementation by governments is uncertain.

This policy brief[1] presents results from a study conducted for the Ministry of the Interior and Kingdom Relations (BZK) in the Netherlands in 2021. The research aimed to investigate if DLT,[2] can be a solution to overcome new challenges. Therefore, we ask three core questions: How can DLT be applied in the public sector? What public values can be strengthened or weakened through DLT adoption? And, what next steps should governments take regarding DLT?

1. KEY CHARACTERISTICS OF DLT AND BLOCKCHAIN

The concept of Distributed Ledger Technology (DLT) is much less well-known than 'blockchain' or 'bitcoin'. It is however older and more comprehensive. DLT includes both blockchain and Bitcoin or any other cryptocurrency. It is the umbrella term for any multiparty systems that operate in an environment without a central administrator or authority.[3] This differs from its traditional counterpart, a centralized system (see figure)[4]. Specific to a DLT is:

- Control over records is shared by independent entities (that do not need to know each other) and are connected via a common peer-to-peer (p2p) network.
- Consensus (defining 'the truth') arises through automatic checks via decision rules through a collaboration with several parties (e.g., proof of work).
- There is no central storage of information. Parallel copies (of meta data) exist in multiple so-called “nodes”.

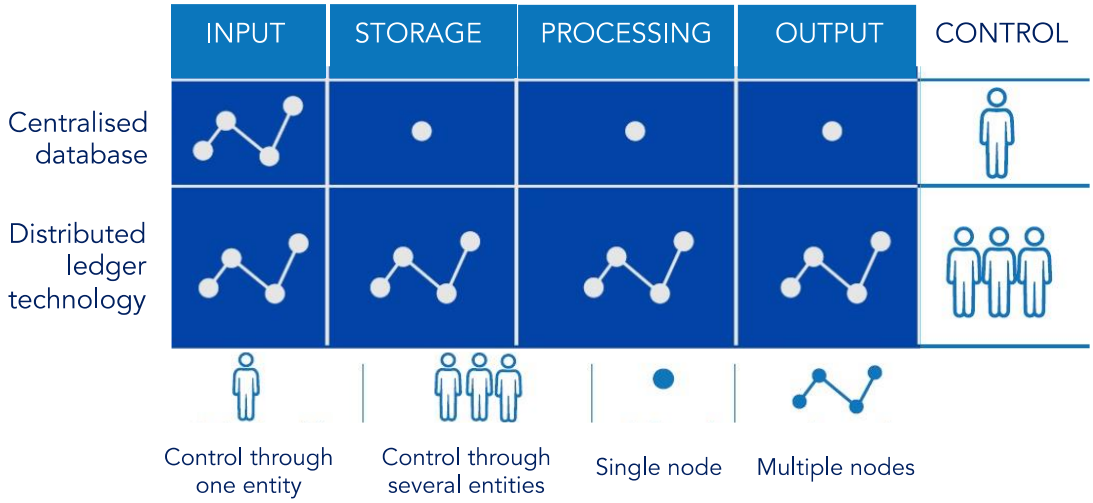
[1] This research was conducted by imec – SMIT – VUB for the Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (BZK). This policy brief is a summary of the full report prepared for the Ministry of BZK, which includes full information and references.

- To access the full study in English go to https://smit.vub.ac.be/wp-content/uploads/2022/02/Full-Report_DIGITAL-DECENTRALIZED-VALUE-TRANSFER-FOR-THE-PUBLIC-SECTOR_EN_FINAL.pdf.
- The Dutch versions of the full report and policy brief prepared for the Ministry of BZK can be found via https://www.rijksoverheid.nl/documenten/rapporten/2021/12/20/digitale-decentrale-waardeoverdracht-voor-de-publieke-sector-in-nederland

[2] Please note that for the purpose of this report, the terms DLT and blockchain will be used interchangeably.

[3] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3230013

[4] Adapted from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3230013



DLT is different to centralized systems, which are often under the control of one party (for example the government or the bank) and information is managed or stored centrally in a single database (secured only by centralized backups). Public sectors and government services still mostly use these traditional data systems. Centralized systems are more vulnerable to manipulation, sabotage, abuse of power and data leaks. But, DLT has still a lot of limitations and immaturities that are being discussed, including for example difficulties with GDPR compliance, interoperability, custodian issues, and low adoption rates. The characteristics of a DLT system also depend highly on the specific design choices and a choice to switch to DLT systems implies different consequences. The question is therefore why and in what use cases a government should use DLT.

2. USE CASES OF DLT IN THE PUBLIC SECTOR

In the last years, governments have started experimenting and investing in blockchain and DLT solutions for the public sector. The OECD in 2018 found already more than 200 government-led blockchain initiatives in more than 40 different countries.[5] IBM (2017) found that 9 in 10 government executives plan to make blockchain investments.[6] To understand where applicability of the technology should be considered, we want to stress that DLT can be seen as a form of 'general purpose technology'. This is due to the infrastructural character of the technology as described above. In other words: whether DLT or blockchain is a solution to a given problem in the public sector, and in which design of the technology, can only be answered on a case-to-case basis. Below, we present four use cases with opportunities for implementation of DLT in the public sector.[7]

Government-issued digital identities

DLT can offer an infrastructure for establishing permanent digital identities for persons, legal entities and goods. These can be self-governed by the individual or company/entity through a self-sovereign identity (SSI) system, without the need for control by one central authority. Via the DLT, citizens can then manage their digital identity and gain access to government services like, filing a new passport, address registration, birth certificates, etc. While many services in this regard are already online available, experts and literature highlight that blockchain and SSI (and decentralized identifier -DID) can offer additional advantages, including privacy protection, more data control by citizens and prevention of identity fraud. Such systems already run in Estonia and Zug, Switzerland for example. Most notably, in 2021 the European Commission put forward a proposal to create a framework for European Digital. The European Blockchain Services Infrastructure (EBSI) runs already since 2020 trials across Europe in this regard.

Land title registry

Dealing in land properties is still a time-consuming administrative process that is vulnerable to fraud, falsified documents, lost title deeds, etc. Establishing an agreement requires the trust of several parties (seller, buyer, notary, etc.) accompanied by hefty administration, which normally takes several days to finalize. Because of this, DLT

[5] https://www.oecd.org/parliamentarians/meetings/gpn-meeting-october-2018/OPSI-Blockchain-Presentation-for-Global-Parliamentary-Network.pdf
[6] https://www.ibm.com/downloads/cas/WJNPLNGZ
[7] Please consult the full report for the full list of 21 use cases and the applicable sources and references.

systems have been favoured as a solution in research and practice to run title deeds, land registry and transactions of land ownership to reduce bureaucracy, prevent fraud and falsified land titles. There are several countries who already implemented DLT solutions in this regard, including Georgia, Sweden and Ghana having such systems running since 2016.

Central bank digital currencies (CBDC)

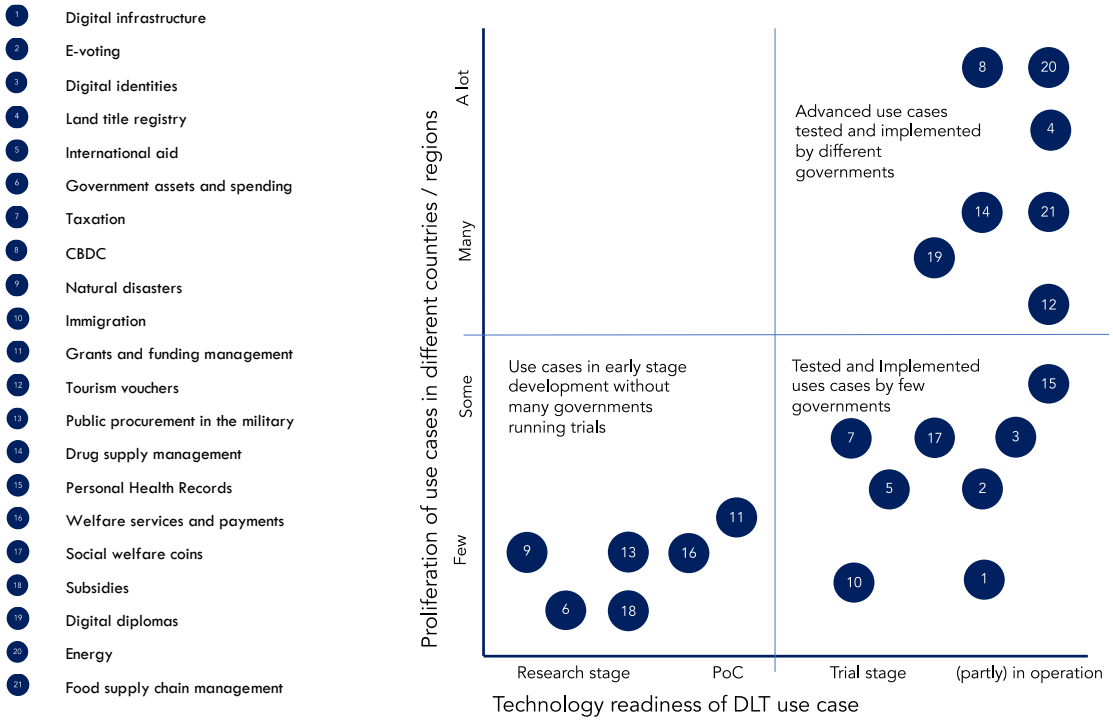
Another important topic related to blockchain are digital currencies and specifically CBDCs. CBDCs can be a starting point for a fully digital payment system. The most discussed benefit of a CBDC is faster, cheaper, and more efficient payments, domestically and internationally. However, there are also privacy. The trend for establishing a CBDC is especially significant in low- and middle-income countries, with the first CBDC called Sand Dollar launched in the Bahamas in 2020 and the Bakong in 2021 (a cross-border payment solution for Cambodia and Malaysia). But there are also already pilots and tests on the way in developed countries. For example, the Bank of Canada and Monetary Authority of Singapore have partnered in 2019 to enable transactions via digital currencies and the European Central Bank invests in a digital euro as well.

Digital diplomas

In the last few years, digital diplomas have become the foremost examples of how blockchain can be used in education. This is due to the permanence, convenience, and security associated with blockchain, using this technology to store and share academic credentials, particularly diplomas. There are a handful of state-funded digital credential initiatives, such as EBSILUX in Luxembourg, the Education Blockchain Initiative, funded by the U.S. Department of Education and LegitDoc in India. There are also private collaborative initiatives (such as Sony Global Education19, ODEM20, IBM's Learning Credential Network21) that range between being in nascent stages to piloting stages. On a national-level, Malta is the first country to have introduced blockchain-driven diplomas in 2019.

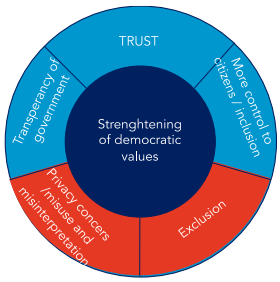
The implementation of DLT into more and more public services and sectors is currently being explored or has already been done in different countries, which includes but is not limited to international aid, taxation, immigration, tourism, public procurement, healthcare, welfare services, energy and more. The readiness of DLT for implementation into a use case is therefore an important factor for the government to understand in which areas implementation should be considered.

Based on our analysis, we found that the most explored and tested use cases in the public sector include energy, land title registry, CBDC, food supply and drug supply chain management (see figure). However, also less explored use cases allow governments to explore and steer developments in the future.



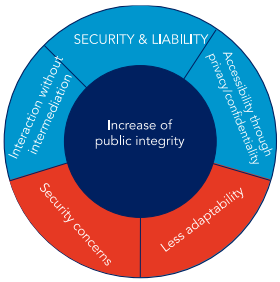
3. THE POTENTIAL IMPACT OF DLT ON PUBLIC VALUES

One of the leading ideas that should drive adoption of a new innovation by governments is the potential public value impact.[8] To understand the potential impact on public, we have grouped and discuss the most discussed public value benefits as identified in literature and based on the case study analysis below, highlighting both the benefits and limitations of DLT (see figure). We have grouped the public value impact of DLT into four categories, arguing that DLT can:



Strengthen democratic values

DLT has been coined as a democratic technology. Decentralized consensus mechanisms, distributed trust, and unbiased transactional verification mechanisms can create trust in governmental services; enable more inclusive participation in government processes by giving more control to citizens (e.g., DLT-driven taxation and ISS), and eliminating prejudices against minorities in processes; and make governments' data and processes more transparent. However, experts also associate risks with transparency as agency over data is being (partly) lost and the abilities of eGovernment services to be inclusive, as internet and device access is necessary.

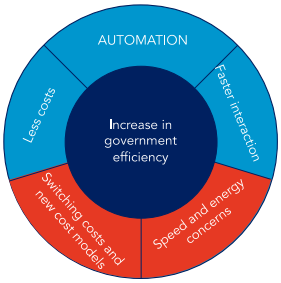


Increase public integrity

DLT can host permanent and immutable records that can increase accountability, and security for the public sector. This leads to concrete benefits for public integrity by: Making services in the public sector more secure and reliable (preventing fraud and corruption); increasing accessibility to services by making them confidential and focussed on privacy; and allowing interaction without potentially failure of intermediation. However, it is also discussed that DLT is often less adaptable and certain security concerns which are related for example to custodian problems, and the loss of private keys.

Increase collaboration

DLT could offer a solution to current closed data environments by enabling a shared and interoperable network on which actors can easily share (meta) data in a secure, transparent, and immutable manner. Standardization through such systems between actors also enables interoperability and e.g., cross-border solutions. But collaboration still needs agreement of many stakeholders leading to bureaucracy. A minimum number of organisations using new systems is needed to make these operational.



Increase public efficiency

Through automation of processes through DLT systems, several efficiency benefits have been identified including reduction of redundancy, streamlining processes, decreasing audit burden, and less needed intermediation and manual or paper-based work and thereby reducing costs. Such efficiency benefits have been discussed in research and reports. While ultimately the installation of DLT systems can reduce cost, switching from current systems also creates costs for the government. Additionally, the speed and energy concerns related to blockchain have been widely discussed.

[8] Please consult the full report for a description of a full decision-making matrix, to support governments in making adoption decisions.

4. OUTLOOK AND RECOMMENDATIONS FOR GOVERNMENTS

Technology influences the everyday lifeworld of citizens and society in general. For DLT this means the government has a role to play in governing these technologies but also should look for opportunities to optimize their governance processes and tasks. DLT can trigger significant organizational change. It is therefore important that the government defends public values, take decisions, and pivot development. It is still unclear today exactly what role DLT will play in our society. But it is important that the government defends public values, makes decisions and, if necessary, raises awareness, because otherwise important public values can be overlooked in this ongoing development. We therefore give the following recommendations for governments, which aim to have an impact and benefit from this new technological development:

Recommendation 1: Bring public value into the focus and local context
Governments should investigate barriers in their local context (including the legal framework, lack of skills in the government, the attitude of the government as well as a lack of capital and funding) and then address and support them. This needs to be always done in a way that considers the contribution to (or loss of) public values.
Recommendation 2: Strategic and informed decision-making is needed to identify the right use cases
Governments should adopt an informed and strategic decision-making approach to identify use cases for development in the public sector. This can be based on existing strong local networks and initiatives in the ecosystem as well as successful use cases that have already been rolled out in other countries.
Recommendation 3: Involve various stakeholders
It is important to set up a discussion forum where various stakeholders (with different types of expertise, background, experience, and roles in the ecosystem) are involved in reaching a consensus on a vision on the role that DLT should play in the digital society and to decide whether DLT should become a theme in the existing or new strategies of a government.

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For full information and insights, please see the full report.

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