

Editorial

Blockchain and the Public Sector

The concept of encrypted distributed ledgers, while developed in theory decades earlier, found practical traction a decade ago, in 2009, with the implementation of Blockchain as a distributed ledger technology, which since has served as the basis for Bitcoin, the now dominant cryptocurrency. In many academic and non-academic publications since, the terms Distributed Ledger Technology (DLT), Blockchain, and sometimes even the term cryptocurrency, have been used interchangeably, which is, of course, incorrect. As guest editors, we were aware of this potential confusion, and we acknowledged in the call for papers that “Blockchain” is just one format of implementation of a DLT.

However, we felt in need of paying tribute to the fact that “Blockchain” was perceived as a placeholder for this particular advancement in technology evolution. As this special issue indicates the potential uses of DLT and Blockchain in the public sector are manifold. Obvious potential candidates for public-sector uses are all records, which shall either not be modified after legal signing and finalization such as treaties, court rulings, voting protocols, session minutes, etc. or, only be altered in a tightly controlled and lawful fashion such as land registries, vital and health records as well as property titles to name a few. However, DLT/Blockchain would also have potential areas of application in more dynamic settings such as in procurement, in which smart contracting might play an increasingly important role in the public sector in the not too distant future. Finally, government is also responsible for providing and enforcing norms and rules of engagement when it comes to using technologies for transactional and record management purposes.

Over the years, debates have unfolded over whether or not cryptocurrency exchanges and other DLT-based services needed to be regulated. Some, initially mainly smaller jurisdictions such as Gibraltar, Malta, Bermuda, and lately Liechtenstein took steps to regulate and legalize crypto exchanges, initial coin offerings, and, more generally, tokenization as economic and legal vehicles. When assessing and evaluating the prospects of DLT (and Blockchain for that matter) from an academic perspective, one has to admit that part of the early reception of and engagement into the topic was at minimum over-enthusiastic in some academic circles, for example, when talking about the “blockchain revolution,” or highly speculative when projecting the “soon complete disruption of the financial sector as we know it.” While such major impacts of DLT on existing structures and practices were projected, it seemed to have been clear even to many pundits and Blockchain enthusiasts that DLT was not a panacea, which would meaningfully be applicable across the board to any purpose. In the public sector as elsewhere, DLTs can be safely and productively used in only carefully chosen areas of application.

Meanwhile it has become also clear to a larger audience that two DLT design principles are among the limitations and potentially the technology’s Achilles heels: (1) cryptography and (2) a large number of nodes (as in permissionless DLTs). To start with the latter, when the number of nodes in a distributed ledger increases, the overall transactional performance goes down, which leads to certain tradeoffs such as either limiting the number of nodes or defining a consensus quorum of some kind. In contrast, today’s central high-speed transaction systems such as the one of credit card company Visa process about two thousand transactions per second whereas Bitcoin, as a DLT example, processes between 4 and 7 at the same time interval. It is not clear how this scalability problem can be solved soon. Regarding the

encryption of the ledger records, it remains to be seen how soon Quantum computing becomes commercially available to an extent that today's encryption techniques are rendered non-protective, that is, worthless. It is too early to predict how Quantum computing can either preserve or obliterate the DLT design principles. It seems to be clear that DLTs of today will be in need of modification and adaptation in the not too distant future. Before this backdrop, the special guest editors present eight articles in this special issue, which characterize the current state of understanding of DLT/Blockchain use in the Public Sector:

First, based on a bibliometrical analysis of academic and good-quality non-academic literature on the subject, *Rodríguez Bolívar* and *Scholl* lay out a map of potential impact areas of DLT and Blockchain use in the Public Sector. Second, *Reddick*, *Purón Cid*, and *Ganapati* empirically examine determinants of Blockchain adoption in the public sector. Third, *Rikken*, *Janssen*, and *Roosenbomm-Kwee* study the governance challenges of Blockchain and Decentralized Autonomous Organizations (DAOs). Fourth, *Fan*, *Gil-Garcia*, and friends scrutinize the organizational, technical, and policy implications of sharing big data in and between local governments. Fifth, *Schwabe* empirically investigates the roles of government agencies in data-sharing platforms and Blockchain consortia with Cardossier as case in point. Sixth, the developers' perspectives on government regulations of virtual currencies are presented by *Dahlberg*. Seventh, in an essay *Jones* ponders the virtue of Blockchain as a governance vehicle as opposed to impose governance to Blockchain use. And, eighth, *Allessie*, *Janssen*, and friends deliberate on the consequences of Blockchain architectures for the governance of public services.

This special issue is intended to provide a stepping stone in the unfolding academic and practitioner discussions about the potential opportunities and challenges of Distributed Ledger Technologies (DLTs) such as Blockchain in the Public Sector.

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Guest Editors