Distributed Ledger Technologies and Blockchain
Research and technology monitoring report

euLISA
European Union Agency for the Operational Management of Large-Scale
IT Systems in the Area of Freedom, Security and Justice (eu-LISA)

Key findings

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Why blockchain and distributed ledger technologies?

In the past years, blockchain and distributed ledger technologies (DLTs) attracted much attention from different industries. Although the successful use cases can mostly be found in financial services, implementation of these technologies is being explored in other domains, including the public sector. This research and technology monitoring report aims to review the recent developments in blockchain and DLTs, their application across domains, unwrap the functionalities those provide and explore the potential for these technologies in the context of large-scale IT systems operated by eu-LISA.

Domains of possible application

eu-LISA operates large-scale IT systems with strict requirements for the technical solutions in relation to security, availability and business continuity, hence application of new technologies at scale requires careful evaluation. Blockchain and DLTs provide a range of functionalities with potential relevance to eu-LISA. The following domains were identified for potential application:

- **Decentralised identity management**, including self-sovereign identity. The shift towards decentralised identity management will have direct implications to the systems relying on verification of government issued identity credentials.
- **Visa and travel authorisations** can also be handled electronically. In such cases, a visa or an authorisation can be stored in a digital wallet of a traveller with its record stored on blockchain. This would allow for tackling visa fraud and visa shopping.
- **Securing and sharing records with third parties**, such as those related to the ETIAS pre-authorisation processes, but also data updates made in the systems. The latter use case could help ensure transparency and auditability of changes made to the data stored in the systems (e.g. SIS II, VIS, Eurodac).
- **Upgrade to logging of system access,** data submission and retrieval instances. This use-case allows for full transparency and auditability of the use of the systems by authorised parties.
- Last but not least, the overall **distributed nature** of blockchain and DLTs allows to eliminate single point of failure in centralised data storage systems and addresses updates across nodes to avoid data inconsistency.

Technology outlook for the EU

Blockchain and DLTs have entered the scene at a time when governments in the EU and around the world are actively pursuing digitalisation strategies. Although blockchain will not 'cure all maladies', the rapid diffusion of DLTs across domains indicates that these technologies may potentially have transformative effect on management of public records and e-government systems more generally. Countries with both more and less advanced e-government systems can leverage blockchain-based solutions for trusted and secure management of public records. Particularly interesting in this regard is the application of blockchain for decentralised identity management. Last but not least, to support the wider adoption of these technologies, attention should be paid to standardisation as well as alignment with the already existing technology frameworks (e.g. eIDAS), legislation and data protection rules (e.g. GDPR).

Main conclusions

Development of new approaches specifically suitable to public sector needs, such as private permissioned blockchains based on proof of authority, will support the wider adoption of blockchain-based solutions. The application of blockchain in the public sector will to a significant extent also depend on the development of new consensus algorithms specifically suitable for public sector applications and supporting the functioning of distributed platforms. However, before such new technologies are applied at scale, they must demonstrate reliability, security, and long-term sustainability.

eu-LISA will be closely monitoring the development of blockchain and distributed ledger technologies to continue assessing the possibility of their application.

The report is publicly available on eu-LISA website https://eulisa.europa.eu
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