



Blockchain Applications in Health WG@VP19

Blockchain applications for health data markets

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Co-Chair: Edwin Morley-Fletcher, Ludovica Durst

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Blockchain Applications in Health WG

Background

- The Blockchain Applications in Health WG was promoted by the RDA Health Data IG on the assumption that it would be meaningful to examine the ways in which blockchain technologies can make it possible to access the data that traditionally are separately stored by a multiplicity of health repositories.
- The expectation was to be able to check through this WG whether blockchain systems could:
 - overcome the difficulties currently encountered by patients in ensuring an effective portability and overall control of their health data,
 - leaving those data in decentralized electronic folders, but allowing to share or to mobilise those data with a precise verification and tracing of who would really access them.
- After a series of WG sessions – delayed by the COVID pandemic – a draft report was prepared, with the aim of:
 - highlighting the “State of the Art” of blockchain applications in the healthcare domain
 - assessing the main regulatory and legal issues raised by the usage of this technology.

Draft Report of the Blockchain Applications in Health WG ³

Draft Report of the Blockchain Applications in Health Working Group

Guidelines regarding blockchain applications for health data



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Draft guidelines regarding blockchain applications for health data

- This draft report provides some basics on:
 - What is a blockchain and why can it be particularly helpful to employ blockchain solutions in healthcare.
 - What are the regulatory and legal aspects related to the use of blockchain and health data
 - What can be a set of guidelines for blockchain design and implementation in different use cases, based on lessons learnt from concrete experiences in the healthcare domain.
- Its three co-authors, Ludovica Durst (University of Rome), Mirko De Maldé (INATBA), and myself (Edwin Morley-Fletcher, Lynkeus), are attending this meeting today in view of welcoming any appropriate suggestion for updating the current draft.
- As a matter of fact, having been largely disrupted by the pandemic in regularly conducting our WG, we deemed that:
 - Not only, some decantation could be useful for dealing with such a continuously evolving subject,
 - But, additionally, an appendix on blockchain-based health data marketplaces would now be of order.

- This is why the main speaker today will be Davide Zaccagnini, MD, who has been significantly involved in building elements of KRAKEN:
 - a 2020-2022 EU-funded project that aims at creating a blockchain-based ecosystem
 - in which legally and ethically binding terms will allow users to temporarily access and process personal data for predefined purposes in return for value.
- Davide is currently engaged in devising more advanced solutions for realising a distributed, autonomous, marketplace for health data, implying a set of incentives based on a virtual currency.

Let us quickly recap some basic concepts

- The blockchain is a technology that allows people and organisations to reach agreement on and permanently record information without a central authority.
- It is thus an important tool for building a fair, inclusive, secure and decentralised digital economy, being, at its core, a shared, peer-to-peer database.
- All blockchains provide:
 - a mechanism for nodes to propose the addition of information to the database (the common ledger), usually in the form of some transaction,
 - a consensus mechanism by which the network can validate what is the agreed-upon version of the database.

- The blockchain is a disruptive innovation for dealing with uncertainties that traditionally have implied the need of relying on some amount of trust for coping with them.
- It is a technology providing transparent and secure storage and transfer of data without having recourse to a central authority. With blockchain all data transfers become traceable and auditable by participants to the ledger.
- The blockchain allows to envisage a distributed rather than a hierarchical foundation of trust.
- If internet has dramatically reduced transaction costs on information, the blockchain can do the same regarding the exchange of data incorporating value.
- The blockchain allows to digitize value transfers and use self-enforcing “smart contracts” for automating the enactment of contractual rules (*code is law*).
- Finally, the blockchain allows to have recourse to issuing digital tokens for crowdsourcing (*tokenomics*) and for settling transactions.

Similarities between blockchains and bureaucracies

- There are close similarities between blockchains and bureaucracies, though bureaucracies are normally centralised and blockchains are distributed:
 1. both are defined by the rules and execute predetermined rules
 2. both work as information processing machines
 3. both work as trust machines
- Bureaucracies are thus natural candidates to have centralisation being replaced by federated blockchain systems.
- Sustainable growth implies doing more with existing resources and attracting more resources to expand the scale of operations:
 - blockchains reduce costs
 - increase the flow of funds, helping social innovation organisations to scale up,
 - by enabling marketplaces and the issuance of alternative currencies and tokens.
- All these characteristics are highly relevant in the healthcare sector.

Blockchains reside at the nexus of issues which are key for providing innovative healthcare solutions

- There is a huge potential for:
 - Employing cryptographic and algorithmic methods to record and synchronise health data transactions across distributed networks in an immutable manner.
 - Using smart contracts as coded instructions, which execute on the occurrence of an event and extend the functionality of blockchains from storing transactions to performing computations.
 - Developing multi-sided platforms, where data providers (being both clinical institutions and individuals), researchers and industries can all rely on data integrity and security and mutually reinforce network effects.
 - Allowing to manage data flows and usage, based on individual free choice and self-determination, making dynamic data portability in real time possible for individuals and companies, along with various compensation models.
 - Applying Health Big Data to Artificial Intelligence and Machine Learning for medical knowledge discovery.
 - Improving clinical trial records.
 - Minimizing fraud related to prescription drugs and tracking and preventing the sale of counterfeit drugs and devices.

- The European Blockchain Observatory has issued a report on the Convergence of Blockchain, AI and IOT, stating that blockchains can be used to develop:
 - open, decentralised data markets
 - in which data producers, whether individuals or enterprises, can sell, rent or share their data.
- Blockchains can be used as the basis for open, decentralised markets for AI models, allowing independent AI developers to:
 - directly sell their wares
 - more easily collaborate with each other on large projects
 - share computer resources.
- Health data marketplaces are a crucial innovation frontier which it is worth while including in our Blockchain Applications WG report.