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Can Blockchain support advances in radiology?

In 2019 we will embrace Blockchain and innovation as necessary support for the healthcare of our time.

Blockchain can influence the design and implementation of new models by refining data security; provide more robust audit trail mechanisms required, eliminate medical imaging acquisitions repetition, reduce transaction costs, while allowing clinicians to access data easily, compare images, and provide patients with better and quicker treatment options.

The main technology trends of 2018 that have been identified in Healthcare such as AI, machine learning VR/AR, Internet of things (IoT's) and Blockchain, should not be seen as "trends" anymore.

In fact, in 2019 we will move from viewing these as over-hyped buzzwords to embracing them as necessary support for the healthcare of our time.

The acknowledgement of the potential of these technologies brings new opportunities for flourishing new economies, new business models and most importantly the leverage for enabling true citizen-centric care and efficiency in the care process.

Even though the healthcare landscape has seen benefits from these technologies, the industry is still on a learning process to better understand how to fully unleash these tools.

Blockchain as enabling technology for teleradiology

It has been said that approximately 90% of the health data generated is medical imaging. A study indicated a growth of 35 ZB of imaging data by 2020 produced by the world's devices (Alexander et al. 2018). In such a scenario, it becomes critical to establish secure, reliable and efficient processes and tools for exchanging and leveraging this growing wealth of data toward improving clinical outcomes and overall efficiency along the care process.

At the same time, such great amount of data

is exposed– with the current technologies and approaches, to high risk of cyberattack. Fragmented PACS systems, siloed databases for different kind of data (notes in one system, medicine records in another system), has made it very difficult to properly use data while ensuring proper security.

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As a consequence, it is not surprising that several cyberattacks have affected a fair number of organisations and institutions. One of the most notable ransom attacks called the WannaCry in 2017 was yet another reminder of the vulnerability of healthcare organisations and the need of continuously finding better ways to protect patient data but also obtain and maintain trust in the ecosystem and most importantly patient trust.

In such a scenario, Blockchain could likely influence the design and implementation of new storage models by not only refining the security of the data and providing more robust audit trails mechanisms required by regulatory bodies, but also eliminating the repetition of medical imaging acquisitions,



Maria Marengo

President, Sweden/Nordic Chapter
Government Blockchain
Association
Stockholm, Sweden

eHealth and Healthcare
vertical lead
The Swedish Blockchain
Association
Stockholm, Sweden

Healthcare Informatics
Consultant and Founder
Mentfort Ltd
London, UK

maria@mentfort.com

miamarengo@googlemail.com

[@healthurbanista](https://twitter.com/healthurbanista)

reducing transaction costs, at the same time allowing clinicians to have access to data more easily, compare images, and provide patients with better and quicker treatment options.

Such innovations can be of benefit in enabling distributed teleradiology, allowing offsite and onsite diagnostics to read data while providing transparency to all parties in the care chain.

A real-world implementation of the above-described scenario was presented at the 2018 Radiological Society of North America (RSNA) annual meeting, where Medical Diagnostic Web (MDW) presented the first radiology Blockchain platform for connecting stakeholders of the imaging ecosystem.

Blockchain and AI: teaming up for improved care

The usage of AI and machine learning for processing large data sets, imaging analysis and clinical decision support, is becoming more and more widespread worldwide, along with progressive demystification of such technologies. Indeed, the importance and efficiency that is gained from AI in the field of radiology is currently becoming more and more difficult to argue against.

In particular in image analytics, AI – thanks to its pattern recognition and data-crunching capabilities, can play a fundamental role to support radiology departments to deal with the ever-increasing amount of available imaging, making sense of such enormous quantity of data and extracting valuable insight for improving diagnosis and therapies. It doesn't therefore come as a surprise that the relevant AI in the medical imaging market is expected to grow to 2 billion USD by 2023, according to recent forecasts (Harris 2018).

Still, it is very important for the proper and successful implementation of these technologies in an operational environment, that a thorough learning phase is completed. In such a scenario, introducing a more open, distributed, and “democratised” way of accessing and sharing medical images, via Blockchain-based open and distributed database, could dramatically improve AI training process at the same time reducing the risk of biases of the resulting algorithms, by taking data from a variety of sparse and different sources, therefore improving clinical value.

Such a new open environment would greatly contribute in improving interoperability and

accessibility, as key drivers for delivering proper care at the right time.

Additionally, and coming to a conclusion, a further layer of security and trust in the data exchange process could be added, also outlining a greater role for patients, by using smart contracts. In such cases, in which data are openly available but still in control of the relevant providers and of the patients/data owners, personal smart-contract based tools could be entrusted by the patients for sharing the data on the basis of specific and pre-defined consent and permission options – seeking for second opinions and allowing for data access by third party (and data-driven services) in an automated fashion.

In conclusion, DLTs and their “cooperation” with AI hold great promises for the future of radiology and healthcare at large, but we must always remain mindful of the fact that an environment of trust remains a challenge, for all parties within institutions and between patients and healthcare providers. ■

KEY POINTS



- ✓ 2018 main technology trends in healthcare such as AI, machine learning VR/AR, IoT and Blockchain, should not be seen as “trends” anymore.
- ✓ Approximately 90% of the health data generated is medical imaging.
- ✓ Fragmented PACS systems and siloed databases make it very difficult to properly use data while ensuring security.
- ✓ Blockchain can benefit imaging by enabling distributed teleradiology, allowing offsite and onsite diagnostics, providing transparency to all parties in the care chain.



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