Frost Perspectives

Does Blockchain Have A Place in Healthcare?

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Blockchain technology is making headlines everywhere. If you have recently attended any tech events it is highly likely that you came out of them having heard just that bit more about it. Everybody is talking about blockchain -- from the President of the United States to the Nigerian Government. Despite all the hype, for many people (across different industries) the blockchain concept still seems difficult to grasp, which makes it one of the most misunderstood technologies of 2017. This confusion around blockchain can be attributed both to its contentious origin (Satoshi Nakamoto, the "unknown" who designed Bitcoin and its original reference implementation) and equally to the absence of any standard definition of blockchain technology. Nevertheless, the perceived (if not yet fully understood) disruptive nature of blockchain and its possible impact on businesses across industries make it crucial first to understand blockchain and then to distinguish the hype from the reality. Today we are going to try to unpack blockchain at a basic level and understand its implications for the healthcare industry.

What Is Blockchain Technology and How Can We Separate the Hype from Reality?

So **what is blockchain?** If we filter out all the hype and technological jargon blockchain, technology is, at its simplest, a distributed and immutable (write once and read only) record of digital events that is shared peer to peer between different parties (networked database systems). In essence, the fundamental strengths of a blockchain system lie in its data integrity and networked immutability. Having said this, there is always scope to build application layers on top of a blockchain system and enable additional functionalities such as public or private keys, or self-executing mechanics (for example, smart contracts), but this is not the core functionality of blockchain technology.

To put it even more simply, let us flash back to the 1990s when “Internet” was the buzzword. People misunderstood the Internet with a tunnel vision around its early use cases (for example, Internet = e-mail or Internet = Web). Similarly, today’s confusion around blockchain technology is not because of its fundamental properties at the protocol layer, but rather because of hype around as yet unproven use cases at the application level, which are often mistaken for the integral part of core blockchain technology. For example, today many people commonly identify blockchain with Bitcoin, by far the most commonly known implementation of blockchain technology. But in fact Bitcoin is only the tip of the iceberg of several hundred applications using the blockchain system today.

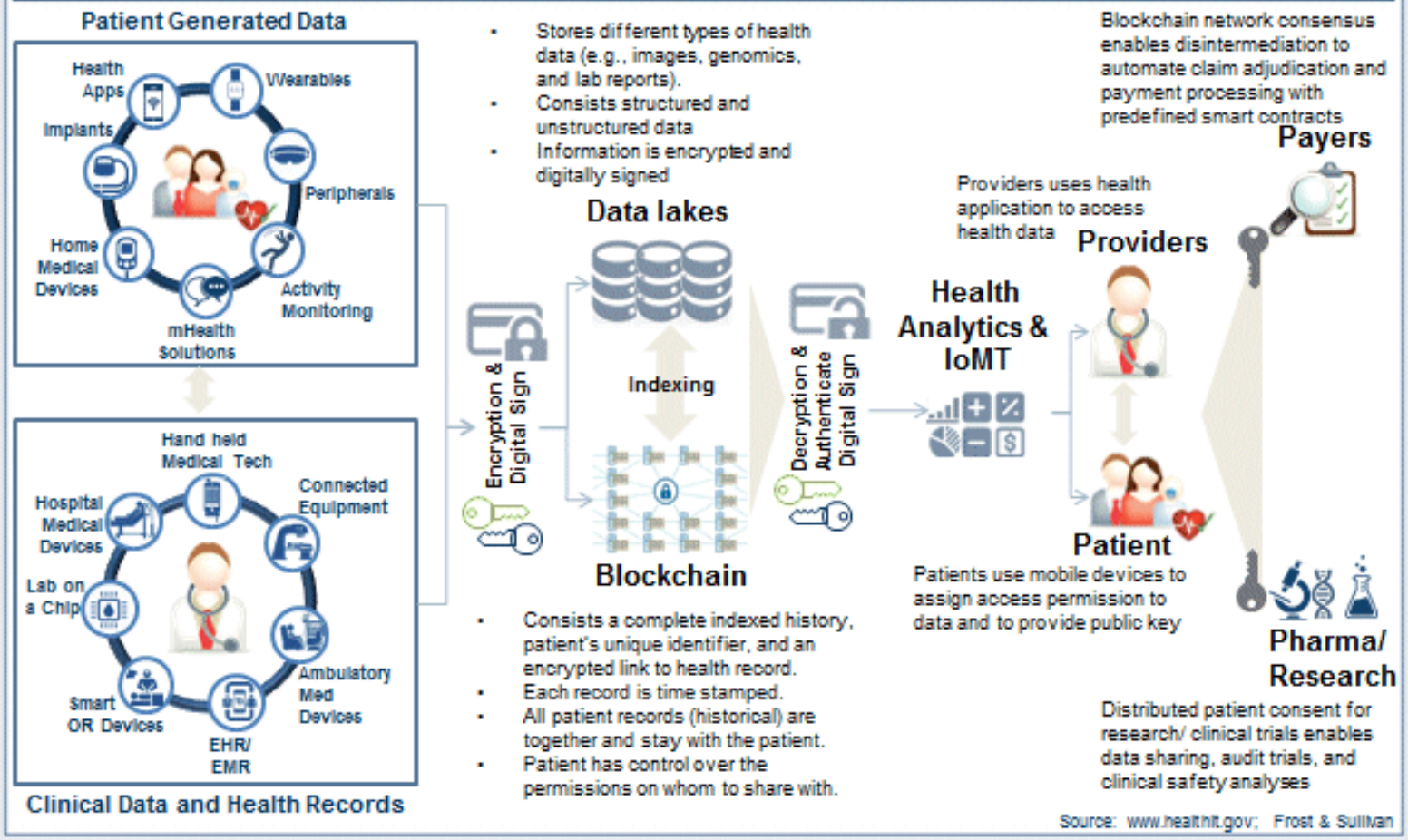
Translating this analogy for the healthcare industry, the concept of blockchain technology and systems is undoubtedly disruptive but it will not act as a magic bullet to solve emerging business problems in the fast changing and highly interconnected digital health ecosystem. Rather, it will be an evolutionary journey for blockchain-based healthcare systems or applications, where trust and governance within a blockchain network or consortium will be the critical success factors for implementation.

What Are the Most Promising Blockchain-based Use Cases for the Healthcare Industry?

Beyond blockchain technology’s utopian moment in the fintech industry, in the healthcare industry it has just started to inspire both relatively easily achievable and more speculative potential applications. Healthcare authorities, governments, and the provider community globally are equally excited about the new possibilities presented by blockchain. Nevertheless, the industry needs to focus on establishing blockchain consortia to foster ecosystem partnerships and create standards or frameworks for future implementation on a large scale across healthcare use cases. The Hyperledger Foundation, an open source global collaborative effort created to advance cross-industry blockchain technologies, is one great example among many developing small blockchain consortia models in the healthcare space.

Despite the current euphoria, we need to understand and decode the hype cycle for blockchain technology and its realistic healthcare applications. By doing so, we believe among several hundred use cases the five blockchain-based healthcare use cases mentioned below demonstrate more convincing opportunities, albeit at varying degrees of adoption across countries and health systems.

Blockchain Technology – Promising Use Cases for Healthcare Industry



Source: www.healthit.gov; Frost & Sullivan

- **Clinical Health Data Exchange and Interoperability:** When we talk about blockchain and healthcare data exchange is typically the first topic to come up. Blockchain-enables health IT systems can provide technological solutions to many challenges including health data interoperability, integrity and security, portable user-owned data, and other areas. Most fundamentally, blockchain could enable data exchange systems that are crypto-graphically secured and irrevocable. This would enable seamless access to historic and real-time patient data, while eliminating the burden and cost of data reconciliation. The recent collaboration between Guardtime, the data-centric security company, and the Estonian eHealth Foundation to secure the health records of one million Estonian citizens using its proprietary Keyless Signature Infrastructure® (KSI®) is a classic example of blockchain technology. However, considering the complexities around data ownership and governance structure for health data exchange between public and private entities, it would be difficult to replicate the Estonian blockchain secured health records model globally.
- **Claims Adjudication and Billing Management:** An estimated 5% to 10% of healthcare costs are fraudulent, resulting from excessive billing or billing for non-performed services. For example, in the United States alone Medicare fraud caused around $30 million in losses in 2016. Blockchain-based systems can provide realistic solutions for minimizing these medical billing related frauds. By automating the majority of claim adjudication and payment processing activities, blockchain systems could help to eliminate the need for intermediaries and reduce the administrative costs and time for providers and payers. Blockchain could also have significant ramifications for improving some of the huge logistical information tracking hurdles of reliability centered maintenance (RCM) functions. Recently, Gem Health, a provider of blockchain application platform for enterprises, has collaborated with Capital One to develop blockchain-based health care claims management solutions.
- **Drug Supply Chain Integrity and Provenance:** Based on industry estimates, pharmaceutical companies incur an estimated annual loss of $200 billion due to counterfeit drugs globally. About 30% of drugs sold in developing countries are considered to be counterfeits. A blockchain-based system could ensure a chain-of-custody log, tracking each step of the supply chain at the individual drug/product level. Furthermore, add-on functionalities such as private keys and smart contracts could help build in proof of ownership of the drug source at any point in the supply chain and manage the contracts between different parties. For example, a company called iSolve LCC is currently working with multiple pharma/biopharma companies to implement its Advanced Digital Ledger Technology (ADLT) blockchain solutions to help manage drug supply chain integrity.
- **Pharma Clinical Trails and Population Health Research:** It is estimated that 50% of clinical trials go unreported and investigators often fail to share their study results (for example, nearly 90% of trials on ClinicalTrials.gov lack results). This creates crucial safety issues for patients and knowledge gaps for healthcare stakeholders and health

policy-makers. Blockchain-enabled, time-stamped immutable records of clinical trials, protocols and results could potentially address the issues of outcome switching, data snooping, and selective reporting, thereby reducing the incidence of fraud and error in clinical trial records. Furthermore, blockchain-based systems could help drive unprecedented collaboration between participants and researchers around innovation in medical research in fields such as precision medicine and population health management.

- **Cyber Security and Healthcare IoT:** According to the Protenus Breach Barometer report, there were a total of 450 health data breaches in 2016, affecting over 27 million patients. About 43% of these breaches were insider-caused and 27% due to hacking and ransomware. With the current growth of connected health devices, it will be very challenging for existing Health IT infrastructure and architecture to support the evolving Internet of Medical Things (IoMT) ecosystems. By 2020, an estimated 20-30 billion healthcare IoT connected devices will be used globally. Blockchain enabled solutions have the potential to bridge the gaps of device data interoperability while ensuring security, privacy and reliability around IoMT use cases. Companies such as Telstra (user biometrics and smart homes); IBM (cognitive Internet of Things); Tierion (industrial medical device preventive maintenance) are actively working around these use cases.

If you would like more insights on blockchain in the healthcare industry, please connect with us! Email kamaljitb@frost.com and speak to a thought leader in this field.

This article was written with contributions from Kamaljit Behera, Visionary Innovation Industry Analyst in Frost & Sullivan's Transformational Health Practice.

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