BLOCKCHAIN™ IN HEALTHCARE — T O D A Y —

Real Blockchain Use Cases for Healthcare

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Blockchain is at the peak of the hype curve right now, and venture capitalists are eager to fund any company with cyber-currency, blockchain, or Bitcoin in the name. As the Editor-in-Chief of *Blockchain in Healthcare Today*, my goal is to publish high-quality opinion pieces and research papers about use cases that really require blockchain. Just using blockchain in healthcare because it's cool does not make sense.

In 2017, I worked on several production blockchain applications, so I have a sense what works and what does not. Blockchain is not meant for storage of large data sets. Blockchain is not an analytics platform. Blockchain has very slow transactional performance.

However, as a tamperproof public ledger, blockchain is ideal for proof of work/proof of stake. Blockchain has the potential to implement smart contracts, making data available to those appropriately authenticated and authorized. Blockchain is highly resilient and decentralized, so it works well in infrastructure-challenged locations.

In my view, there are 3 general classes of appropriate blockchain use cases in healthcare.

1. Provide Proof of Work

Every year, clinicians throughout the U.S. experience malpractice assertions—not a judgement of malpractice, just a claim. Plaintiff attorneys request medical records and at times contend that medical records have been falsified. As a CIO, I have been involved in cases in which I provide electronic medical records and then spend hours extracting audit trails to prove that no alteration was done. What if EHRs (electronic health records) posted a hash of every signed note to a blockchain? A tamperproof ledger of hashes could easily be compared to the original signed note to prove it was not altered. Standard database technology cannot provide that level of assurance. It's a perfect application for blockchain.

2. Guarantee Data Integrity

The Gates Foundation has funded an effort in South Africa to unify the HIV lab data of the country in support of the 90/90/90 national policy—90% of all HIV-infected patients should know they are positive, 90% of those should be treated with anti-viral medications, and 90% of those should have evidence of viral suppression based on two successive viral load tests, six months apart.

To architect this solution, Gates has chosen a combination of biometrics, very basic phone apps, and blockchain. South Africa has infrastructure challenges such as unreliable power and expensive bandwidth; so a distributed, decentralized data layer that is not affected by the failure of any local node makes sense. However, it's important to guarantee the integrity of that distributed data. The combination of relational technologies on decentralized servers with a very thin blockchain layer that validates the integrity of the data via a hash of every 10,000 records should work very well.

3. Support an Economic Model

In the Meaningful Use era,[1] we did a great job with vocabulary standards (naming labs, medications, and problems), a reasonable job on the payload standard (medical summaries are good but often lack important data or have too much data of limited value), but we did not create a comprehensive transport environment (data governance, national provider directory, universal consent policy). In 2007, I suggested a kind of "smart contract" that I called the Consent Assertion Markup Language (CAML).[2] Some blockchain implementations include smart contract capability built in. Part of the smart contract idea could include micro-payments for data sharing, which could solve the healthcare information exchange sustainability challenge we continue to face. The idea that one decentralized infrastructure could provide support for various consent models and payment for data flows is appealing. In the MIT MedRec project we experimented with these concepts.[3] Startups are leveraging the same blockchain capabilities i.e.

1. The actual healthcare data are not stored in blockchain—it can remain in the underlying EHRs or registry databases operated by healthcare stakeholders

2. The blockchain infrastructure provides three benefits—a ledger of where a patient's records are to be found, smart contracts to determine who can access those records, and key pairs to ensure only authorized parties access the data

3. It also provides a simple micropayment mechanism for funding the ecosystem of data exchange

The advice I give to stakeholders, investors, and innovators is to avoid statements like, "We're creating a cloud-hosted machine learning-driven blockchain-based interoperable mobile API [application programming interface]". I've heard over 50 start up pitches in the last 90 days that had that sentence on the first slide. Instead, use the blockchain term only when something very unique to blockchain concepts is truly needed—proof of work, data integrity, and economic models.

References

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