Health Data & Blockchain: The New Sharing Frontier

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Health

Overview

- •Who? •Background
- •Why?
 - •Enterprise & Consumer Benefit
- •What? (Blockchain of course)
 - •Value Prop
 - •Lingo
 - •Pros & Cons
- •FAQs

Who? Tech entrepreneur, health data exchange pioneer, globalist



Why? User Generated Health Data:300% Growth



*global digital health market value 2015-2020, https://www.statista.com/statistics/387867/value-of-worldwide-digital-health-market-forecast-by-segment/

Why? Patient Data Flow is useful for all Healthcare Participants

Payers An independent data marketplace helps payer have access to important care delivery and efficacy data.

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patient data to improve business at each point of value chain.



Customization: better care at lower cost can be achieved only with individual at the center of information flow. Providers can do better care delivery with more data to target prevention.



Numerous care continuum partners can do better population management with good data.

Blockchain's Value Prop: *Moving from Stores to Access*



The blockchain is a **distributed system** where every node has a ledger of everything that happens. A new level of transparency/privacy where organizations can verify what happened at every level.

Blockchain Replaces the "3rd Party"

- Block chain technology was designed to **replace the trusted third party with a protocol**.
- This "trust-less" protocol runs on a peer-to-peer network which allows rapid, low-cost local clearing of global transactions.
- A mechanism to tie data and code to transactions, aka "smart contracts".

Blockchain Lingo



- Chains
- Signatures
- Ledgers
- Hashing
- Proof of Work
- Wallets
- Nodes
- Smart Contracts

Roadmap to Blockchain: Institution to Individual

Individual-centric, scalable Health Data Storage which securely allows organizations to share data with individuals and stakeholders. **Sharing and Privacy together.**

	Past	Present	Future
Infrastructure	Institution- centric	Cloud	Individual-centric data layer
Identity	Identity and Data Combined	Deidentified	Data and identity separate
Access	All or none access	Role-based	Granular access and control, provenance



Blockchain platforms & apps will use DLT technologies for a immutable data transaction record not for data storage.

Data Stores (EMR, et al)

SmartKey Enabled Data Store

Blockchain + Healthcare: Well Suited

In healthcare, something like the blockchain could be used in setting up vaccine registries or transactional histories for patients. During clinical trials, the blockchain could be used to share blood test information; for, say, five different trials, only one blood test would then be needed.

The blockchain could also be paired with a patient's current electronic medical record to provide a new level of data integrity and interoperability, meaning patient data could be shared across organizations and people without compromising the security of the information that's stored.

Pros & Cons

- Audit. Digital signatures and "Proof of Work" enable a universal, unalterable record.
- Integrity. Cryptographic hashing functions provide security.
- Patient ID. Inherent separation of PHI and PII from ID.
- Messaging. Smart contracts provide a mechanism for incentivizing patients.
- Scalability. Large data sets are expensive to transact on the blockchain.
- Enterprise asset protection.
- Interoperability.

Scaling: large-scale implementation, large data sets

- Content-addressable data store de-duplicates data for efficiency.
- Federated data store designed to run across many inexpensive nodes (RAID for cloud).
- P2P technology scales system resources automatically as result of new entrants.
- Bulk of processing client-side.

Custodian Benefits

- Runs on existing infrastructure
- Custodian has population data
- Individuals have their own data
- Global IDs, so data can live and move across multiple silos.



Private vs Public Chains

	On chain data	Off chain data
Data types	 Standardized data fields containing summary information in text form (e.g. age, gender) 	 Expansive medical details (e.g. notes) and abstract data types (e.g. MRI images, human genome)
Pros	 Data is immediately visible and ingestible to all connected organizations, making blockchain the single source of truth 	 Storage of any format and size of data
Cons	Constrained in the type and size of data that can be stored	 Data is not immediately visible or ingestible, requiring access to each health care organization's source system for each record Requires Off-Chain micro-services and additional integration layers Potential for information decay on the blockchain

Healthcare Enterprise Blockchain Value



Blockchain Benefits for Health Data Sharing

- Combine general population data with the individual's data.
- Validated data, yet private: a private patient ID.
- Any kind of data profile for an individual, IoT, etc.
- Individuals choose desired level of privacy to a public (or other) store for research.
- See how one's DNA profile is related to personal information.
- Potential for complete, **longitudinal data of individual** and population, with trust.
- Sharing can be **compensated**.
- Distributed data model improves security, lowers costs.

Blockchain FAQs

- What is the risk of patient privacy breaches if blockchain nodes are hacked?
- Though we understand blockchain apps will primarily contain pointers to patient data, will these firms also be storing patient data for smaller customers?
- Are there HIPAA compliance issues limiting implementation?
- Where will users/patients store private keys? What if they are lost?
- How is a single user's data residing across multiple databases being linked initially? (assuming data was not associated with a user's public token)
- Ideas on getting other nodes to contribute data?
- •Will patients see all data that's added to their wallet? Will they verify the data's accuracy or be able to change it?





#MakeHealthDataYourData