The Evolution and Ramifications of Blockchain: What is the impact on Interoperability?

Unlocking Healthcare Data

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Conflict of Interest

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Have no real or apparent conflicts of interest to report.
Agenda

- Why is blockchain special?
- Address the “What is appropriate and not appropriate for blockchain?”
- What are the appropriate use cases?
- Where are we going from here and how are we likely to evolve?
- Addressing the perceived issue of “blockchain islands” and addressing interoperability concerns
- How can we leverage blockchain technology within existing hub/spoke architectures?
- How to evaluate whether blockchain technology is the right solution? Provide a step-by-step decision guide
- Is it worth ROI?
Learning Objectives

- Discuss how blockchain intersects with current interoperability standards and methods
- Recognize the importance of a decentralized distributed ledger system to as the infrastructure for interoperability
- Identify key-takeaways and call to action for organizations to start to plan distributed ledger technologies for their organizations
“Tomorrow belongs to those who can hear it coming.”

- David Bowie
What’s the Big Deal with Blockchain and Healthcare?

Potential to transform significant areas of healthcare:

- increasing interoperability
- bringing efficiency to processes
- maintaining security and privacy
First, a Little History

• 2008: Satoshi Nakamoto’s white paper titled “Bitcoin: A Peer to Peer Electronic Cash System”

• Designing of the blockchain database, a distributed database containing continuously-growing list of data records secured from revision and tampering

• The first block in the initial blockchain was created by Nakamoto and is known as the Genesis Block

• Black swan = unforeseen event
What Is It?

- Blockchain technology = distributed ledger technology
- Network of computers (nodes) each running software
- Digital records on the blockchain cannot be modified
- Consensus driven – no central server
- Transparent
- Cryptographically safeguarded
What It Is Not ≠ Bitcoin

- Bitcoin is an electronic currency that is validated by the underlying blockchain foundation

- A blockchain application (Dapp) does not need to be associated with cryptocurrencies
What It Is Not ≠ Database

• Terrible database
• Inefficient at storing data of significant size
What Makes It Special?

- It is a list (or ledger) of encrypted transactions that once created cannot be changed, therefore it is trusted.

- When trust is codified in software there is no need to rely on third parties.
Why It Matters? – Inviolate

- Permanent and unchangeable
- Write once and read only
- Can be a countless number of chronically linked blocks in the chain
- Each completed block that enters the chain contains irreversible data.
Why It Matters? - Trust

- No single server holds the records
- Allows trust between unknown parties
- Trust is decentralized
- No central authority needed to process and validate transactions
- Trust is electronically embedded in the software foundation
Potential Use Cases in Healthcare

Potential to transform significant areas of healthcare by increasing interoperability, bringing efficiency to processes, and employing smart contracts while still maintaining security and privacy.

- Health Data
- Pharmaceutical Supply Chain
- Clinical Trials and Research
- Professional Credentialing
- Revenue Cycle
- Others: patient compliance and monetization of data, etc.
Health Data

Can offer technological solutions to the present gaps in health data interoperability:

• Promote interoperability through collaborative version control by ensuring each participant in the network has a record of transactions occurring on the network

• Potentially eliminate or reduce the costs and reliance on intermediaries

• Support EHRs, PHRs, and HIEs by accessing time stamped data on the blockchain
Pharmaceutical Supply Chain

Can be the foundation for drug supply chain provenance and integrity:

• Track medication distribution at different stages of supply chain including at the drug level, to authenticate prescriptions, ensure a chain-of-custody log, and enhance transparency of components during the manufacturing of medications

• Allow consumers to track pharmaceutical products from the manufacturer throughout the supply chain to their home
Clinical Trials & Research

Shows promise in improving the current process by supporting safer, faster, trusted, and more efficient clinical trials:

• Protocols for consent and revision are traceable for stakeholders and transparent for patients

• Eradicates fraudulent modification of data

• Provenance of distribution of trial drugs and devices
Professional Credentialing

Eliminates the need for repetitive time consuming and costly administrative actions

• Records from a verifiable source can be stored on a blockchain

• Subsequent credentialing only requires update from last trusted block
Revenue Cycle

Addresses the current inefficient system of identification, coverage proof, delivery documentation, and gaps that span from mis-coding to inefficient appeal flow:

• Insurance confirmation
• Network confirmation
• Pre-authorization
• Release of payment
Where Are We in Adoption?

- Technology trigger 2009
- Peak of inflated expectations 2017/2018
- Trough of Disillusionment 2018
- Slope of Enlightenment 2019?
- Plateau of productivity?
How Can We Integrate Blockchain?

Current Healthcare Infrastructure

- Software & Applications
- Electronic Medical Record Databases
- Health Information Exchanges (HIE)
- Interoperability Standards & Infrastructure
  - HL7 FHIR®
  - IHE
  - APIs
A History on Health Data Exchange
Today’s Health Data Exchange
The Many Flavors of Blockchain
Need to Standardized

Current Organizations working on Blockchain Standards

- EHNAC
- IEEE
- Private Consortias
The ONC Vision and Blockchain

Must Build On:

- Existing technical standards and functions
- Certification process for health IT products & services
- A supportive ecosystem
  - Clinical, cultural and regulatory environment
- The rules of engagement of the exchange of health data and information
The ONC Vision and Blockchain

Blockchain Must Offer:

- Improved data integrity
- Enabling scaled interoperability for information exchange
- Patient tracking with identity assurance and validation
- Privacy
- Robust audit trails
- Improved healthcare-related security
The ONC Vision and Blockchain

Blockchain Provides:

- Cryptographic techniques
  - Public and private key pairs
  - Distributed Ledger
- Smart Contracts
- Patient management of their own private keys
- No Personal Health Information (PHI) on the blockchain
Is Blockchain Right for You

• Does blockchain fit within your organization
  – What problem(s) are you trying to solve
  – Blockchain is a tool, not the goal
• What are the best use cases
  – Start small and build
• Identify the correct ecosystem
  – Define the players
• Hold fast to rules of engagement
  – Smart contracts and identity proofing
• Reshape your talent
  – Embrace the new technology internally
Evaluating the ROI of Blockchain

- Increased Efficiency
  - Less waste
- Reduced Lag Times
  - Claims
  - Clinical Data
- Reduced Liability
- Computing Power
  - Costs of hardware upgrades
- Storage
  - In house vs. remote
- Skill Set
  - Retrain vs. new hire
Questions

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