

HIMSS[®]18

The leading health information and technology conference

WHERE **THE WORLD** CONNECTS FOR HEALTH

Conference & Exhibition | March 5–9, 2018

Las Vegas | Venetian – Palazzo – Sands Expo Center

Blockchain 101 for Healthcare Session 145 | March 7, 2018, 11:30 a.m.

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The Linux Foundation

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COMMITMENT

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Conflict of Interest Disclosure

Brian Behlendorf and Corey Todaro have no real or apparent conflicts of interest to report.

Conflict of Interest Disclosure

- **Setting the stage** (The case for blockchain in healthcare, paradigm changes, debunking myths)
- **Ledger technologies, a brief history**
- **Blockchain 101** (distributed ledgers, hash functions, smart contracts, different types)
- **Industry adoption** (healthcare uses cases, Hyperledger Healthcare Working Group)

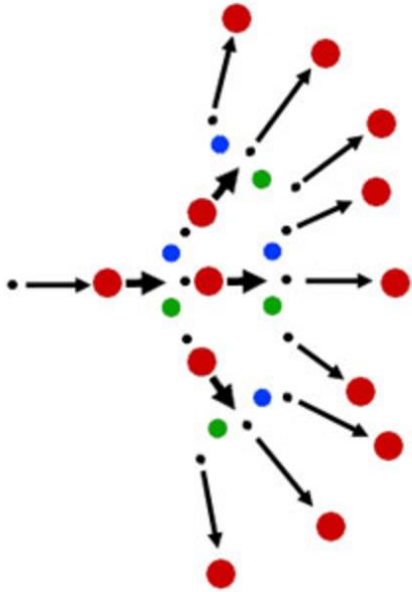
Agenda

- **Setting the stage** (The case for blockchain in healthcare, paradigm changes, debunking myths)
- **Ledger technologies, a brief history**
- **Blockchain 101** (distributed ledgers, hash functions, smart contracts, different types)
- **Industry adoption** (healthcare uses cases, Hyperledger Healthcare Working Group)

Learning Objectives

- Recognize what blockchain technology is and what it isn't
- Describe use cases of blockchain technology in healthcare
- Discuss what should be considered when looking at blockchain
- Identify best practices for applying blockchain in healthcare
- Recognize that blockchain is not a fit for everything and discuss other possible solutions

The Case for Blockchain in Healthcare

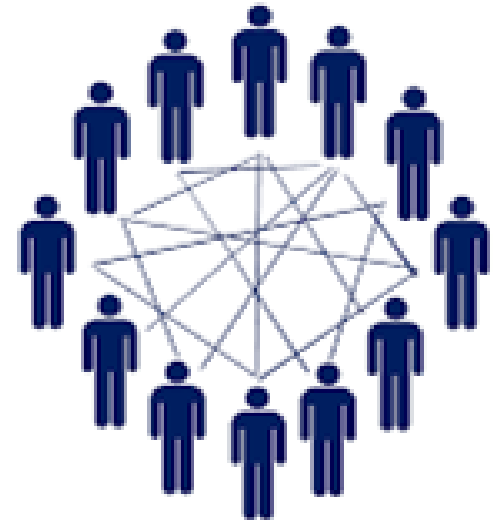


- Friction and cost in healthcare arises from closed, controlled operating systems and a fundamental lack of interoperability between entrenched silos and market competitors.
- Healthcare operates under a complex and overlapping regulatory regime.
- Every provision of care triggers a cascade of administrative transactions across multiple, distinct organizations and enterprises.

Paradigm Change: Control

“Blockchain networks rely on a decentralized infrastructure that can’t be controlled by any one person or group. Blockchain governance is not emergent from the community. Rather, it is ex ante, encoded in the protocols and processes as an integral part of the original network architecture.”

– Harvard Business Review, April 2017





The first long-distance trade occurred between Mesopotamia and the Indus Valley in Pakistan ~3000 B.C.

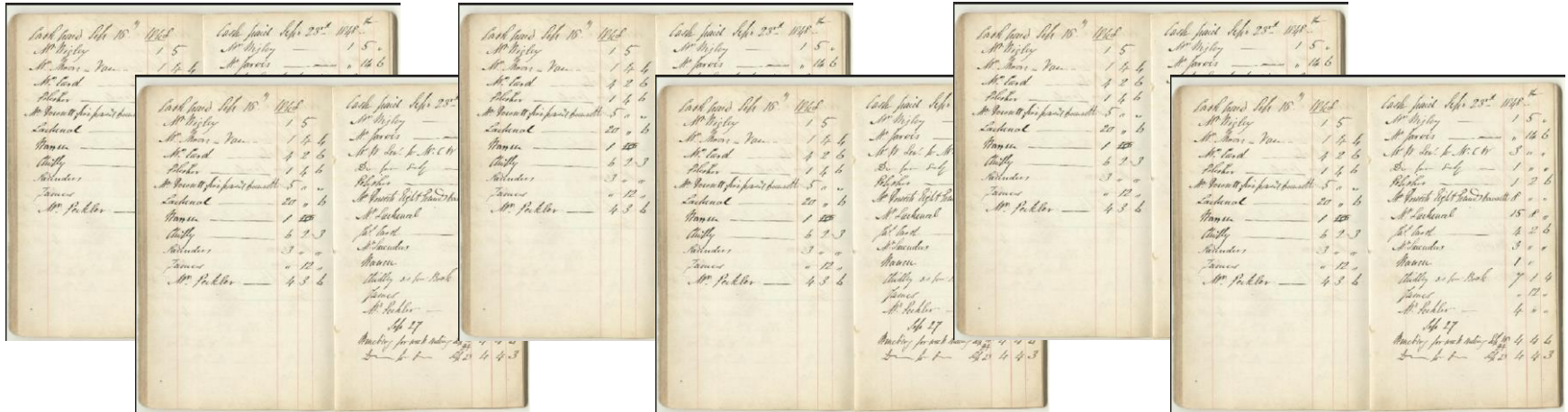
How do we agree on an assets balance?



Traditional Ledgers

Sept 16 th 1848		Sept 23 rd 1848	
Cash paid	1 5	Cash paid	1 5
M ^r Wigley	1 4 6	M ^r Wigley	1 4 6
M ^r Moore - Van	4 2 6	M ^r Jones	3 " "
M ^r Lord	1 4 6	M ^r W. Sew. for M ^r . C. W.	1 " "
Plisher	5 " "	Do for July	1 2 6
M ^r Jernett for paid board	20 " 6	Plisher	15 " "
Lachenal	1 " "	M ^r Varsity Eight Paid Board	15 " "
Hansen	6 2 3	M ^r Lachenal	4 2 6
Whitely	3 " "	J ^r Lord	3 " "
Palander	" 12 "	M ^r Sacader	1 " "
James	4 3 6	Hansen	7 1 4
M ^r Peckler		Whitely as for Book	" 12 "
		James	4 " "
		M ^r Peckler	
		Sept 27	
		M ^r Jones for book binding	4 4 6
		Do for "	4 4 3

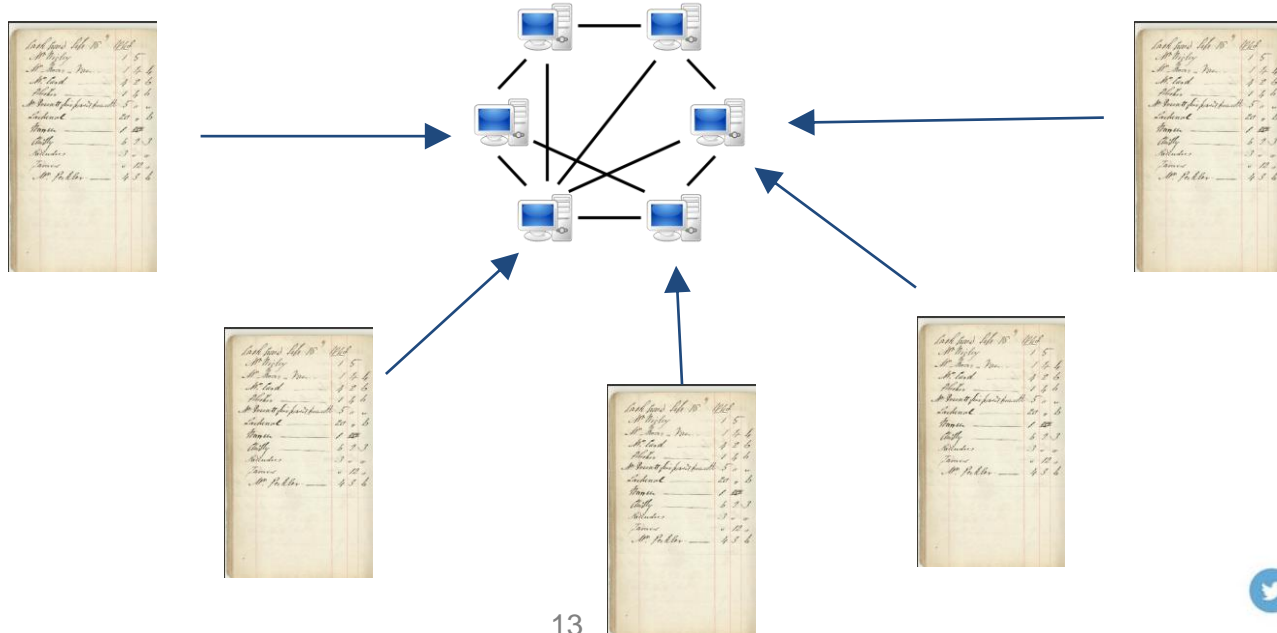
Traditional Ledgers



In the digital world there are many copies that may contain different versions. **The challenge:** Which do you trust as the single source of truth?



Now We Can Keep Our Ledgers In Sync



Facets of Distributed, Shared Ledgers

Network nodes both generate own data and verify data generated by others	Contain historic record of verified transactions and easily auditable	Distributed Consensus eliminates costly and inefficient reconciliation processes
No central repository – each node stores identical copies of the ledger	Resilient due to network power and cryptographic integrity	Large economic disincentive for malicious actors

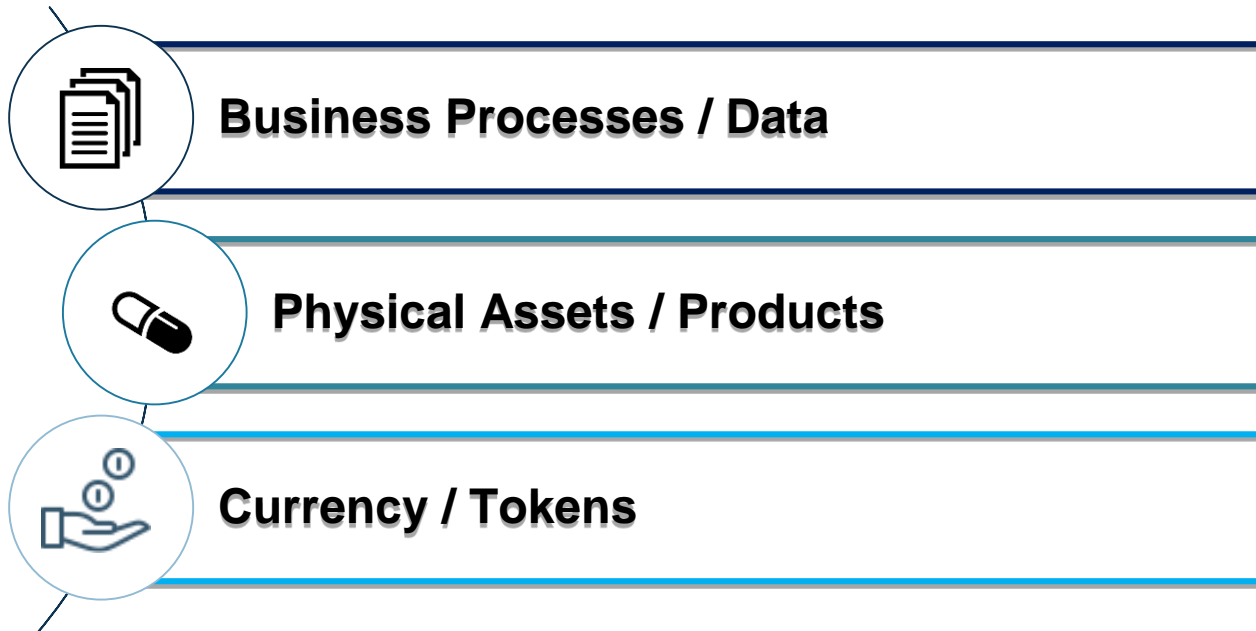
Blockchains and Cryptocurrencies

A cryptocurrency is just one kind of application that uses a blockchain.

Blockchains and cryptocurrencies are often discussed in similar contexts, but they are not one in the same.

Tokenization has interesting uses, but usually, a coin is not necessary for a blockchain application.

Paradigm Change: Assets and Transactions



Public? Private?

**Permissionless
Public**

**Permissionless
Private**

**Permissioned
Public**

**Permissioned
Private**

Bitcoin,
Ethereum

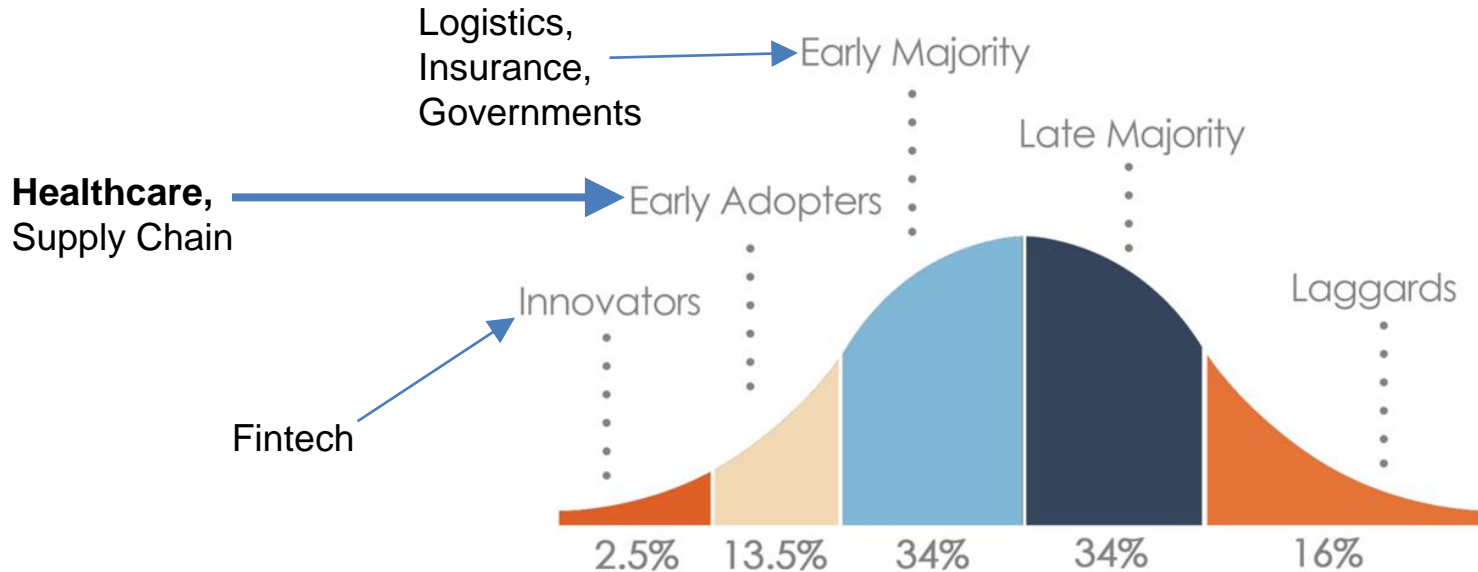
Public Polls

Land titles,
University degrees

Medical records

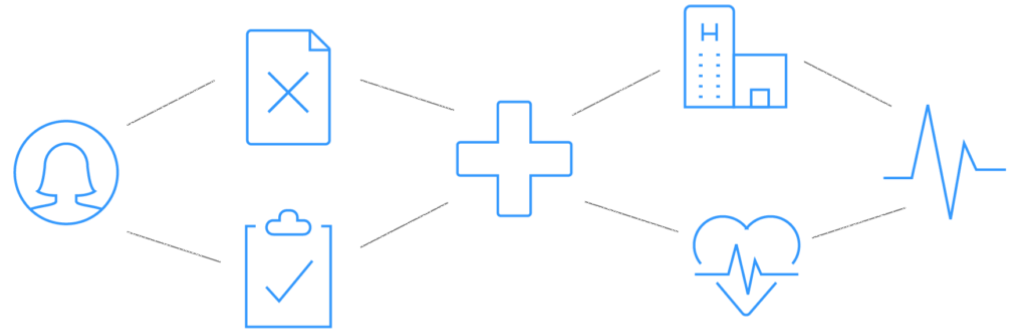
- **Permissioned vs. Permissionless:** Who can write to a blockchain (i.e., accessibility)
- **Public vs. Private:** Who can read from a blockchain (i.e., visibility)

Blockchain Industries Curve

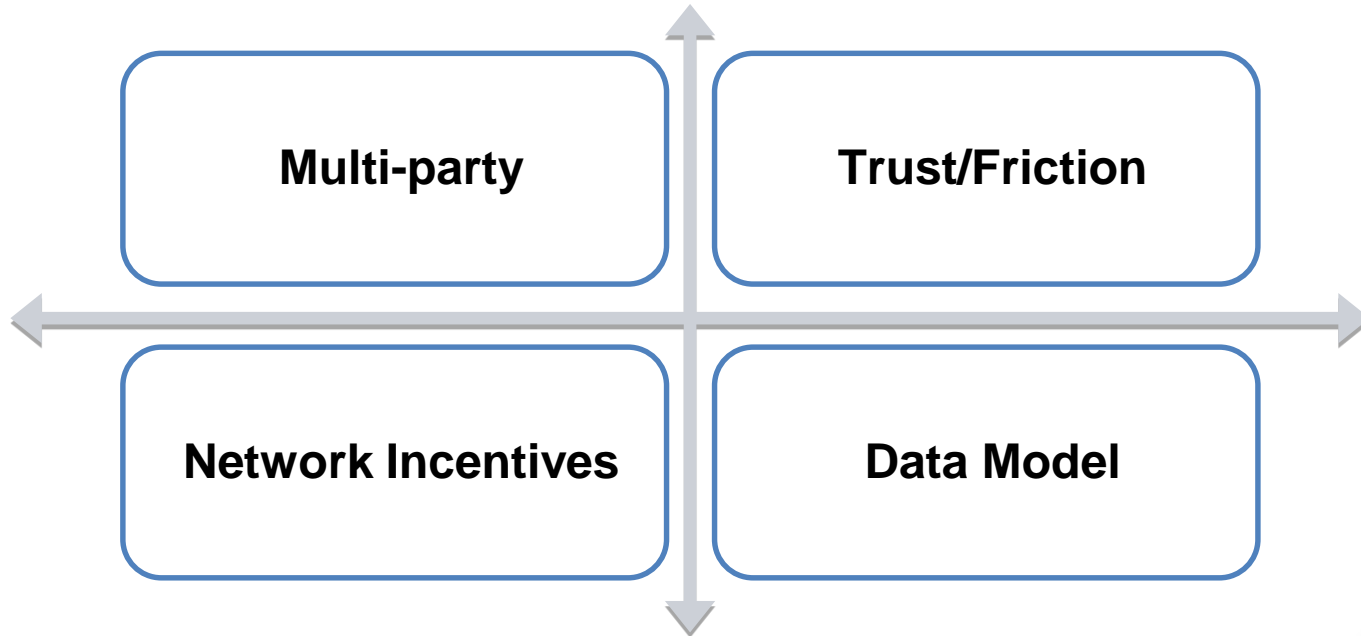


Healthcare Areas Ripe for Exploration

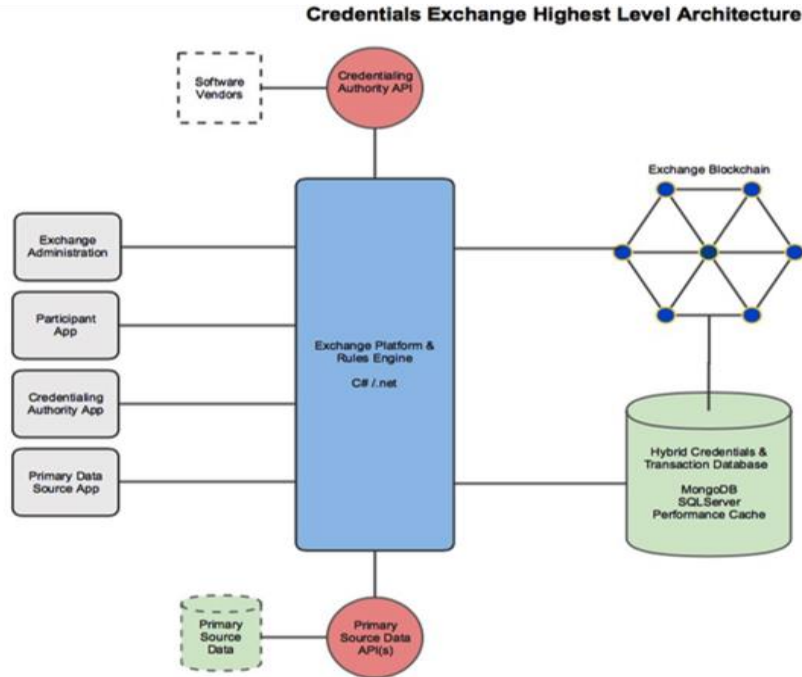
- Provider directories
- Pharmaceutical supply chains
- Insurance / claims processing
- Portable health records
- Payments
- Repeatable prescriptions
- Employee certification



Rubric for Use Case Ideation



Use Case: Provider Credentialing



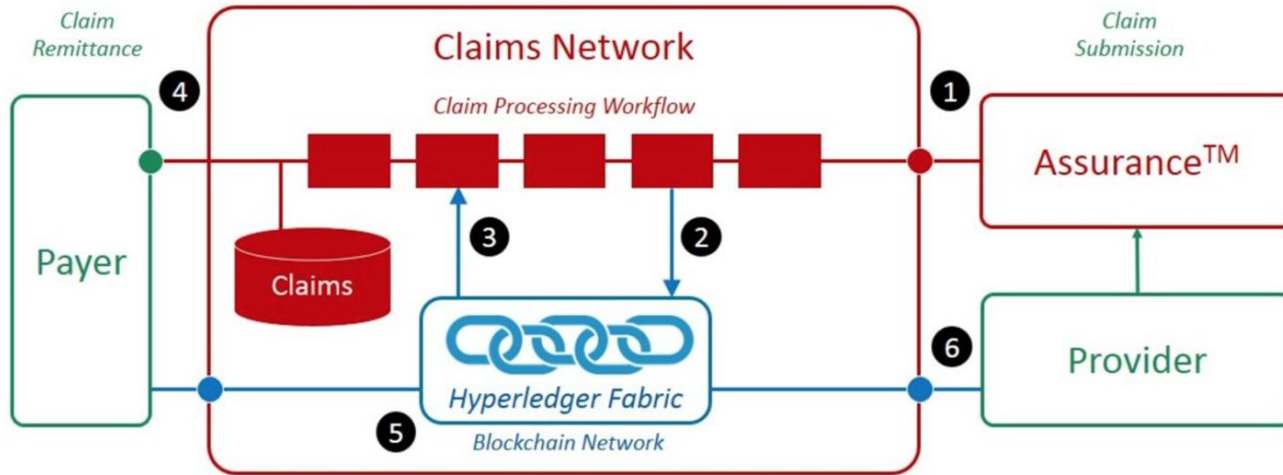
Primary source verification and open exchange of provider credentials.



HEALTHCARE BLOCKCHAIN INNOVATION



Use Case: Claims Transparency



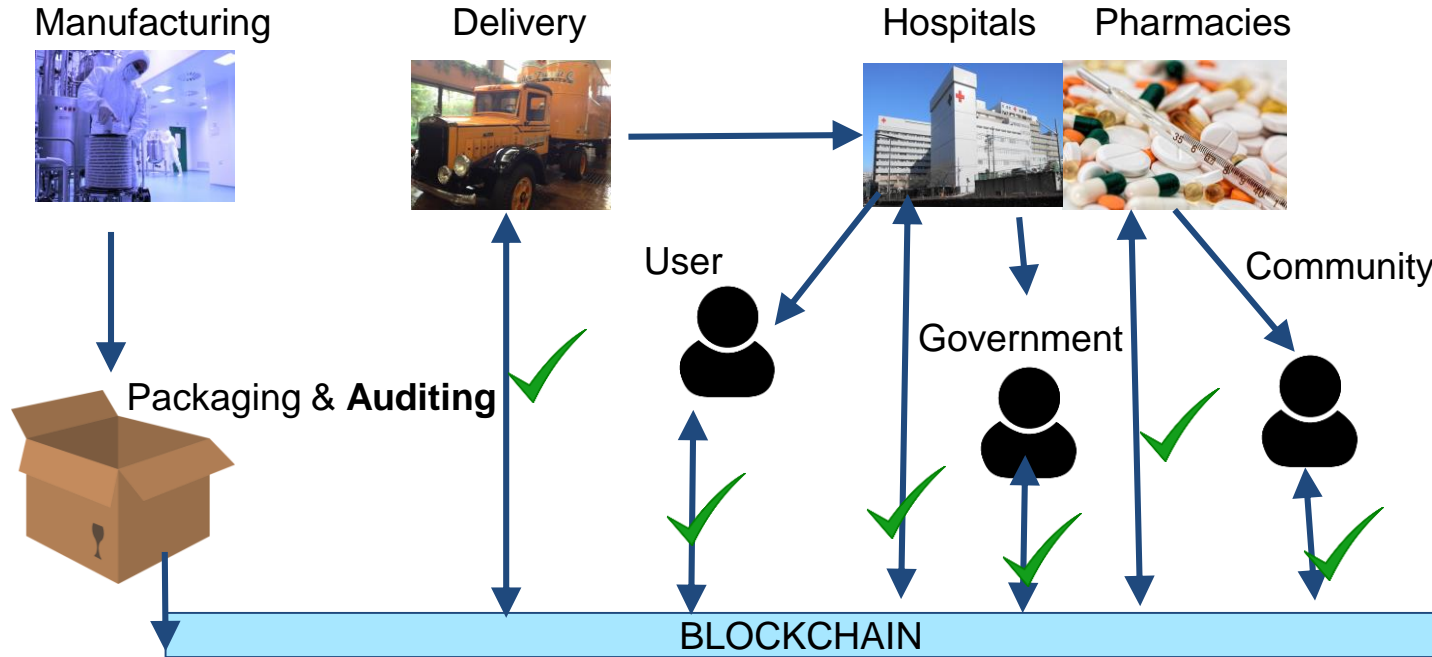
- 1 Claims submitted for payment by Provider
- 2 Claims Network workflow writes claim lifecycle events to blockchain
- 3 Blockchain events trigger Claims Network workflow activity
- 4 Claims submitted to Payer for processing
- 5 Blockchain maintains real-time immutable record of claim lifecycle
- 6 Provider accesses claim status from blockchain via API

- Claims Network Components
- Blockchain Components
- Customer Components

Claims management transparency between payers, providers, and other parties.

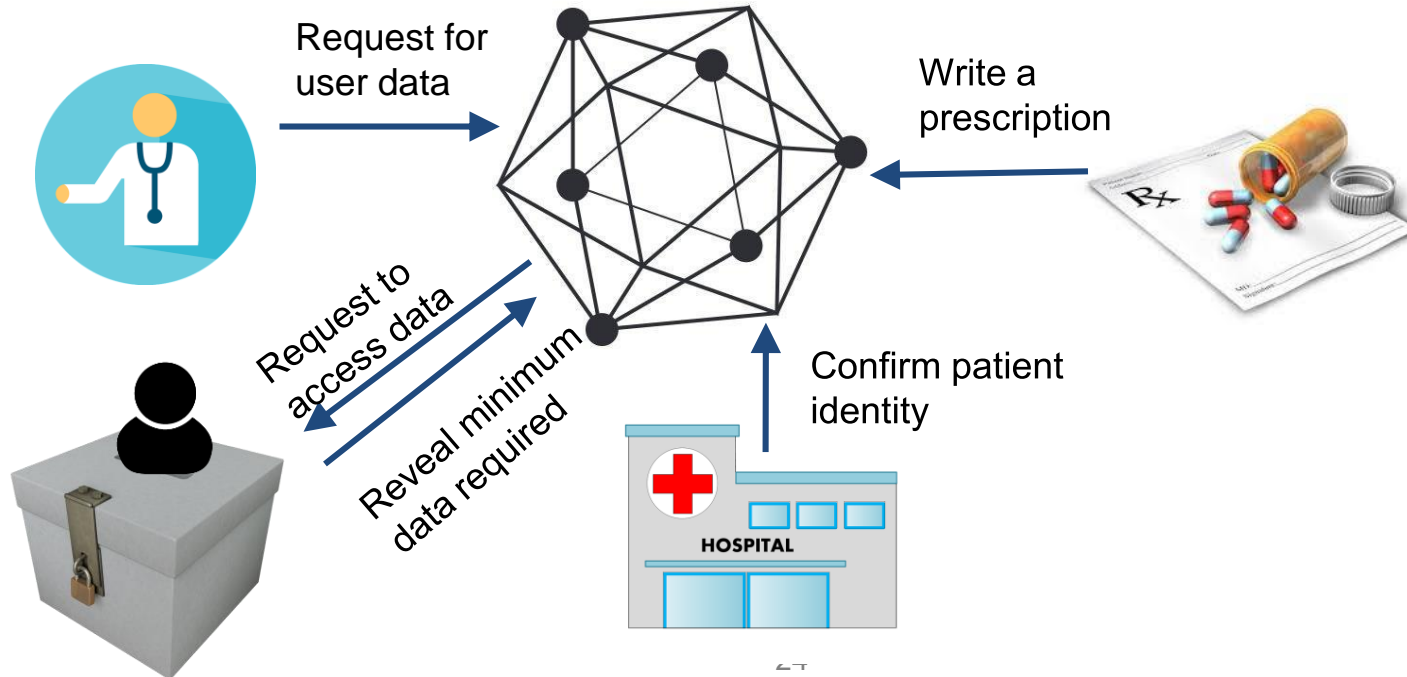
CHANGE
HEALTHCARE

Use Case: Pharmaceuticals Tracking



Results: prevent fraud; better manage responses to quality issues; perhaps even link to health outcomes.

Use Case: Healthcare Records



Collaborate With Us!

(No need to be technical)

Join the open Hyperledger Healthcare Working Group (HLHC) mailing list and participate in our open calls to help bring commercial blockchain adoption to the healthcare industry.

Learn more at
<https://hyperledger.org/industries/healthcare>

CHANGE
HEALTHCARE



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HEALTHCARE BLOCKCHAIN INNOVATION

 **KAISER PERMANENTE**

 **patientory**

Questions?



HYPERLEDGER

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