The Art of Trust: Blockchain Technology

Texas HFMA
Today’s Presentation

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Back to the Future: 1995
A little thing called “the internet”
History 101 – 10 inventions that changed the world

1. The Wheel, 3500 BC
   - The stroke of brilliance: The wheel / axle concept
   - The Gap: Labor

2. The Nail, 0
   - The stroke of brilliance: Fastening without wood
   - The Gap: Shelter

3. The Compass, 900 BC
   - The stroke of brilliance: Consistency of direction
   - The Gap: Discovery

4. The Printing Press, 1400 AD
   - The stroke of brilliance: Moveable type
   - The Gap: Knowledge

5. The Engine, 1860 – 1900 AD
   - The stroke of brilliance: Conversion of chemical to mechanical work
   - The Gap: Power
History 101 – 10 inventions that changed the world

6. The Telephone, 1876
   - The stroke of brilliance: Electronic voice transmission
   - The Gap: Communication

7. The Lightbulb, 1879
   - The stroke of brilliance: Carbon filament light bulb
   - The Gap: Productivity

8. Vaccination, 1796, 1926
   - The stroke of brilliance: Eradication of infection
   - The Gap: Disease

9. The Internet, 1965
   - The stroke of brilliance: Electronic data packet transfer
   - The Gap: Distance

10. Blockchain, 2009
    - The stroke of brilliance: Distributed ledger / triple accounting
    - The Gap: Trust
Double vs. Triple Entry Accounting

Double Entry Accounting

<table>
<thead>
<tr>
<th>DEBIT</th>
<th>CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSETS</td>
<td>ASSETS</td>
</tr>
<tr>
<td>LIABILITY</td>
<td>LIABILITY</td>
</tr>
<tr>
<td>EQUITY</td>
<td>EQUITY</td>
</tr>
<tr>
<td>EXPENSES</td>
<td>REVENUE</td>
</tr>
</tbody>
</table>

Accounts are increased and decreased with a debit or credit

Triple Entry Accounting

It’s tough to lie when everyone is watching...
What do you think of when you hear the word Blockchain?
To level set, Blockchain is not Bitcoin

Blockchain ≠ Crypto-Currency

1. Blockchain, *does not* require crypto-currency.
2. The platform can be constructed to handle a varying set of rules and configurations.
3. Related technology, such as smart contracts, can greatly improve process efficiency, transparency, reliability and reduce risk.

1. A crypto-currency is merely *one application of* crypto-technology, allowing the transfer of value via transactions recorded on a Blockchain.
2. There are many existing crypto-currencies, most notably Bitcoin.
3. Specific to crypto-currencies a key benefit include preventing double spending.
The problem with ledgers today is that you can tamper with them causing a trust issue.
Blockchain technology is a tamper-proof ledger that bridges the ‘Trust Gap’
The problem with ledgers today is that you can tamper with them causing a trust issue.

Example Source: Blockchain: Massively Simplified | Richie Etwaru | TedXMorristown
<table>
<thead>
<tr>
<th>Doctor</th>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncologist</td>
<td>2011</td>
<td>Biopsy</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>2010</td>
<td>Prescription</td>
</tr>
<tr>
<td>General Practitioner</td>
<td>2005</td>
<td>Annual check-up</td>
</tr>
<tr>
<td>Acute Care Provider</td>
<td>2000</td>
<td>Strep throat</td>
</tr>
<tr>
<td>General Practitioner</td>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>General Practitioner</td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>Physician Therapist</td>
<td>1985</td>
<td>broken leg</td>
</tr>
<tr>
<td>Orthopedist</td>
<td>1982</td>
<td></td>
</tr>
</tbody>
</table>

Blockchain technology is a tamper proof ledger that bridges the ‘Trust Gap’.

Example Source: Blockchain: Massively Simplified | Richie Etwaru | TedXMorristown
A crypto-currency is merely one application of crypto-technology, allowing the transfer of value via transactions recorded on a Blockchain.

There are many existing crypto-currencies, most notably Bitcoin.

Specific to currencies or finance, benefits include preventing double spending, and a single ledger arrived at by consensus.

**Blockchain Technology – Distributed Ledger**

### Centralized Ledger
1. Central repository
2. Tamper-able
3. No accountability for changes among a network

### Distributed Ledger
1. No central repository
2. In-tamperable
3. Copy of the same ledger spread across the network
Blockchain is a decentralized ledger of transaction in a network.

Someone in a network requests a transaction.

The transaction is broadcast to other computers (nodes) in the network.

The network of nodes validates the transaction using agreed algorithms.

The transaction is complete.

The new block is added to the network’s blockchain, in a way which is permanent and unalterable.

The verified transaction is combined with other transactions to create a new block of data for the ledger.

Smart contract (additional business logic) could be applied if needed.
The Blockchain ecosystem is leverage the following technological advancements to drive digital marketplaces

Distributed ledger
Every participant in the network has simultaneous access to a view of the information

Cryptography
Integrity and security of the information on the blockchain are ensured with cryptographic functions

Consensus
Verification is achieved by participants confirming changes with one another, replacing the need for a third party to authorize transactions

Smart contracts
The ability to run additional business logic means that agreement on the expected behavior of financial instruments can be embedded in the blockchain

What does this mean for your organization?
Near real-time data availability and transparency that can eliminate the need for reconciliation
Prevents unwanted intrusion on the network from non-authenticated participants
Facility for peers in the network to validate updated information ensuring validity and integrity of the data on the chain
Facilitates the ability to design and implement shared workflow and enhance automation
Learning Check

Understanding blockchain’s underlying functionality
Potential Use Cases for Blockchain Technology in Healthcare
We believe several promising Blockchain based use cases will be explored and enabled over the next 3-5 years.

- Provider Data Management
- Fraud, Waste and Abuse
- Transparent, Seamless Payments
- Seamless Claims Processing
- Medicaid Management Information System
- Health Data Interoperability
- Portable Health Record
- Care Plans/Care Management
- Transparent Eligibility and Coverage
- Patient Generated Health Data
- Cyber Security and IoT
- Training Certification

Legend:
- Payer Administration Simplification
- Clinical Efficiency
- Health & Wellness Management
- Other
- Detailed Use Cases
Blockchain solutions are currently being piloted by various companies across the healthcare ecosystem

Interoperability
Medicalchain is currently working with Coinsilium, NHS, Wings, and Hyperledger to bring a blockchain platform to life that will allow patients to control and share their medical records.

Contracting Solutions
Curisim provides scalable innovative contracting solutions for payers, providers, and life science companies to enter into patient-centric, secure and efficient innovative contracting arrangements.

Claims Management
Change Healthcare is retooling their Intelligent Healthcare Network platform which will allow for improved transparency and efficiency of claims management.

Wearables
Med Rec, using Ethereum, is designing a platform for patients to control their medical data, including clinical EHR records and data from personal health wearables like Fitbit. Patients can securely allow providers, researchers and family members to access their data.

Patient Application
MedChain is utilizing the blockchain to create a longitudinal record of a patient's health history. They are supplementing this technology with a patient facing application.

Research Database
Blockchain health is launching a platform that is specifically focused to help users share their health data with researchers through a fully integrated platform.

**Hot off the Press**

Humana, UnitedHealthcare, Optum, Quest Diagnostics and Multiplan pilot blockchain provider data management platform

Announced in early April 2018, Humana, UHC, Optum, Quest Diagnostics, and Multiplan are piloting a provider data management program utilizing blockchain. In this pilot, that will be launched in the summer of 2018, participants would be able to share provider demographic and participation data in near real time at a lower cost and without having to reconcile different data, the companies said in a joint statement.
Provider Data Management (PDM) is a strong potential use case for Blockchain.
Direct submission of claims through a Blockchain ledger can reduce the complexity and use of clearinghouses

Claims Process Flow Diagram

- Verify eligibility
- Provider performs services
- Coding and claim submission
- Claim is routed to payer via the use of clearinghouse
- Payer adjudicates the claim
- Payer determines financial responsibility
- Determine additional coverage information for members by querying the blockchain ledger
- Approve claims with near-instantaneous payment without the need for a third-party financial intermediary.
- Payer rejects claim

Blockchain has the potential to simplify member eligibility verification transactions.

Blockchain solution

- Ability to post claims directly to a blockchain ledger, allowing payers to access and process claims without the need for clearinghouses.

Claims with errors could be rejected through the blockchain network.
Portable Health Record – Current State

Every player in the ecosystems transfers health data with the consumer and/or with each other, creating a complex network of information exchange that requires quick and secure access.
**Portable Health Record—Future State**

A complete, portable health record owned by the consumer. All players in the healthcare ecosystem (health systems, health plans, community physicians, labs, etc.) access data on the Blockchain enabling trusted data sharing, providing a secure and accessible platform for health records.

**Future Health Data Flows (Non-Exhaustive)**

Transactions on the blockchain contain links to encrypted data sources, enabling a standard way to access health records.

- Health Systems
- Post-Acute Centers
- Pharmacies
- Urgent Care / AMCs
- Assisted Living
- Home Health
- Health Plans
- Community Physicians
- Reference Labs
- Clinical Trials
- Surgery Centers
- Behavioral Health
- Data Storage Services
- EHR Systems
- Device Vendors

Note: Leverage existing HL7/FHIR data standards so that EHR systems can more easily integrate their data with the Blockchain.

Seamless sharing of consumer health data across the healthcare ecosystem.
The future state ensures consumer control of portable health records
Meet Stuart:
At CrossFit, Stuart missed a step doing box jumps and landed badly. He is in pain and not sure if he should get up.

“I want to find the fastest way to get back on my feet”
Considerations for Blockchain Adoption
Organizations will need to answer the following questions to fully understand the potential implications of blockchain:

1. What risk does Blockchain-enabled solutions pose to the organization?
2. How will Blockchain-enabled solutions impact the customer experience? What is the impact on provider business models?
3. What is the maturity timeline for Blockchain-enabled technology?
4. How are competitors and comparable organizations in other industries approaching the situation?
Blockchain technology could not only help business models today but can launch new solutions for administrative simplification across the industry.

**Business Model Impact**

**From...**

- Products and services to enable collaboration and **information sharing** across the healthcare ecosystem (COB)
- Standardization of operating rules for **electronic business transaction** (CORE)
- Certification of health organizations that follow the standard operating rules for **electronic transactions**
- **Leveraging** the large provider network to keep provider data up-to-date

**...To**

- Products, services and the underlying **blockchain infrastructure** on which some of the products are built
- Governance and policies to manage the shared **blockchain network**
- Potential for **subscription/transaction revenue** for partners (health plans, providers) leveraging the network
- **Enabling** the large provider network to keep their records up-to-date
Leaders need to consider additional factors to drive the successful adoption of Blockchain based ecosystems and solutions

**Adoption**
Participants must come to group agreement on **industry-wide standard** and a universal set of protocols and standards. Without accepted regulatory guidelines, healthcare entities may hesitate to embrace blockchain technology.

**Legal and Regulatory Framework**
There are no global regulatory bodies setting the standards on blockchain technology. **HIPAA regulations** have not specified the implications of using blockchain for patient data storage.

**Cost**
Maintenance of the blockchain platform, technology and data storage costs will be a **shared responsibility** across all the entities.

**Maturity**
Companies should anticipate the right time to involve themselves with blockchain to shape standard setting and the evolution of the industry.

**Reliability**
Blockchain requires frequent updates for the most current data available across parties involved in the transaction (e.g., providers to update credentialing and demographic data for payers to have accurate information for processing).

**Security**
A blockchain can either be public, permissioned or private, having either no centralized authority, a consortium of organizations determining the participants or a centralized authority. Gaining **wide-spread consent** from providers to allow outside players access their patient’s health records.
Adoption of Blockchain based solutions and the development of commercially useful solutions will be an evolutionary process

<table>
<thead>
<tr>
<th>Today</th>
<th>Near Term (Today - 3 Years)</th>
<th>Longer Term (5-10 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="" /> All transactions point-to-point between individual parties and via third parties (e.g., clearinghouses)</td>
<td><img src="image2.png" alt="" /> Pilot programs will demonstrate viability of the technology and limited solutions will be available</td>
<td><img src="image3.png" alt="" /> Blockchain solutions will be widely available to address a variety of business problems</td>
</tr>
</tbody>
</table>

The healthcare market today is a complex ecosystem:

- Most interactions between players in the health industry are point-to-point
- Blockchain solutions are primarily conceptual and the technology is in the early stages of adoption with activity in the proof of concept/pilot applications

Initial Blockchain solutions will be smaller-scale to prove viability:

- Pilot programs will be implemented to test the feasibility of Blockchain
- New ecosystem challenges without current solutions will face the least resistance to adoption (e.g., IoT)
- Standardization of complex interactions between multiple parties will also be of early interest
- Replacement solutions for existing processes may be undertaken by vendors in efforts to initiate business transformation

Blockchain based solutions will mature and solutions will become ubiquitous:

- Revision of existing processes will face greater challenges, but enterprising organizations will eventually offer Blockchain solutions
- Organizations facing disintermediation will either push efforts to improve existing technology or will invest in the new Blockchain ecosystem
Thank you