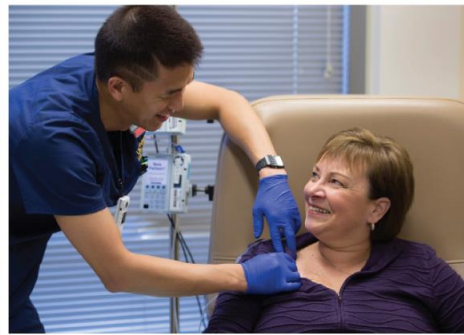# HyperLedger HC SIG – Health Info Exchange Today and Blockchains Future Fit

Michael Marchant, UC Davis Health

Director, Health Information Exchange and Systems Integration

Overview:

My discussion will be centered around the current exchange frameworks and standards supporting that facilitate Health Information Exchange. I will discuss where that exchange works today and where it falls short. I will also present some current Healthcare use cases that I am familiar with and where I opportunities for Blockchain to be a viable solution for those areas where it is not working.

Michael Marchant has spent the last 25+ years implementing technology and integrating data in leadership roles working with and for application vendors, provider organizations and government entities. His expertise in the area of data integration has been built in connecting his customers with applications and data in a myriad of standard and non-standard ways throughout his career.

A former member of the [HIMSS Interoperability and HIE Committee](#) and currently serving on the HIMSS BlockChain Task Force as well as the Carequality FHIR Technical Workgroup which helps both organizations establish direction and continuity for their membership with evolving solutions, organizational messaging and helping drive organizational decisions and action.

His current role as Director of HIE and System Integration for UC Davis Health has him solving interoperability challenges for a leading HealthCare Organization advancing educational, clinical and research missions. Michael is actively working to leverage technology to connect patients and their health information through his work at UC Davis Health to integrate genomic data, connect new devices for IoT, capture patient generated data for Apple Healthkit and SDoH and continually evolve organizational solutions to better connect and utilize the information found in UC Davis Health's application ecosystem.

About UC Davis Health

- **Academic Health System for inland Northern California**

- **Schools of medicine, nursing, 1 major medical center, extensive primary care network**

- **1,473 faculty | 1,902 trainees | 11,610 staff**

- **627 beds | 34,564 admissions/year**

- **78,022 ED visits**

- **949,802 office visits**

- **$299M external research funding in 2017**

- **$2.16B in revenue in 2017**

1. Introduction
2. Overview of Interoperability Options
3. Current State and Standards
4. National Exchange Networks & Methodologies
5. FHIR – what is it and why is it hot?
6. Blockchain – why all the hype?
7. Close with Q&A
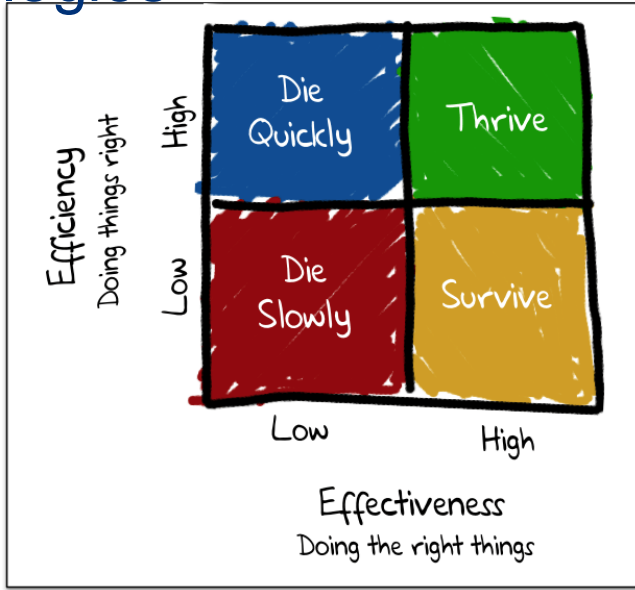
Introduction & Overview

- What is Health Information Exchange

Health information exchange (**HIE**) is the mobilization of health care information electronically across organizations within a region, community or hospital system. In practice the term HIE may also refer to the organization that facilitates the exchange.

HIE provides the capability to electronically move clinical information among different health care information systems. The goal of HIE is to facilitate access to and retrieval of clinical data to provide safer and more timely, efficient, effective, and equitable patient-centered care. HIE is also useful to public health authorities to assist in analyses of the health of the population.

(Wikipedia)

Verb vs. Noun

- **Health Info Exchange** – **Noun** – is a vendor, software or service provided to you to support the exchange of information with customers and business partners

- **Health Info Exchange** – **Verb** – the act of sending information between business partners for entities for Treatment, Payment and/or Operations (TPO)

Starting from the bottom

- **How do you want to handle HIE**
  - **Health Info Exchange – Noun**
  - **Health Info Exchange – Verb**

- **Are you leveraging standards or creating point solutions?**

- **What type of information do you want to exchange?**

- **Are you aware of the exchange standards?**

- **Do you have the technical competence, staff and knowledge?**

What are we doing?

- **National Exchange Networks**
  - **eHealth Exchange** – connects UC Davis to SSA, VA, Dignity, Davita
  - **Carequality** – connects UC Davis to participating entities
  - **Commonwell** – connects participants (Carequality implementer)
  - **DIRECT** – secure 'email like' ability to push information to other providers
- **Are you leveraging standards or creating point solutions?**
  - Data standards like HL7, FHIR, X12, IHE Profiles help identify the types of transactions and data in a particular exchange, industry vendors supporting those standards usually help your organization to connect and exchange data, sometimes vendor interpretation of the standard can differ, which impacts the speed from start to finish of a particular exchange.

What are your needs?

- **Clearly identify use cases**

- **Is there an existing standard that applies**

- **Is there an existing technology in place**

- **Meeting all your data needs**

- **Secondary Data Uses**

- **Patient Mediated Exchange**

- **Decision Support Rules**

- **Is the data for Patient Care?**
  - **Physician to Physician**
  - **Physician to Patient**
  - **Physician to Insurer**
- **Will it be consumed by a system?**
  - **EHR, Patient Portal, Insurance Mainframe, Web API**
- **Is the data discrete or non-discrete?**
  - **Lab Reports, Problem Lists, Radiology Reports, Images**
- **Exchange Types to support use case?**
  - **P2P – Direct, IHE, HL7, CCD, FHIR**
  - **P2C – Portal, Direct, API, FHIR**
  - **P2I – EDI X12, Direct, FHIR (Da Vinci)**

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HL7 Standards

- [HL7](#) is a standards organization that has been defining and harmonizing data standards for exchange an interoperability since 1987

- HL7 has a Version 3 that is XML based standard

- HL7 has a Clinical Context Document (CCD) standard

- HL7 has recently developed a draft standard called FHIR (Fast Healthcare Interoperability Resource) which is based on more web friendly protocols and provides the capability to request and receive a more targeted dataset.

- Version 2.x is the most widely used standard for exchange in the US – it is a pipe delimited ASCII format that uses system triggers to generate transactions and defines transaction sets and data

- Message Types and Triggers Include:
  - ADT – A01 - Admit, A03 Discharge, A02 Transfer)
  - ORM (Order)
  - ORU (Result)
  - DFT (Detailed Financial Transaction)

```
MSH|^~\&|AcmeHIS|StJohn|ADT|StJohn|20050518073622|(|ADT^A01)|MSGID
20050518073622|P|2.3

EVN|A01

PID|||12001||Jones^John^^^Mr.||19670822|M|||123 West
St.^^Denver^CO^80020^USA||(850)555-0809|||||99345|460-99-2928

PV1||I|Main^802^1||||^Quacker^John|||IP|||||||||||1|||||||||||||||
|||||||||||20050518073622

IN1|1|EPO|80|AETNA US HEALTHCARE|PO BOX 981114^""^EL
PASO^TX^79998^""|||1500004000001|AETNA SERVICES INC|19|AETNA US
HEALTHCARE|""|""||2|SOUTAR^RENEE^D|3|19700722|13324 WHITE
CEMETERY
RD^""^HANNIBAL^NY^130740000^""||||||||||||||||||124705454||||||1|
F|225 GREENFIELD PARKWAY^^LIVERPOOL^NY^13088|185428

IN2|1||124705454||461-1200|||||||
```

	PID – Patient Info
	PV1 – Visit Info
	IN1 & IN2 Insurance Info

- ## HL7 Version 3

  – The Version 3 Normative Edition represents a new approach to clinical information exchange based on a model driven methodology that produces messages and electronic documents expressed in XML syntax. The V3 specification is built around subject domains that provide storyboard descriptions, trigger events, interaction designs, domain object models derived from the RIM, hierarchical message descriptors (HMDs) and a prose description of each element. Implementation of these domains further depends upon a non-normative V3 Guide and normative specifications for: data types; the XML technical specifications (ITS) or message wire format; message and control "wrappers", and transport protocols.

HL7 Version 3

- The Version 3 Normative Edition represents a new approach to clinical information exchange based on a model driven methodology that produces messages and electronic docum... subject domains... designs, domain... descriptors (HMD... these domains fu... specifications for... wire format; mes...

```xml
<?xml version="1.0" encoding="UTF-8"?>
<PRPA_IN101001UV01 ITSVersion="XML_1.0" xmlns="urn:hl7-org:v3"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <id extension="3948375" root="2.16.840.1.113883.19.10.700363.2288"/>
  <creationTime value="20060501140010"/>
  <versionCode code="NE2006"/>
  <!-- Interaction is a notification of a person registration -->
  <interactionId extension="PRPA_IN101001UV01" root="2.16.840.1.113883.1.6"/>
  <processingCode code="P"/>
  <processingModeCode code="T"/>
  <acceptAckCode code="ER"/>
  <receiver>
    <device>
    <id extension="922" root="2.16.840.1.113883.19.9"/>
    <name>Master MPI</name>
      <asAgent>
        <representedOrganization>
          <id extension="1002003" root="2.16.840.1.113883.19.200"/>
          <name>Alpha Hospital</name>
        </representedOrganization>
      </asAgent>
    </device>
  </receiver>
  <sender>
    <device>
      <id extension="1" root="2.16.840.1.113883.19.9"/>
    </device>
```

- ## HL7 CDA ([CCD](#))

  - The HL7 Version 3 Clinical Document Architecture (CDA®) is an XML based document markup standard that specifies the structure and semantics of "clinical documents" for the purpose of exchange between healthcare providers and patients. It defines a clinical document as having the following six characteristics: 1) Persistence, 2) Stewardship, 3) Potential for authentication, 4) Context, 5) Wholeness and 6) Human readability.

  - A CDA can contain any type of clinical content -- typical CDA documents would be a Discharge Summary, Imaging Report, Admission & Physical, Pathology Report and more. The most popular use is for inter-enterprise information exchange, such as is envisioned for a US Health Information Exchange (HIE).

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- ## HL7 CDA (CCD)

  – The HL7 Version 3 Clinical Document Architecture (CDA®) is an XML based document markup standard that specifies the structure and semantics of "clinical documents" for the purpose of exchange between he... following six character... Context, 5) Wholenes...

  – A CDA can contain an... Summary, Imaging Re... use is for inter-enterp... Information Exchange...

- HL7 CDA (CCD)

- CCD maps the CCR elements into a CDA representation.

...nent markup standard that ...urpose of exchange

```
<Results>
  <Result>
    <CCRDataObjectID>
      2.16.840.1.113883.19.1
    </CCRDataObjectID>
    <DateTime>
      <Type>
        <Text>Assessment Time</Text
      </Type>
      <ExactDateTime>
        200004071430
      </ExactDateTime>
    </DateTime>
    <Type>
      <Text>Hematology</Text>
    </Type>
    <Description>
      <Text>CBC WO DIFFERENTIAL</Te
      <Code>
        <Value>43789009</Value>
        <CodingSystem>SNOMED CT</Co
      </Code>
    </Description>
    <Status><Text>Final Results</Text></Status>
```

```
<section>
  <templateId root="2.16.840.1.113883.10.20.1.14
  <code code="30954-2"
    codeSystem="2.16.840.1.113883.6.1"
    codeSystemName="LOINC"/>
  <title>Laboratory results</title>
  <text>
    CBC (04/07/2000): HGB 13.2; WBC 6.7; PLT 123
  </text>
  <entry>
    <organizer classCode="BATTERY" moodCode="EVN
      <templateId root="2.16.840.1.113883.10.20.
      <id root="2.16.840.1.113883.19" extension=
      <code code="43789009"
        codeSystem="2.16.840.1.113883.6.96"
        codeSystemName="SNOMED CT"
        displayName="CBC WO DIFFERENTIAL"/>
      <statusCode code="completed"/>
      <effectiveTime value="200004071430"/>
```

...sd" templateId="2.16.840.1.113883.3.27.1776" xmlns="urn:hl7-org:v3"

...OINC" />

...op if temperature is above 103F.

...OINC" />

...s born FT, but had resp. distress requiring mehcanical ventilation for 3 days for ...ed

...ent home but after 3 weeks developed bronchiolitis and had been in the hospital ...spiration. He was also found to have Chronic lung disease -- possibly due to ...e being treated with Phenobarb. For the last 4 days his feeds were switched to ...osed.

What's Next?

Where is HIE Heading?

- **AI, NLP, ML**
  - **Artificial Intelligence**
  - **Natural Language Processing**
  - **Machine Learning**

- **FHIR and its impact on exchange**
  - **Smart on FHIR applications**

- **Blockchain – Distributed Ledger**
  - **Not just bitcoin**
  - **Smart Contracts**
  - **Currently in use for supply chain management**

- **Patient Mitigated Exchange**
  - **Lightweight, mobile supported**
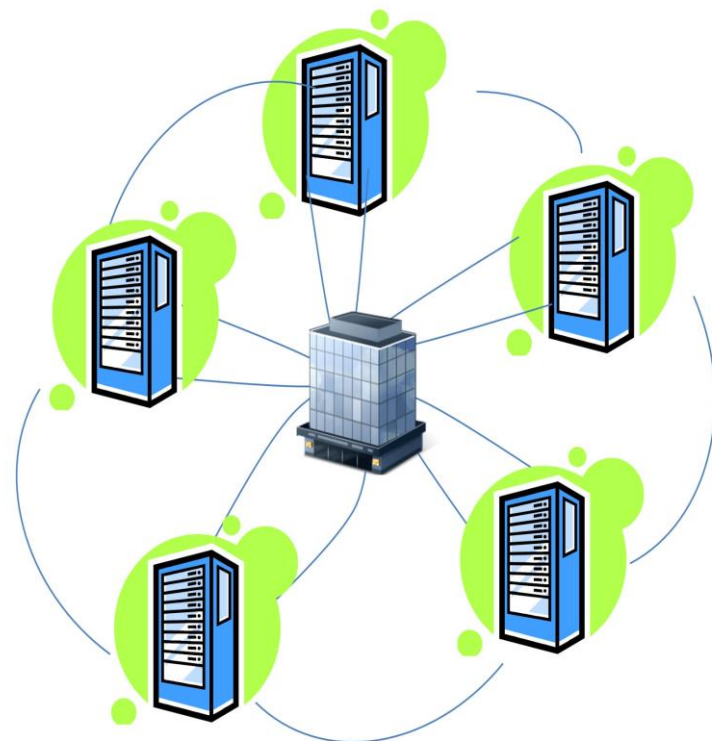
New Technology and Standards
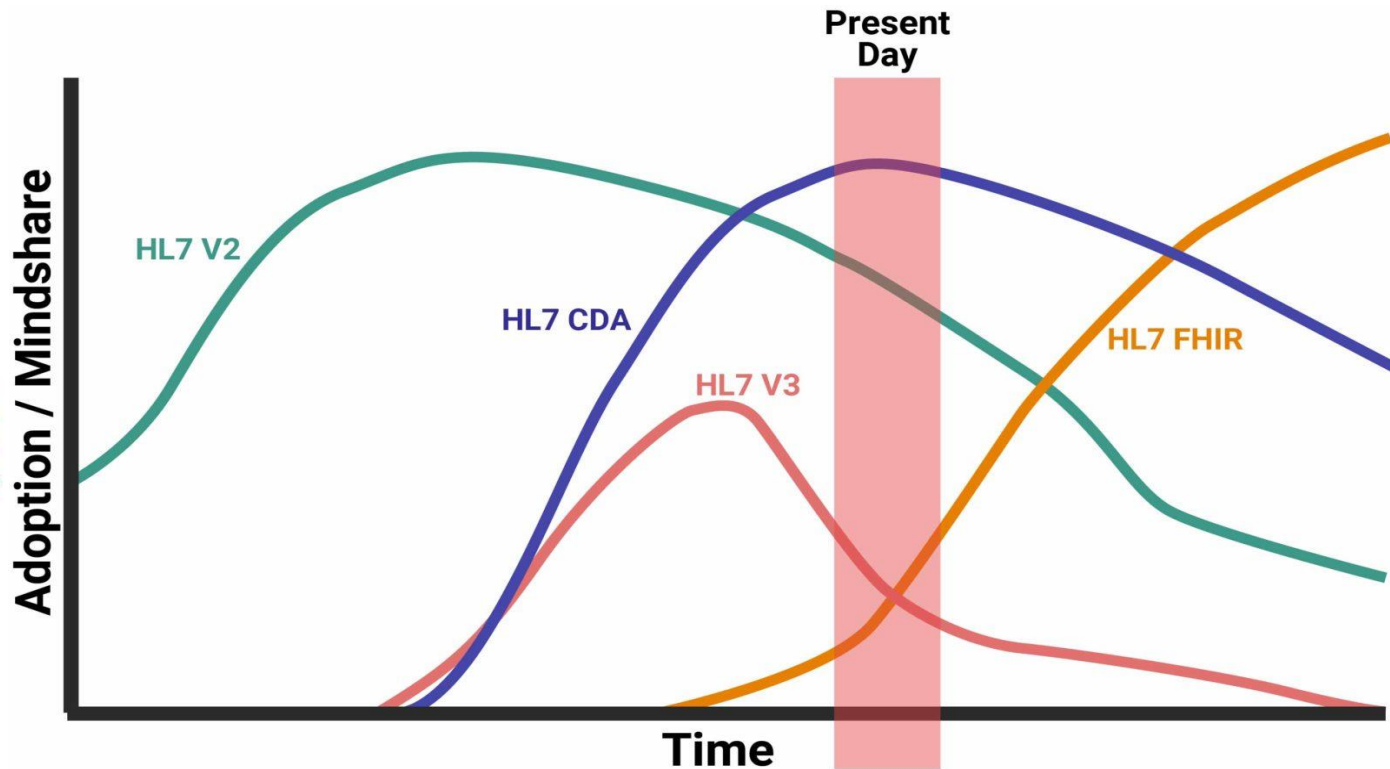
Gartner Hype Cycle for Emerging Technologies, 2017
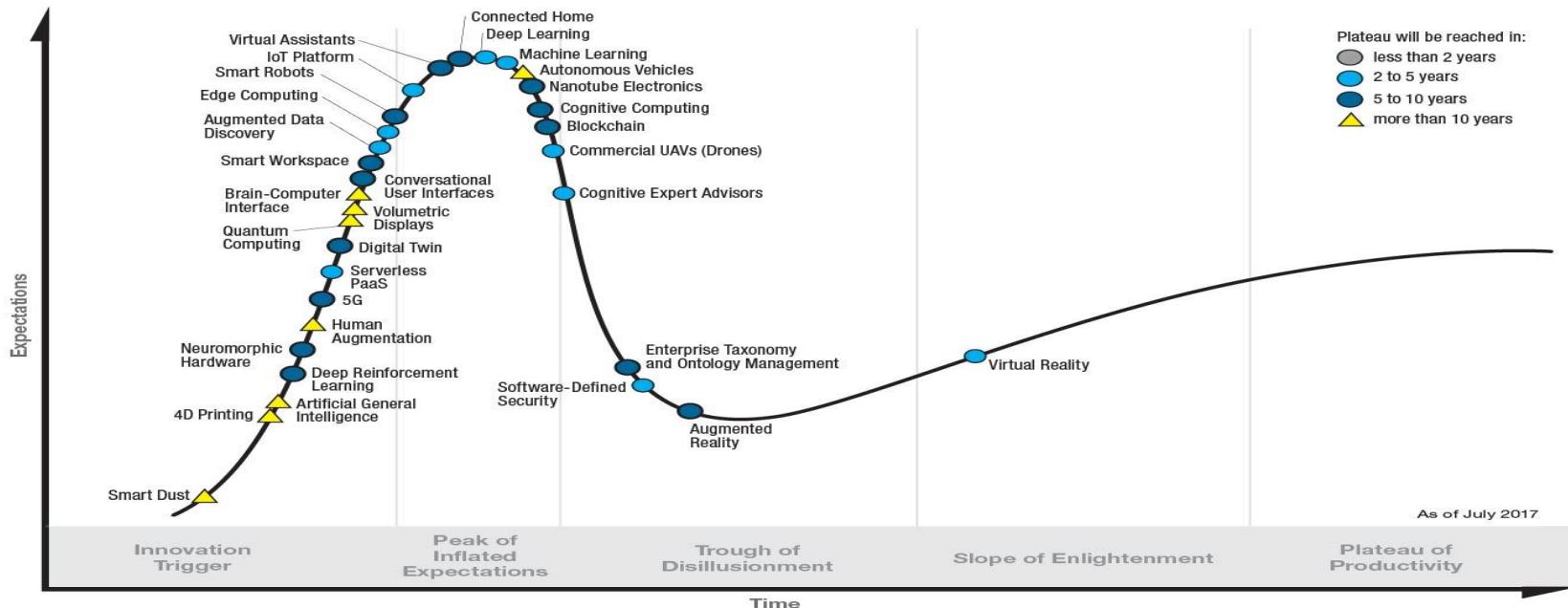
gartner.com/SmarterWithGartner

Source: Gartner (July 2017)
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Gartner

Fast

Healthcare

Interoperability

Resource

FHIR® – Fast Healthcare Interoperability Resources

(hl7.org/fhir) – is a next generation standards framework created by HL7. FHIR combines the best features of HL7's v2 , HL7 v3 and CDA   product lines while leveraging the latest web standards and applying a tight focus on implementability.

FHIR solutions are built from a set of modular components called "Resources". These resources can easily be assembled into working systems that solve real world clinical and administrative problems at a fraction of the price of existing alternatives. FHIR is suitable for use in a wide variety of contexts – mobile phone apps, cloud communications, EHR-based data sharing, server communication in large institutional healthcare providers, and much more.

Substitutable **M**edical **A**pplications and **R**eusable **T**echnologies that allowed hospitals to try out solutions from various developers until they found what they needed.

What is SMART?

SMART provides a standard for how EHR systems and their applications authenticate and integrate. By standardizing these processes, health care providers can utilize more apps, and developers can write apps for a wider audience.

There are several things that SMART does for the developers creating these applications. SMART handles the authorization of a user accessing a patient's data and maintains an open source library for developers to use. It also provides and maintains free API "sandbox" servers that developers can use for testing their application. These sandboxes are important for development because a SMART application cannot be launched a by simply navigating to a URL. SMART provides a **context** to the application when it is launched from the EHR that contains information about the user and the patient. The sandbox simulates a healthcare provider launching the application with one of many fake **contexts** with generated patient data.

TOPHIC https://www.sep.com/sep-blog/2018/09/14/smart-on-fhir-what-is-smart-what-is-fhir/

Apple combines wellness and health to make healthcare a more regular habit + check-in

HealthKit

Apple is incentivizing users to use third parties to better track these metrics. Apple's HealthKit creates APIs to push and pull from your health record, incentivizing developers to build on top of your data (if you give them consent).

CBINSIGHTS

https://www.cbinsights.com/research/apple-healthcare-strategy-apps/

Apple Health Kit – IOS Display
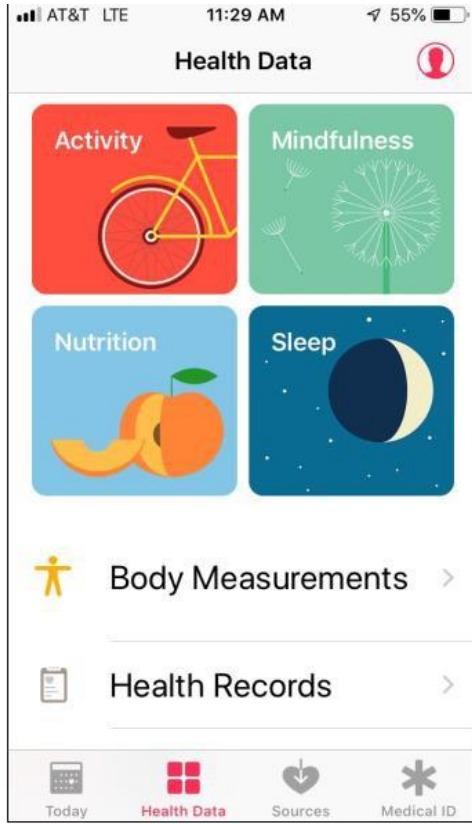
This is what the health record display would look like on your IPhone

FHIR API's with Available Data Sources

Summary of Data Classes & Data Elements

⬡ **Assessment Plan of Treatment**

⬡ **Care Team Members**

⬡ **Clinical Notes**
   Consultation note
   Discharge summary note
   History & physical
   Procedure note
   Progress note

⬡ **Diagnostic Reports**
   Imaging
   Laboratory
   Pathology

⬡ **Goals**
   Patient goals

⬡ **Health Concerns**

⬡ **Immunizations**

⬡ **Laboratory**
   Tests
   Values/Results

⬡ **Medications**
   Medications
   Medication allergies

⬡ **Patient Demographics**
   First name
   Last name
   Middle name + initial
   Suffix
   Birth sex
   Date of birth
   Race
   Ethnicity
   Preferred language
   Address
   Phone number
   Previous name (Future Element)

⬡ **Problems**

⬡ **Procedures**

⬡ **Provenance** (Future Class)
   Author time stamp
   Author
   Author organization

⬡ **Smoking Status**

⬡ **Unique Device Identifier(s)**
   Patient's implantable device(s)

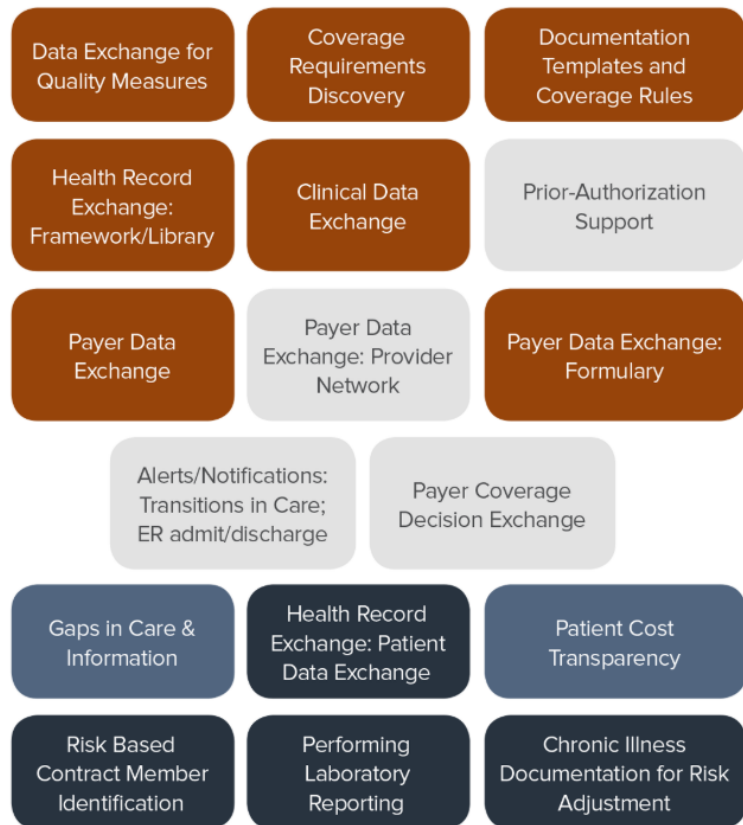⬡ **Vital Signs**
   Diastolic blood pressure
   Systolic blood pressure
   Body height
   Body weight
   Heart rate
   Respiratory rate
   Body temperature
   Pulse oximetry
   Inhaled oxygen concentration

⬡ **Pediatric Vital Signs**
   BMI percentile per age and sex for youth 2-20
   Weights for age per length and sex
   Occipital-frontal circumference for children < 3 years old

2019 USE CASE INVENTORY & STATUS

- Data Exchange for Quality Measures
- Coverage Requirements Discovery
- Documentation Templates and Coverage Rules
- Health Record Exchange: Framework/Library
- Clinical Data Exchange
- Prior-Authorization Support
- Payer Data Exchange
- Payer Data Exchange: Provider Network
- Payer Data Exchange: Formulary
- Alerts/Notifications: Transitions in Care; ER admit/discharge
- Payer Coverage Decision Exchange
- Gaps in Care & Information
- Health Record Exchange: Patient Data Exchange
- Patient Cost Transparency
- Risk Based Contract Member Identification
- Performing Laboratory Reporting
- Chronic Illness Documentation for Risk Adjustment

PROJECT PROCESS

Define requirements (technical, business and testing)

→ Create Implementation Guide

→ Create and test Reference Implementation (prove the guide works)

→ Pilot the solution

→ Deploy the solution

- ■ In Ballot Process through HL7
- ■ Targeted for September Ballot
- ■ In Discovery targeted for HL7 January Ballot
- ■ Use cases in discovery (some may be balloted in January 2020)

Value Based Care Programs Drive Focus to Patient Outcomes *by enabling providers to see the right data at the right time for patient-centered care... in terms of specific patient coverage, their benefits and effective care coordination. Historically, payment and coverage data were completely separate from care.*

http://www.hl7.org/about/davinci/index.cfm

Blockchain

Overview

A conceptual discussion of what problems we are encountering today and how Blockchain technology could enable patients and organizations to 'solve' the identity crisis:

- **High Level Overview of Current State**
- **Discuss current issues with identity**
- **[Discuss the theory of Self Sovereign Identity with Blockchain](#)** – **Metadium**
- **[https://blog.goodaudience.com/how-blockchain-could-become-the-onramp-towards-self-sovereign-identity-dd234a0ea2a3](#)**
- **Overview of how Blockchain might work**
- **Discuss the future possibilities**

Emerging Standards

Hype Cycle for Blockchain Business, 2019

https://www.gartner.com/en/newsroom/press-releases/2019-09-12-gartner-2019-hype-cycle-for-blockchain-business-shows
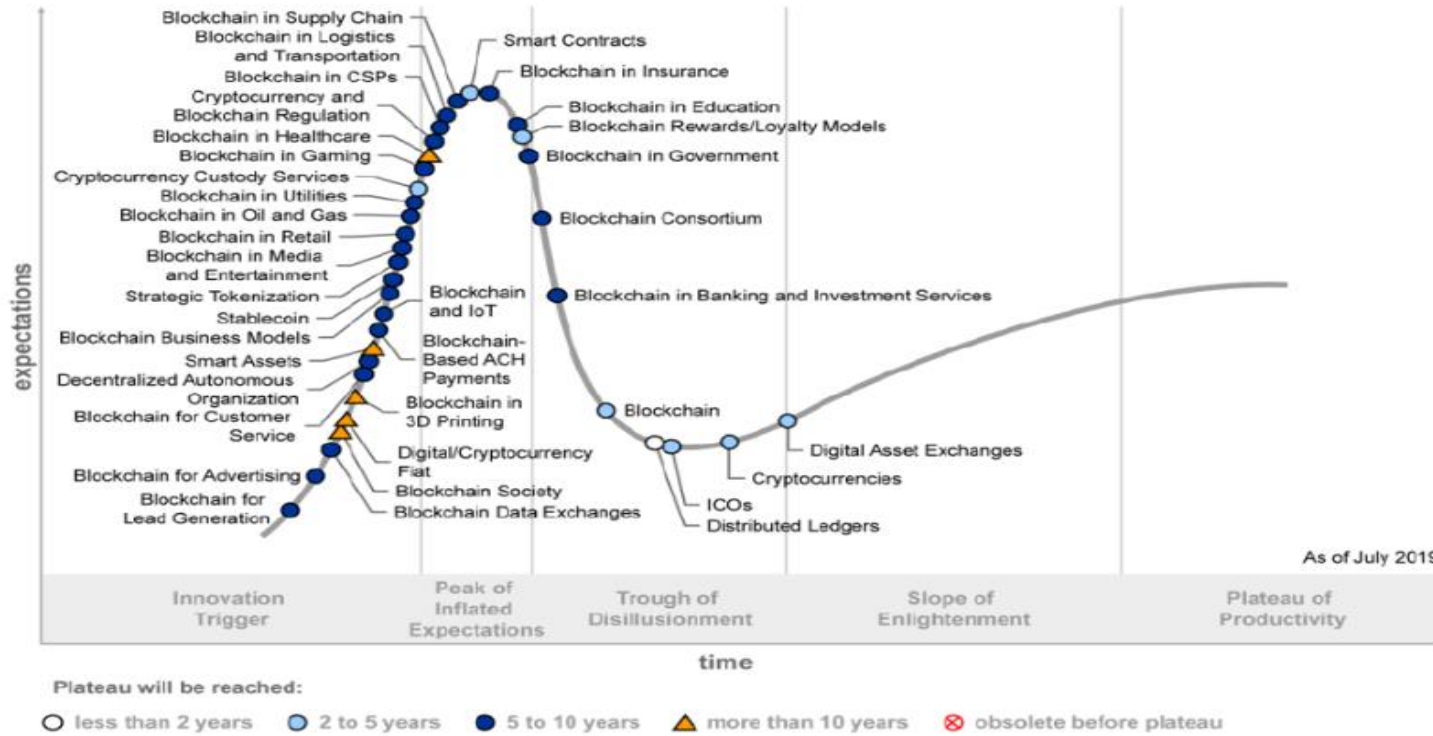
Healthcare-related blockchain projects

Digital Identity Management - https://www.himss.org/library/blockchain-use-case-digital-identity-management - Synaptic Health, Hashed Health, Symblock

Clinical Research / Access / Monetization - https://www.himss.org/library/blockchain-use-case-clinical-research-data-accessmonetization - Pharmaceutical Users Software Exchange (PhUSE) Blockchain Project Encrypgen, LunaDNA, and Nebula Genomic

Supply Chain - https://www.himss.org/library/blockchain-use-case-health-supply-chain-management - Chronicled, FarmaTrust, iSolve, and Viant (with GSK).

Financial Records and Insurance –
Payment Processing - Change Healthcare and TIBCO Software
BC in Practice – Webinar Library
https://www.himss.org/library/blockchain-practice

50+ BLOCKCHAIN
REAL WORLD USES CASES

GOVERNMENT
Essentia develops world's first blockchain solution to manage international logistics hub together with Traffic Labs and the Finnish Government

IDENTIFICATION
Voter registration is being facilitated via a blockchain project in Switzerland spearheaded by Uport.

MOBILE PAYMENTS
The blockchain ledger that Ripple uses has been latched onto by a group of Japanese banks, who will be using it for quick mobile payments.

INSURANCE
A smart contract-based blockchain is being used by Insurer American International Group Inc as a means of saving costs and increasing transparency.

ENDANGERED SPECIES PROTECTION
The protection of endangered species is being facilitated via a blockchain project that records the activities of these rare animals.

CARBON OFFSETS
IBM is using the Hyperledger Fabric blockchain in China to monitor carbon offset trading.

ENTERPRISE
Ethereum's blockchain can be accessed as a cloud-based service courtesy of Microsoft Azure.

BORDER CONTROL
Essentia has devised a border control system that would use blockchain to store passenger data in the Netherlands.

SUPPLY CHAINS
IBM and Walmart have partnered in China to create a blockchain project that will monitor food safety.

HEALTHCARE
A number of healthcare systems that store data on the blockchain have been pioneered including MedRec.

SHIPPING
Shipping is a natural fit for blockchain, and Maersk have been trialling a blockchainbased project within the maritime logistics industry.

REAL ESTATE
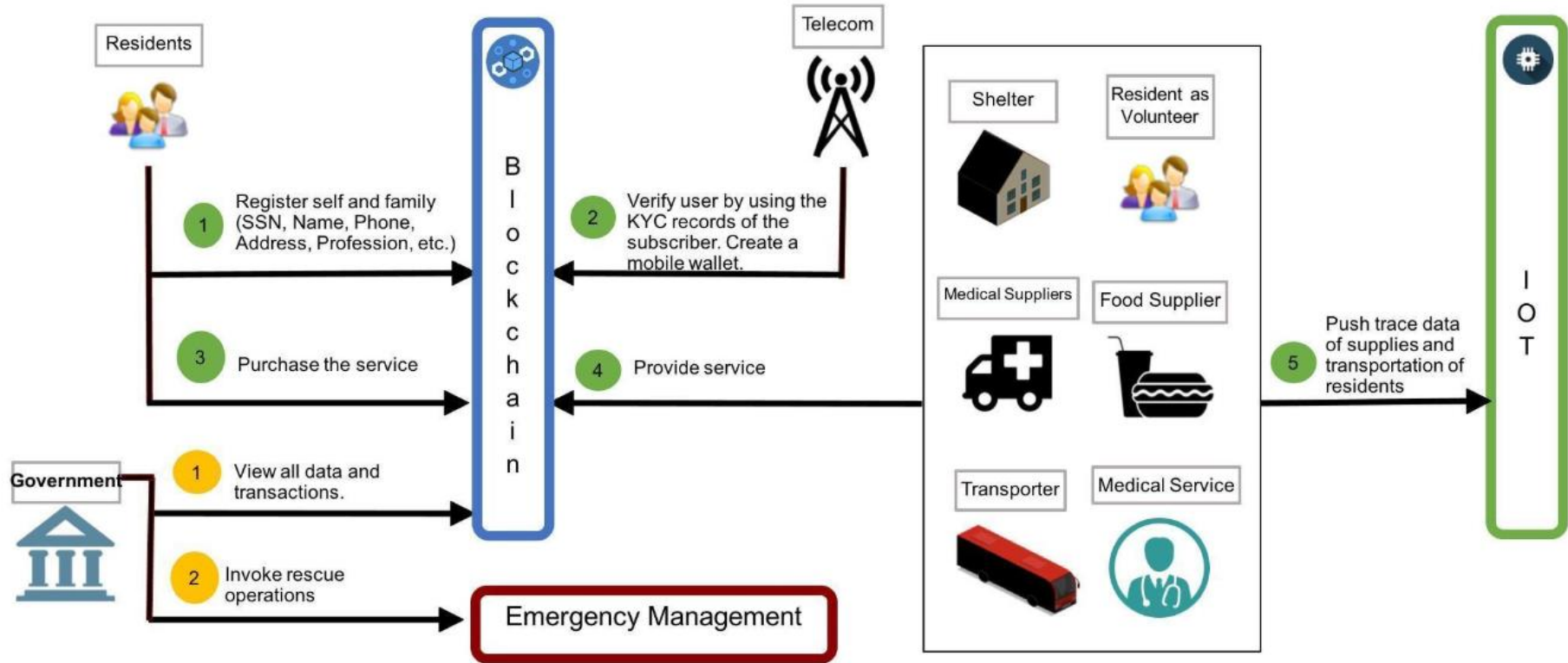Blockchain is now being used to complete real estate deals, the first of which was conducted in Kiev by Propy.

ENERGY
Essentia is developing a test project that will help energy suppliers track the distribution of their resources in real time, whilst maintaining data confidentiality.

LAND REGISTRY
Land registry titles are now being stored on the blockchain in Georgia in a project developed by the National Agency of Public Registry.

COMPUTATION
Digital Currency Group are helping Amazon Web Services examine ways in which the distributed ledger technology can help improve database security.

ADVERTISING
New York Interactive Advertising Exchange has been experimen- ting with blockchain as a means of providing an ads marketplace for publishers.

BORDER CONTROL
Essentia is developing a blockchain project for border control that will allow customs agents to record passenger data from an array of inputs and safely store it.

JOURNALISM
Decentralized journalism, as enabled by blockchain technology, has the potential to prevent censorship and increase transparency, as Civil has shown.

WASTE MANAGEMENT
Waltonchain is using RFID technology to record waste management data on the blockchain in China.

ENERGY
Food importation is another industry where blockchain is proving its worth, with Louis Dreyfus Co trialling a soybean import operation using this technology.

DIAMONDS
The De Beers Group is using blockchain to track the importation and sale of diamonds.

FINE ART
By storing certificates of authenticity on the blockchain, it's possible to dramati- cally reduce art forgeries, as one blockchain project is proving.

NATIONAL SECURITY
For the past two years, the US Department of Homeland Security has been using blockchain to record and safely store data captured from its security cameras.

TOURISM
In a bid to boost its tourism economy, Hawaii is examining ways in which blockchain-based cryptocurrencies can be adopted throughout the US state.

TAXATION
In China, a tax-based initiative is using blockchain to store tax records and electronic invoices led by Miaocai Network.

ENERGY
Chile's National Energy Commission has started using blockchain technology as a way of certifying data pertaining to the country's energy usage as it seeks to update its electrical infrastructure.

RAILWAYS
Russian rail operator Novotrans is storing inventory data on a blockchain pertaining to repair requests and rolling stock

ENTERPRISE
Google is building its own blockchain which will be integrated into its cloud-based services, enabling businesses to store data on it, and to request their own white label version developed by Alphabet Inc

MUSIC
Arbit is a blockchain-based project led by former Guns N Roses drummer Matt Sorum seeking a fairer way to reward musicians for their creative efforts.

FISHING
Blockchain technology has been used to provide a transparent record of where fish was caught, as a means of ensuring it was legally landed.

Blockchain Conceptual Solution for Patient 'Track & Trace'

This is the Smith Family – Paul, Maureen, Declan (17), Tristan (15)
Paul recently changed jobs and now has a new insurance plan and his family has a new doctor

Ins 1   Ins 2

Dr 1   Dr 2

RX 1   RX 2

Paul's son Declan was injured during a recent sports event and was transported by Ambulance to the community hospital.

How many 'identification numbers' does Declan have?

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Let's count the ID's for Declan:
Social Security Number
Drivers License Number
One for each Insurance
One for each Doctor
One for each Pharmacy
Emergency Medical Services
Hospital
(note – the hospital could have multiple internal ID's for applications or even a Master Person Index)

Ins 1	Ins 2
Dr 1	Dr 2
RX 1	RX 2

Minimum of **11** ID's across those identities and applications

Ins 1 · Ins 2

Dr 1 · Dr 2

RX 1 · RX 2
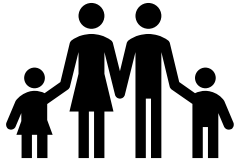
What if Paul has a chronic condition? What if Maureen needs a an imaging study? What if Tristan needs her immunization records.

Traditionally interoperability and patient data exchange is driven by specific matching algorithms that use data elements like Name, Date of Birth, Sex, Address, Phone Number and the like to determine matches. More advanced algorithms provides weights to each element with a scoring system and additional data elements.

The sophistication of the algorithm will definitely enhance the ability of the technology to determine matches, but will not eliminate the need for people to review and make manual matches.

https://perspectives.ahima.org/patient-matching-in-health-information-exchanges/

| Ins 1 | Dr 1 | RX 1 | Ins 2 | Dr 2 | RX 2 |

- Chain of blocks

- Each block has data, e.g. transactions. Minimal but sufficient

- Data on each block h[...]

- Hash codes chained f[...] immutability

- Each blockchain node[...] copy

- Blockchain nodes ma[...] consistency of ledger[...]

Decentralized Network

Blockchain Node
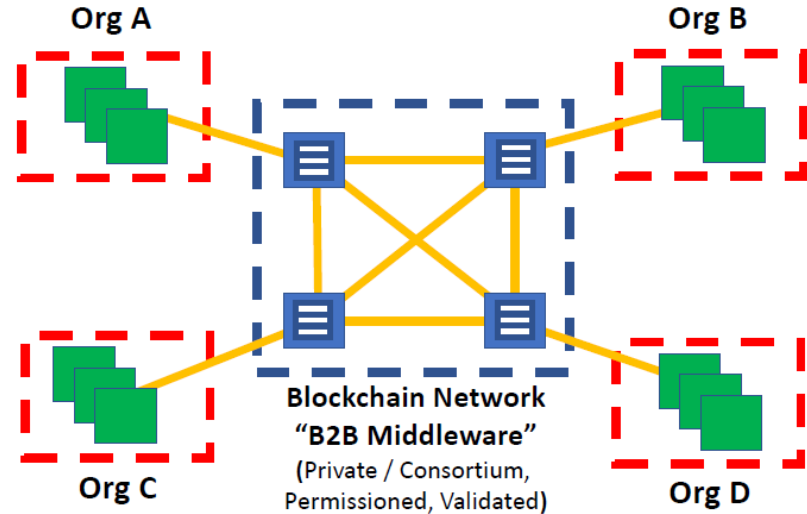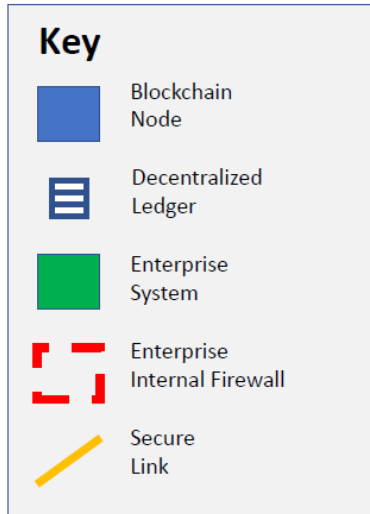
Key

◼ (blue)	Blockchain Node
☰	Decentralized Ledger
◼ (green)	Enterprise System
⬚ (red dashed)	Enterprise Internal Firewall
╱ (orange)	Secure Link

Org A

Org B

Org C

Blockchain Network "B2B Middleware" (Private / Consortium, Permissioned, Validated)

Org D

Images courtesy David Houlding - Microsoft

The patient uses information they know and have to establish an identity on their HealthCare Blockchain – that identity is now used at entities for encounters

The patient then presents their identity to their healthcare provider who uses it as part of their encounter.

Identity Chain

Identity Chain

Org1

Org3

C E Q

C W L

eHEx

Org2

Org4
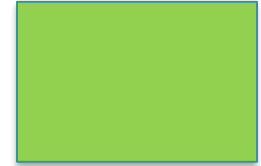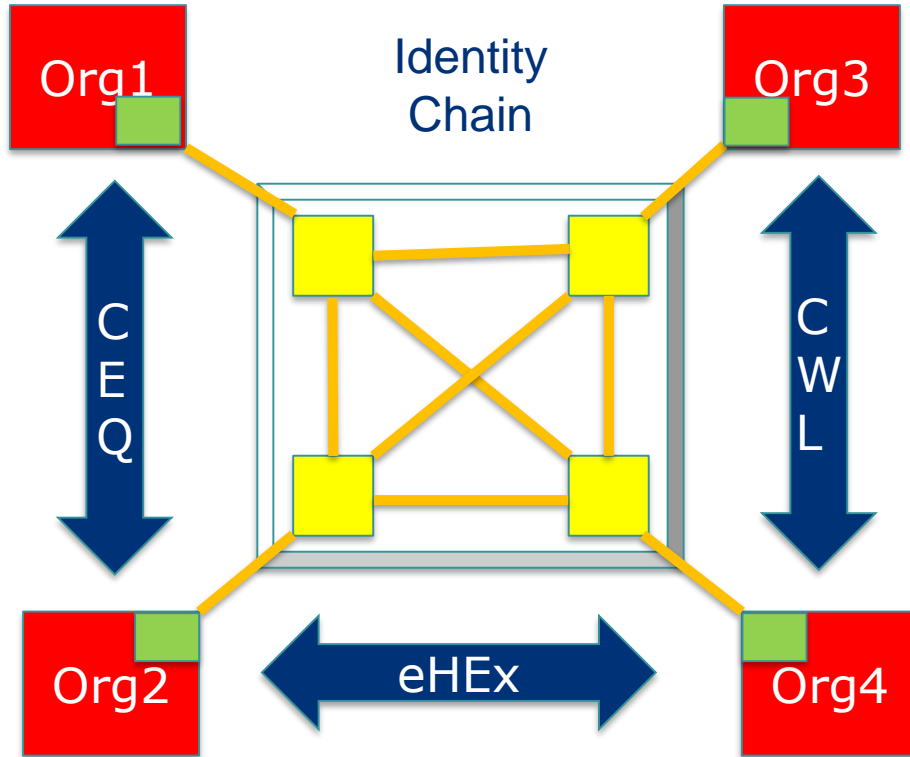
With the patients identity as an immutable data element, requiring no additional validation, exchange across existing networks (eHealth Exchange, Care Equality, Commonwell, etc) will provide access to accurate/timely information

How it might work?
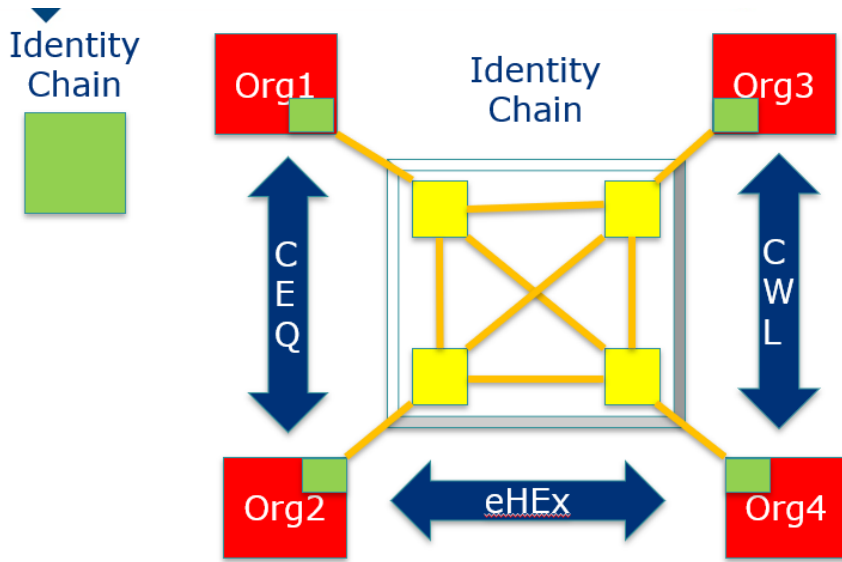
Some of the limitations here are around knowing 'where' patients received care these models of connectivity are dependent on:

1 – having all Orgs included

2 – knowing where care was received

3 – Ensuring those Orgs are connected to an established network

4 – Redundant data – same information stored at each organization that participates in exchange.

One Step Further

The patient uses information they know and have to establish an identity on their HealthCare Blockchain – that identity is now used at entities for encounters
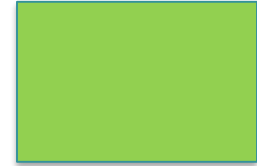
The patient then presents their identity to their healthcare provider who uses it as part of their encounter.

The provider then publishes the encounter to the Healthchain for that patient that then links the patient identity and the encounter identity.
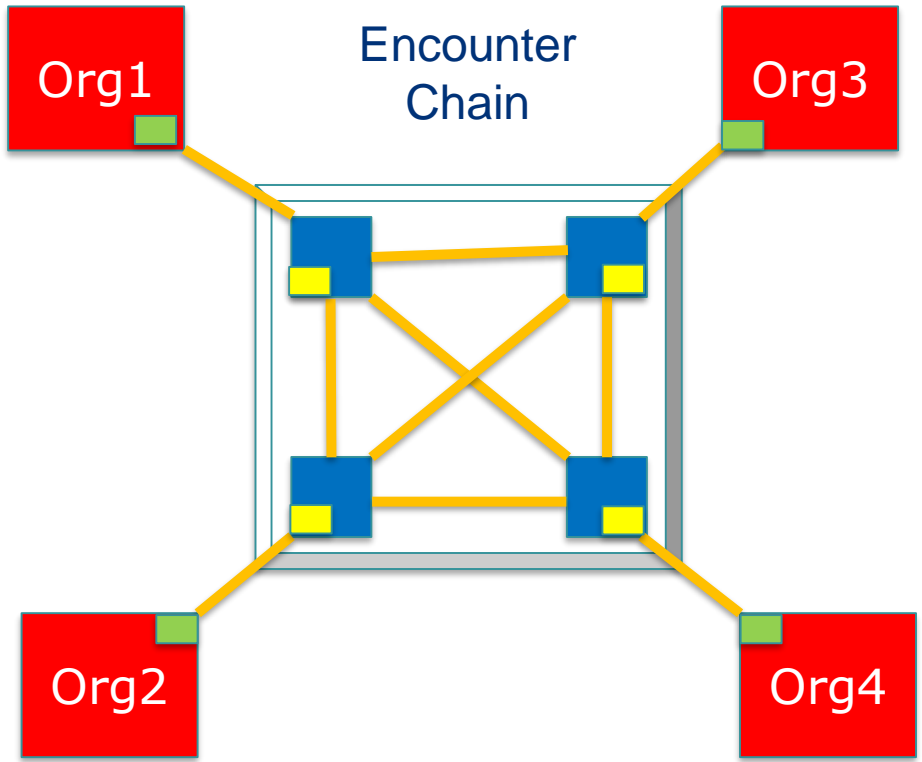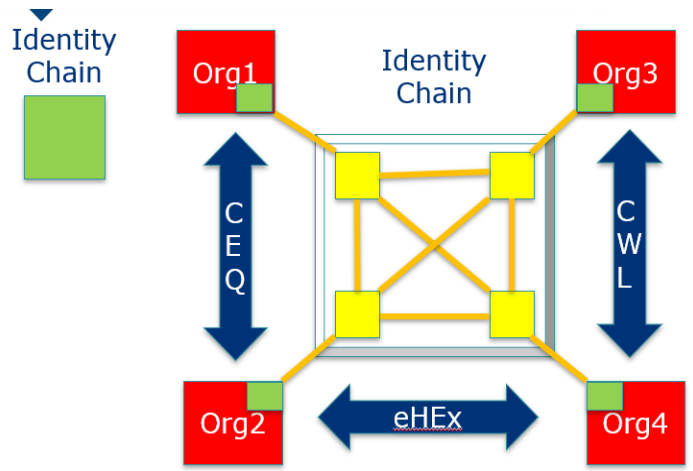
Conceptually, each encounter would have the patient's 'identification' imbedded as part of the transaction – each encounter would be available and linked by that identity – which would allow a reconstructed longitudinal record by leveraging existing HIE frameworks to reconstruct the record.

Blockchain would also enable patients to have a virtual record of all their encounters and ostensibly the ability to authorize access to that data with a permissioned blockchain.

This capability is a ways off, but getting patients data linked to a patient and encounters as a 'Track / Trace' for their health encounters would give them a virtual map of what data exists and where it lives to possibility pull a complete longitudinal record.

It would also allow the patient to authorize entities to access specific medical information found in those individual encounters.

What it might look like

Identity Chain

Encounter Chain

Ins 1 | Dr 1 | RX 1 | Ins 2 | Dr 2 | RX 2
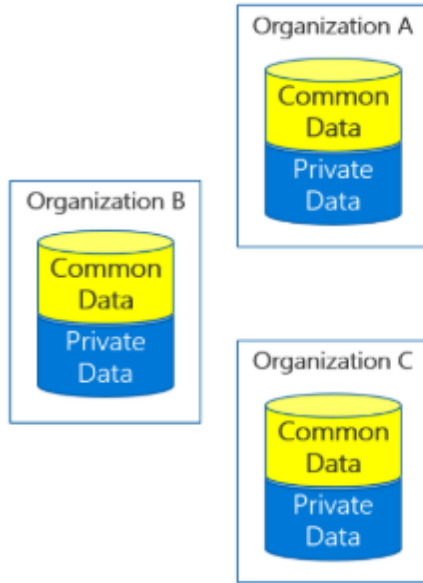
EHR image courtesy of https://onehealthrecord.alabama.gov/services/for-health-providers/

https://www.linkedin.com/pulse/data-centric-view-blockchain-david-houlding-cissp-cipp/#share-modal
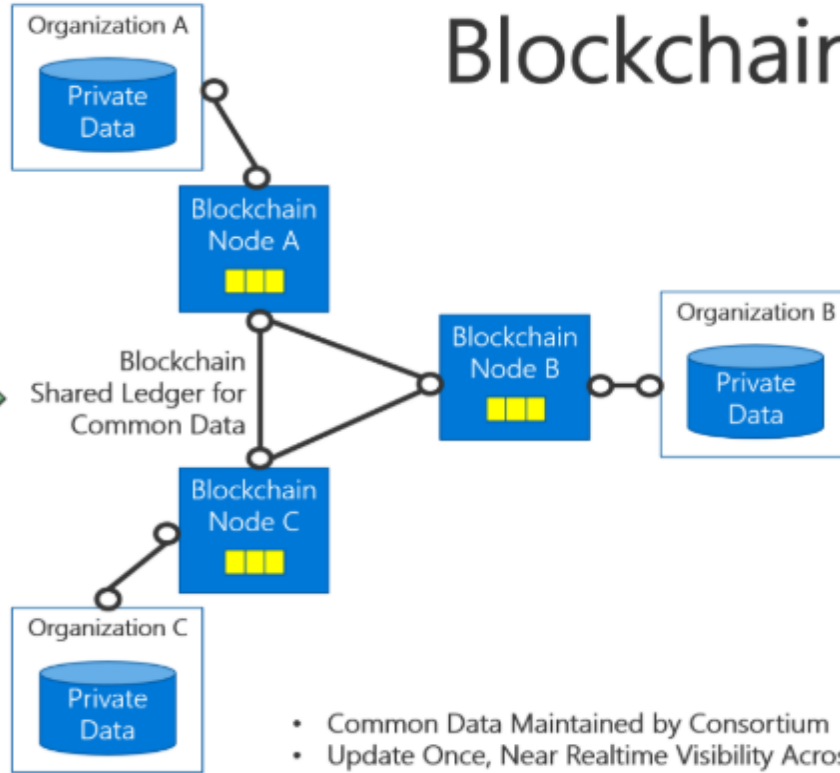
QUESTIONS?!?!?

Thank You!

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