Crowe Horwath

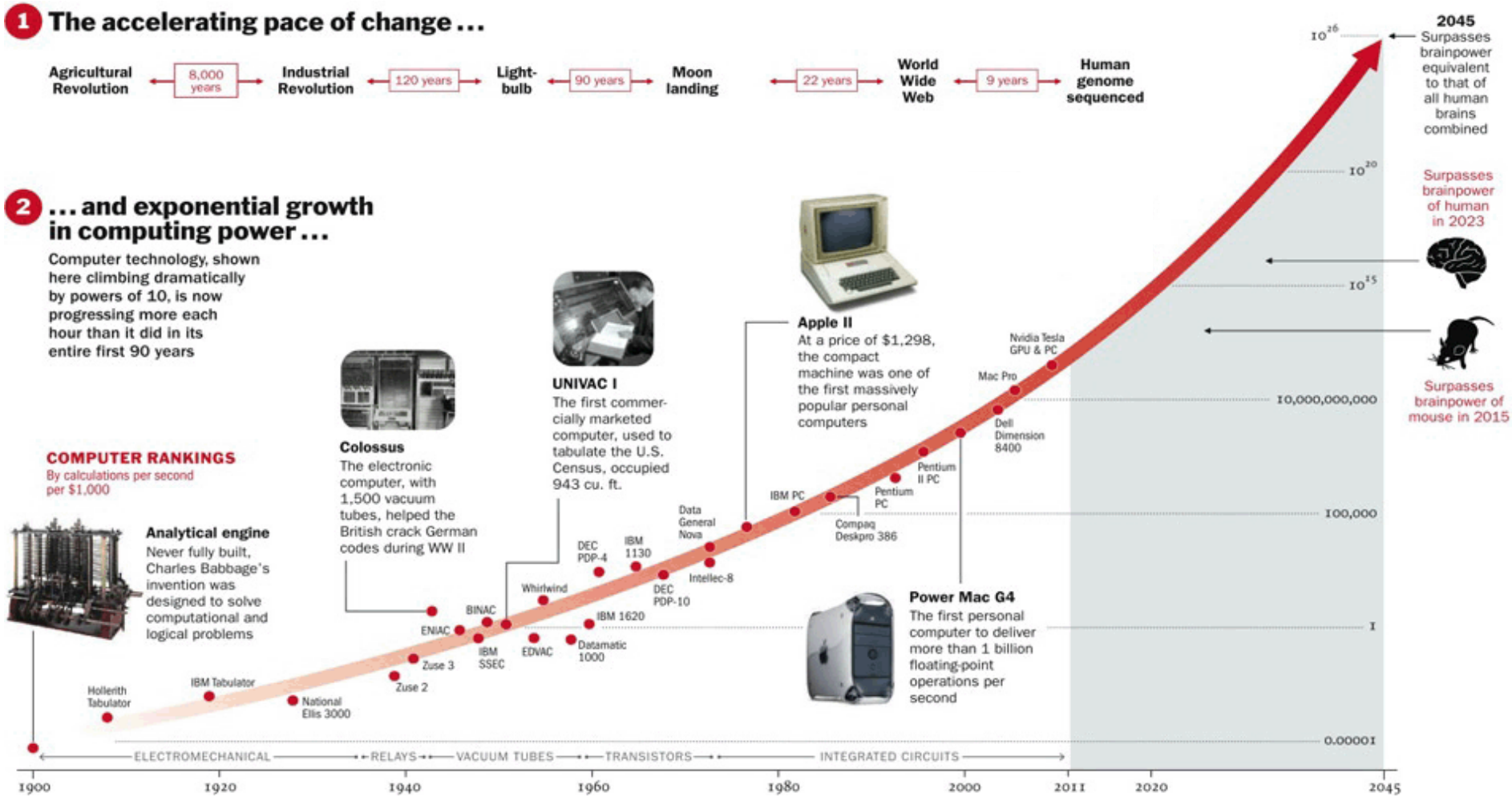
Advancing Healthcare
Crowe Healthcare Summit 2017

Disrupting Healthcare to Prepare for Disruptive Technology: Artificial Intelligence, Robots, Interoperability

September 19, 2017

Eric Boggs, Crowe
Meredith Alger and Tommy Ragsdale, Center for Medical Interoperability

Exponential Growth

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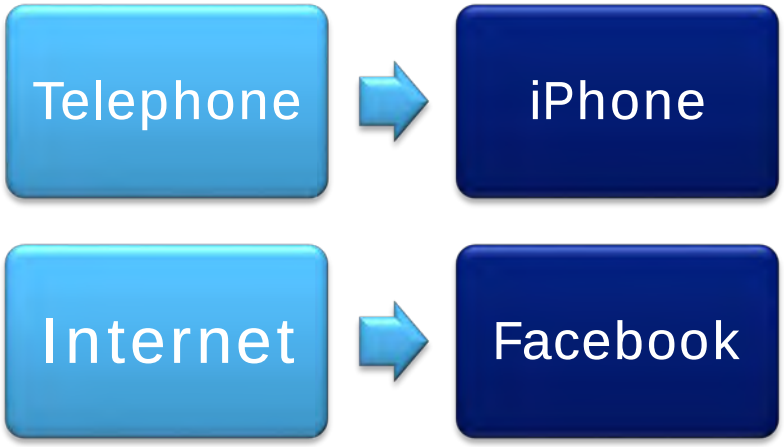
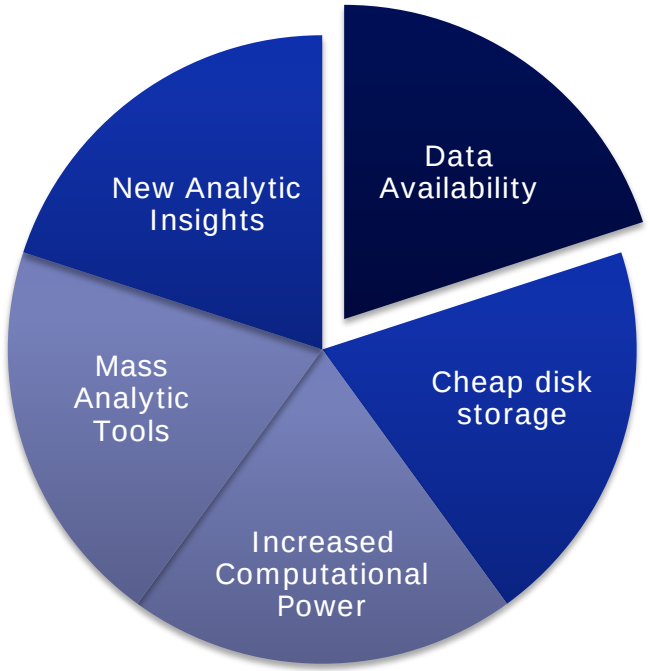
Why is Data Science Here Today?

- We have innate need to improve our lives through better tools and technology.

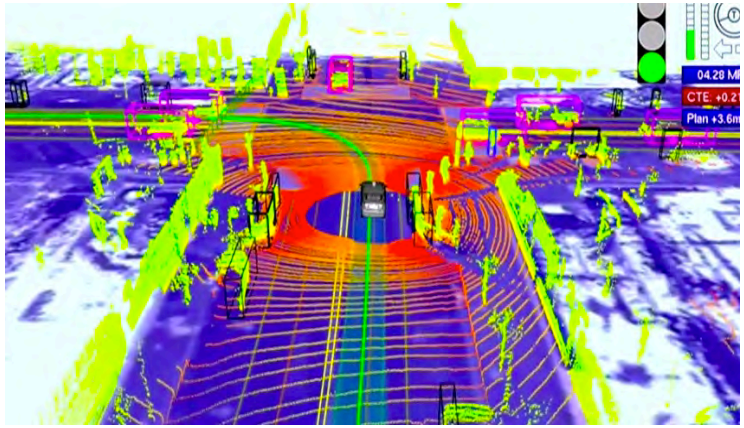


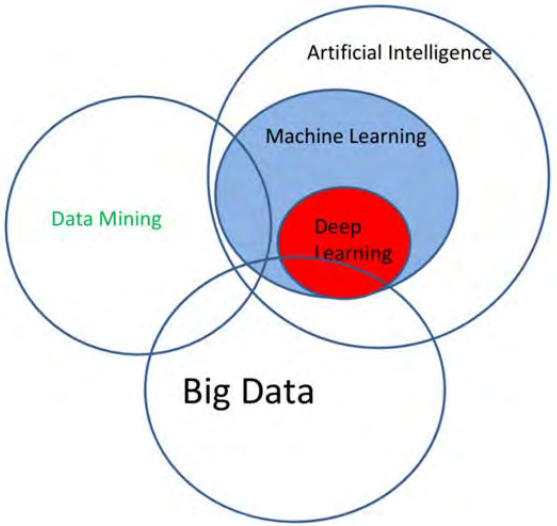


- Today's best tools start with having **<u>access to data</u>**

Why is Data Science Here Today?

- We didn't start with driverless cars
- Institute for Highway Safety reported in 2016
  - 23% reduction in crashes for vehicles with forward collision warning systems
  - 39% reduction for vehicles with automatic braking



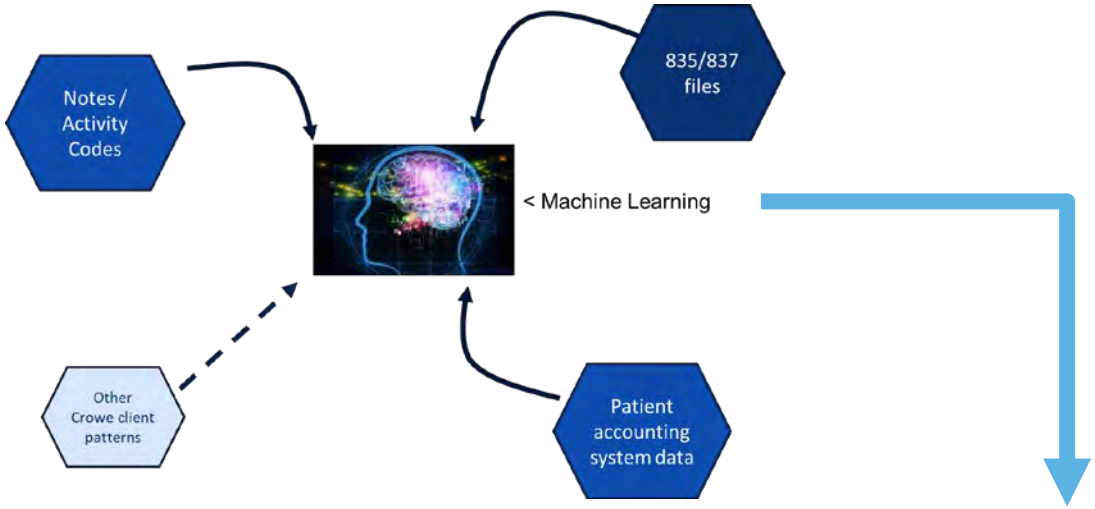


Account Number	Posting Date ID	Transaction Description	Transaction Type	Transaction Amount	Account Balance	Total Charges
********4941	12/14/2013	SELF PAY PAYMENT	PAYMENT	(19.34)	(19.34)	1,008.50
********4941	1/2/2014	AETNA TRSCARE PAYMENT	PAYMENT	(506.91)	(19.34)	1,008.50
********4941	1/2/2014	AETNA TRSCARE ADJ	CONTRACTUAL	(501.59)	(19.34)	1,008.50

Account Number	Claim Status	Claim ID	Remit Dat	Total Charges	Total Payment	Total Cont	Total Denial	PR
********4941	1 – Process as Primary	116453900	12/24/2013	1,008.50	506.91	501.59	-	-

- Check for open debit balance for same patient…
  - Open debit – transfer patient dollars
  - No open debit – send to A/P for refund

Having Access to Data



Patient Name:	Not Specified, Not Specified Not Specified	Insurance 1:	BLUE CROSS PPO LA	Insurance 1 Policy No:	N/A	Insurance 1 Bal:
Admission Date:	May 4, 2016	Insurance 2:		Insurance 2 Policy No:		Insurance 2 Bal:
Discharge Date:	May 31, 2016	Insurance 3:		Insurance 3 Policy No:		Insurance 3 Bal:
Length of Stay:	27	Current Financial Class:	TBD	DRG:	(N/A) - Not Specified	Patient Type:
Crowe Account Owner:		Initial Bill Date:	June 24, 2016	Aging Date:	July 5, 2016	Re-Bill Date:
Client Account Owner:	Not Specified Not Specified	Last Transaction Date:	July 5, 2016	Last Payment Date:	July 5, 2016	Last Billed Date:
Total Payment:	($13,257.86)	Total Charges:	$69,969.50	Patient Balance:	$0.00	
Patient Responsibility:	$0.00	Pct Total Charges Paid:	(18.9%)	Calculated Account Balance:	($371.58)	Themes:
Supervised Recommendation:	CXG (99.5%)	Similar Recommendation:	CXG (99.5%)	Account Balance:	($371.58)	

Account Detail | Account Transactions | Patient Notes | Account Actions | Denials Overview

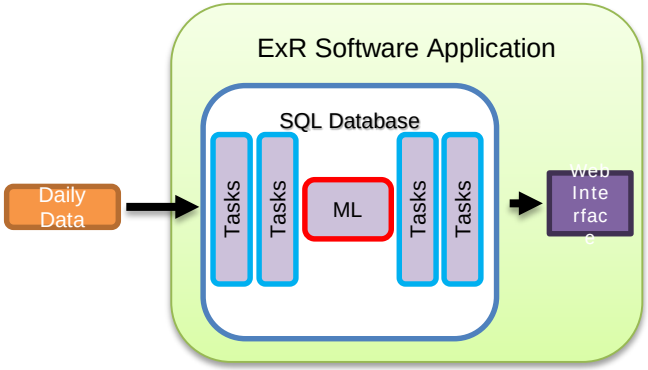
Posting Date	Payor Code	Payor Name	Trans. Code	Trans. Description	Transaction Type	Trans. Sub Type	Trans. Amount	User Name
6/25/16	N/A	Not Specified	CAPPBCPLA	CON ADJUSTMENT PCON PBCPTX	CONTRACTUAL	GENERAL	($57,083.22)	
7/5/16	PBCPLA	BLUE CROSS PPO LA	PAYPBCPLA	PAYMENT PBCPTX	INSURANCE	GENERAL	**($13,257.86)**	
7/31/16	PBCPLA	BLUE CROSS PPO LA	CEBPBCPLA	CON ADJUSTMENT EOB PBCPLA	CONTRACTUAL	GENERAL	$371.58	MLAutoAction

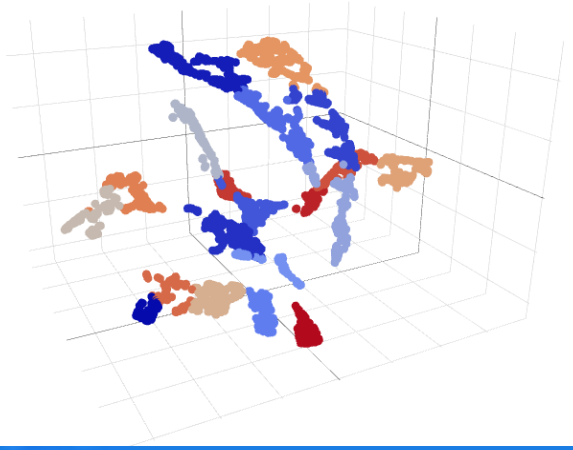
Hide Twins | Take Action

Total Charges: $69,969.50
Account Balance: ($371.58)
Pending Account Balance: $0.00

Selected Total: $0.00
Calculated Balance: $69,969.50

Denials





- Payment prediction model
  - Categorical prediction of payment next steps after a denial
  - Model looks at 16.7 million pieces of information available
- Theme sub-clustering
  - Within each user-defined denials theme, process finds subgrouping of like-claims
  - Fully automated
  - 1-day implementation time

ExR Denials Example | Example Data | Visualization | Overall Denial Data | Theme | Total Charges | Service Location

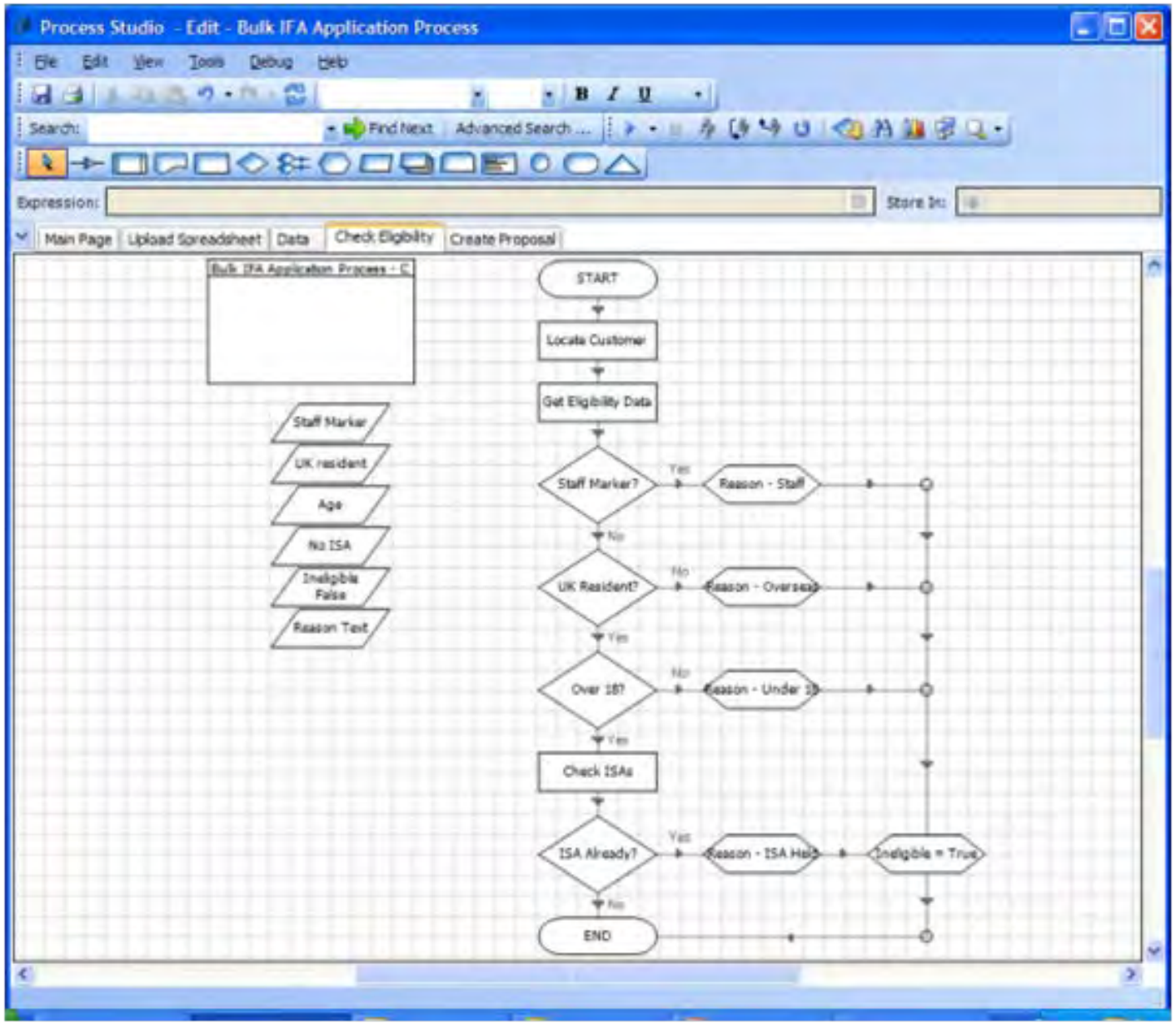
Request For information

Show 100 entries Search:

Theme	AccountID	Crowe.Service.Location	Crowe.Service.Sub.Location	CrowePayorCategoryDesc	Insurance.Code	Insurance.Desc	Is.Denied	Patient.Type.Code	Patient.
6	200403	Diagnostic & Imaging	MRT	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	2	Outpat
18	151332	Other OP	Clinic Visit	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	2	Outpat
5	1581686	Other OP	Preventive Care Svc	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	1	Inpatie
15	1580709	Observation	Treament/Observation Room	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	2	Outpat
14	1207104	Emergency	Emergency	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	3	Emerge
5	866288	Other OP	Clinic Visit	Medicare	2020003	MEDICARE PART A AND B	Denied Claim	2	Outpat
4	226657	Other OP	Respiratory	Medicare	2020003	MEDICARE PART A	Denied Claim	2	Outpat

Previous 1 2 3 4 5 Next

Robotic Process Automation – Creating a Virtual Workforce



Replicate Human Behavior

- Login
- Clicks
- Typing
- Navigation

Mimic the Process

- Activities performed
- Multiple Systems
- Interfaces

Automate

- Linear Steps
- What-if logic
- Configured Activity

The Collector of the Future

Making the Case for Blockchain – Smart Contracts

Provider Encounter

Health Procedures Performed by Provider, clinical info entered in EMR

Dataset is entered into blockchain with patient ID

Transaction is verified and validated, combined to other health data and new block entered on chain

Blockchain with smart contract

Info on blockchain from other external sources (eligibility, provider dictionaries, member info, enrollment, etc…)

Smart Contract Self Executes on conditions being met

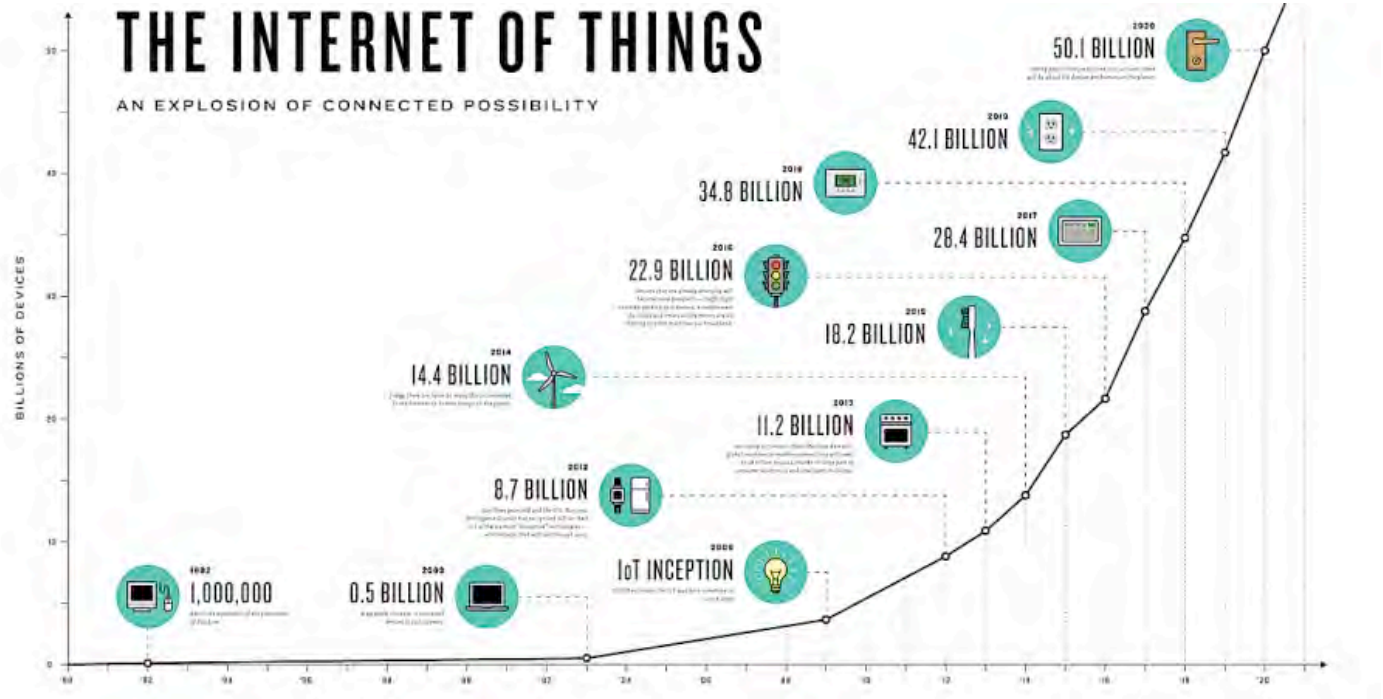
Output of smart contract entered back into blockchain

Processing

Provider provides additional information needed, secondary claims process, etc..

Bank clearinghouse payment processing

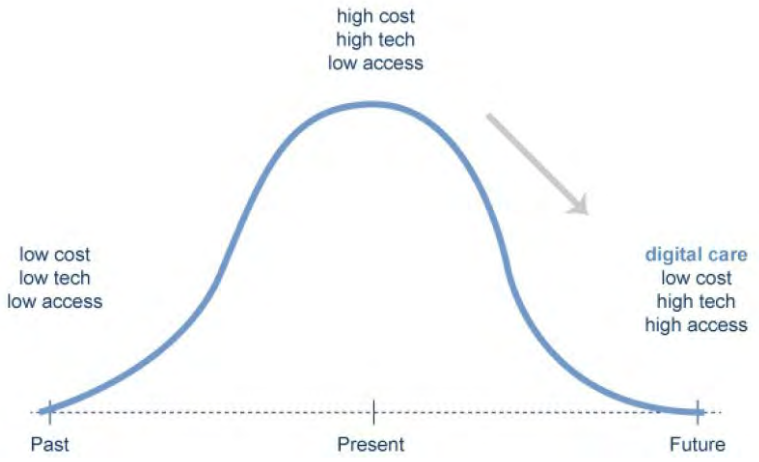
Digital Information Exchange Today



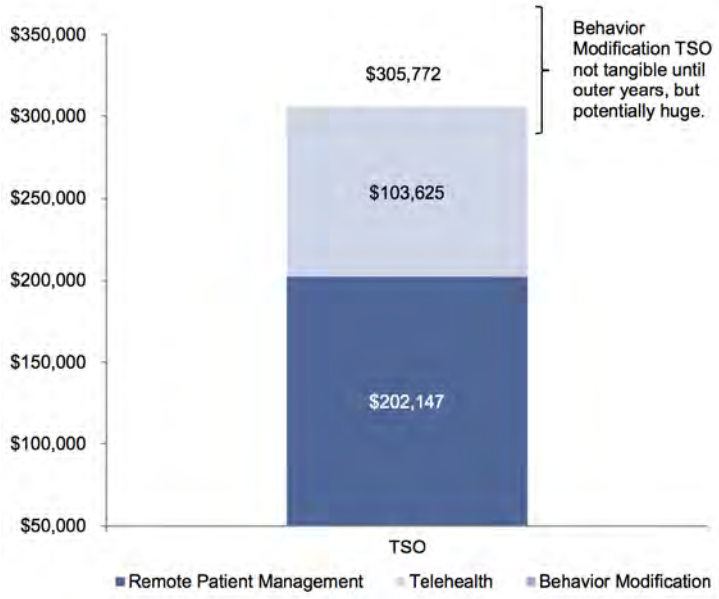
*McKinsey Global Institute, *The Internet of Things: Mapping the Value Beyond the Hype*, June 2015

- There are more than nine billion connected devices around the world, including smartphones and computers
- Over the next decade, this number is expected to increase dramatically, with estimates ranging from 25 billion to 50 billion devices in 2025

Healthcare's Digital Disruption



The Healthcare IoT's Savings Opportunity
$ in millions



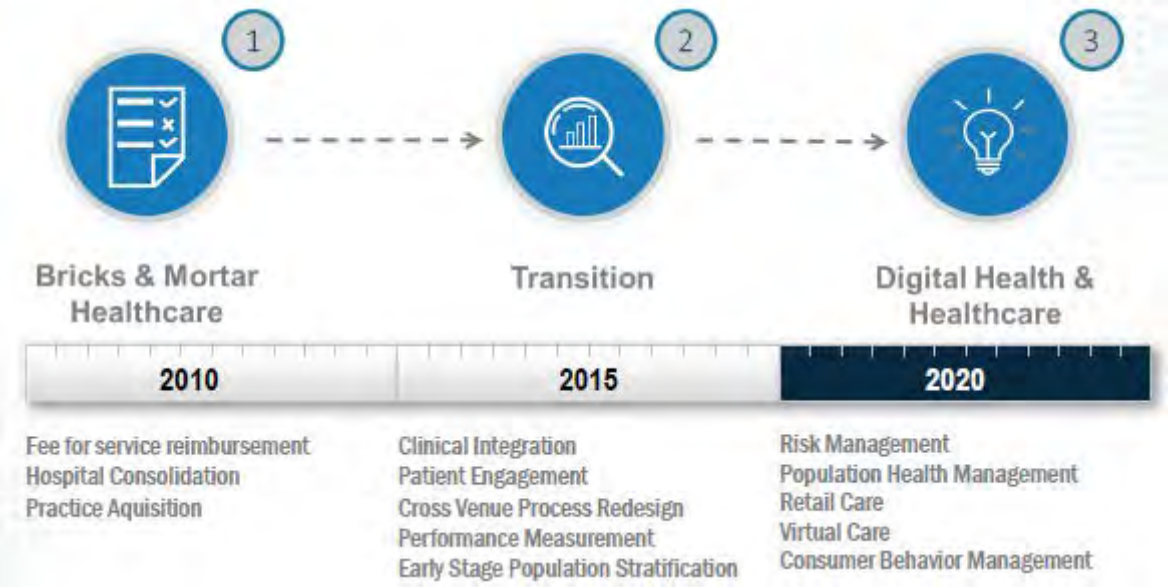
Source: Goldman Sachs Global Investment Research, 2012 MEPS Survey, CMS

- Healthcare represents the new frontier
- The digital health market opportunity over the next decade is estimated at $32 Billion*

*Goldman Sachs & Co. report, *The Internet of Things*, Vol. 5

The Digital Transformation of Healthcare

- You use technology in all aspects of life
- Companies are bringing innovations to market to meet your demand for connectivity
- Healthcare industry is now facing a set of digital challenges and working to reconfigure systems to control costs, increase access and improve quality of care
- You are looking for digital healthcare services, providers are rethinking the services they offer, focusing on wellness and outcomes rather than services consumed



But none of this is possible without Interoperability

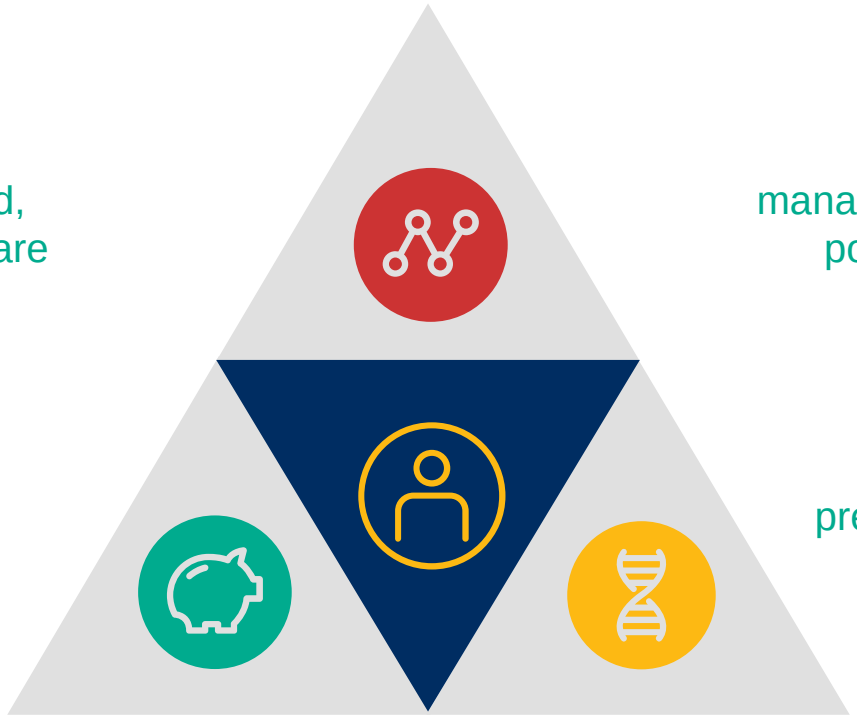
- Most IoT data are not used currently
- For example, only 1% of data from an oil rig with 30,000 sensors is used to make decisions
- The data that are used today are mostly for anomaly detection and control, not *optimization and prediction*, which provide the greatest value

On average, interoperability is required to capture 40-60% of potential value across IoT applications*

*McKinsey Global Institute, *The Internet of Things: Mapping the Value Beyond the Hype*, June 2015

Interoperability Enables Data Liquidity

- Interoperability is the ability of devices and systems to exchange and use electronic information from other devices and systems without special effort on the part of the user
- Without *liquidity of data*, it will be impossible to meet goals of value-based care

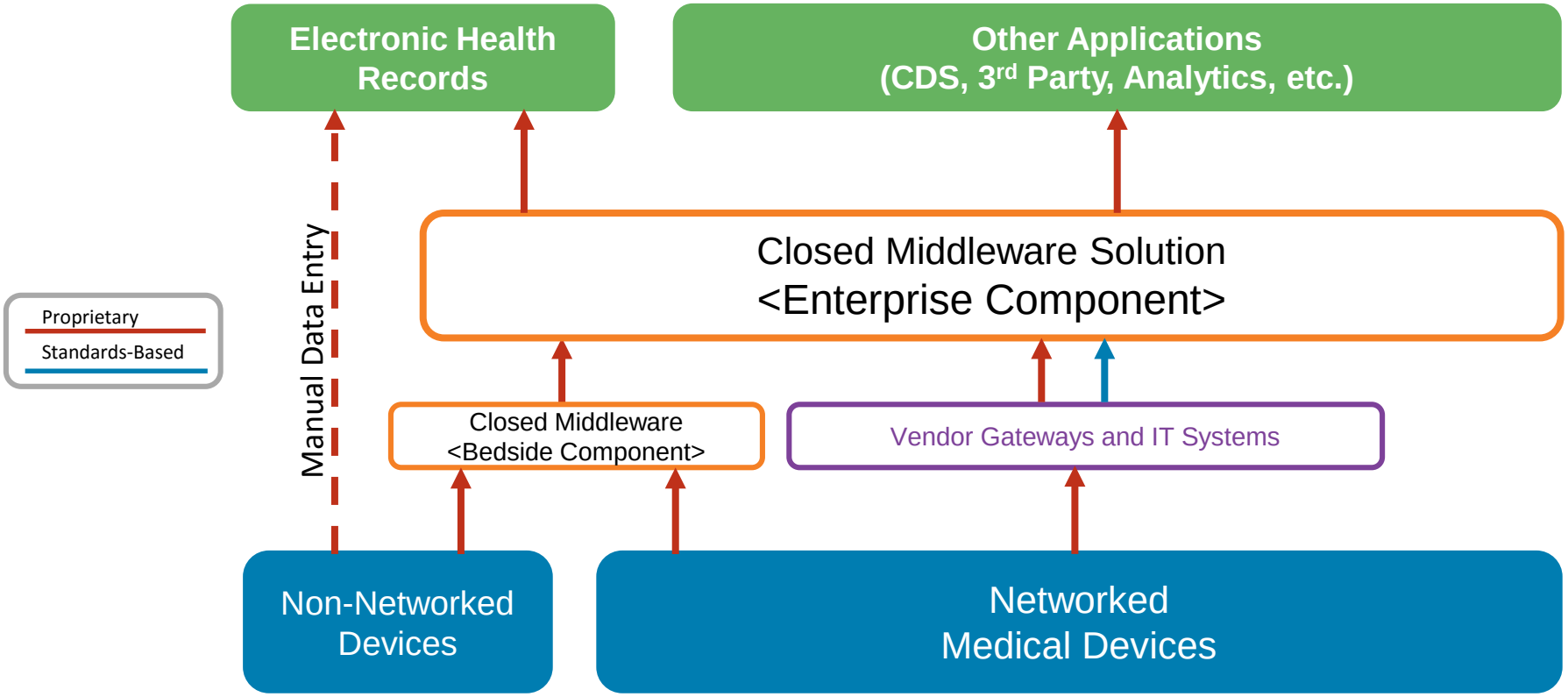


CENTER *for* MEDICAL INTEROPERABILITY

- ***Vision***
- Accelerating the seamless exchange
- of information to improve healthcare for all

- ***Mission***
- To achieve plug-and-play interoperability by
- unifying healthcare organizations to compel change,
- building a lab to solve shared technical challenges, and
- pioneering innovative research and development

Current state is proprietary, high cost and unsustainable



Centralized Testing and Certification Lab

- Center of excellence for plug-and-play interoperability

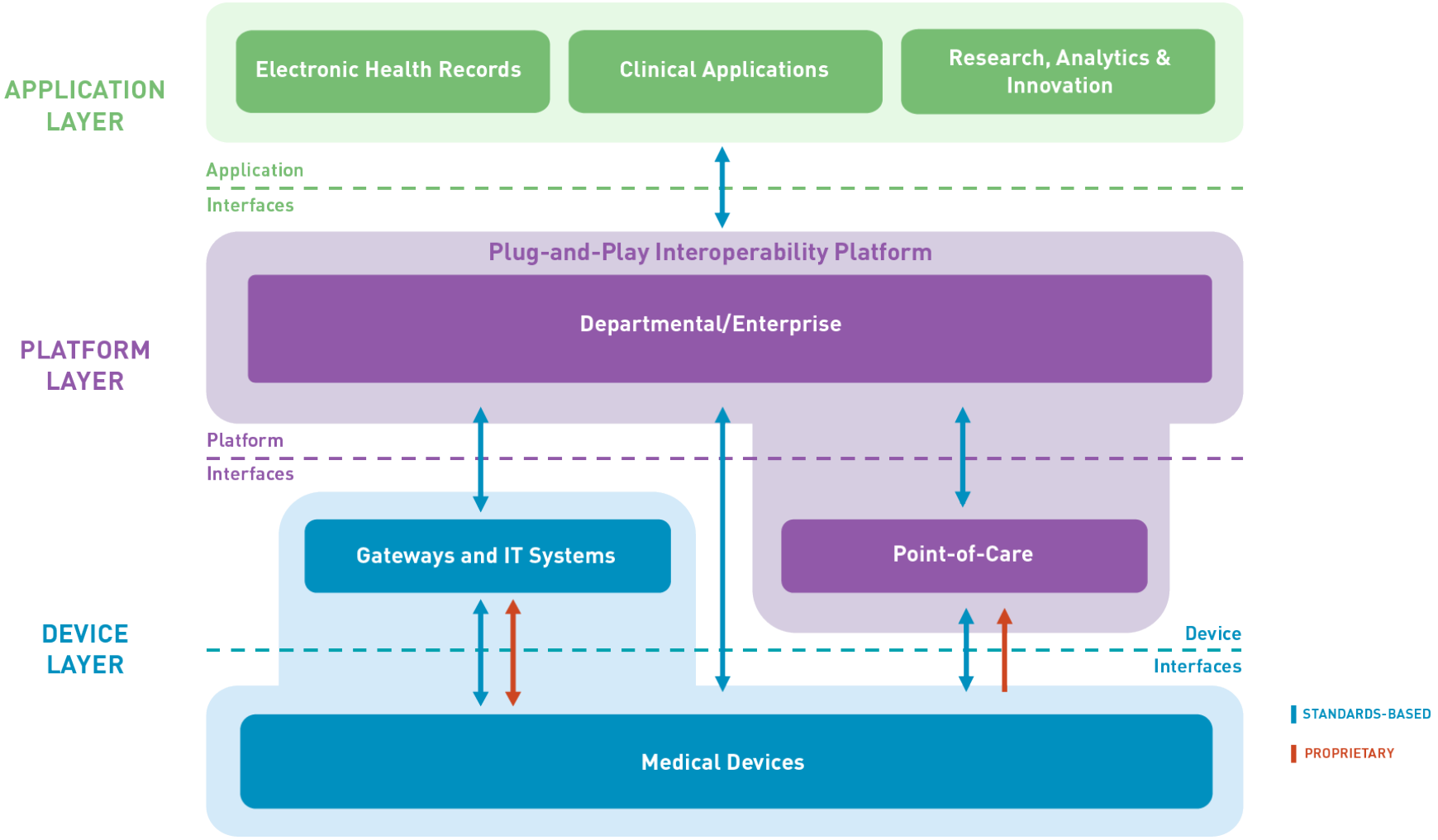
- Serves members and their technology suppliers, and hosts visiting engineers from industry to work collaboratively on solving technical challenges
  - Develop and demonstrate architectures and interfaces needed to deliver interoperability and assured connectivity inside and outside the hospital
  - Test and certify that devices and technology solutions meet Center specifications

Dedicated resource for solving shared technical challenges

- 501(c)(3) cooperative research & development lab
- Founded by health systems to simplify and advance data sharing among medical technologies and systems
- Centralized, vendor-neutral approach to:
  - Performing technical work that enables person-centered care
  - Testing & certifying devices & systems
  - Promoting adoption of scalable solutions

Future state is open, commoditized and enables 2-way plug-n-play interoperability and data liquidity

CENTER for MEDICAL INTEROPERABILITY



CMI Board of Directors Represents Diversity of Healthcare

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LIFEPOINT HEALTH

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HCA Hospital Corporation of America

Dean Harrison
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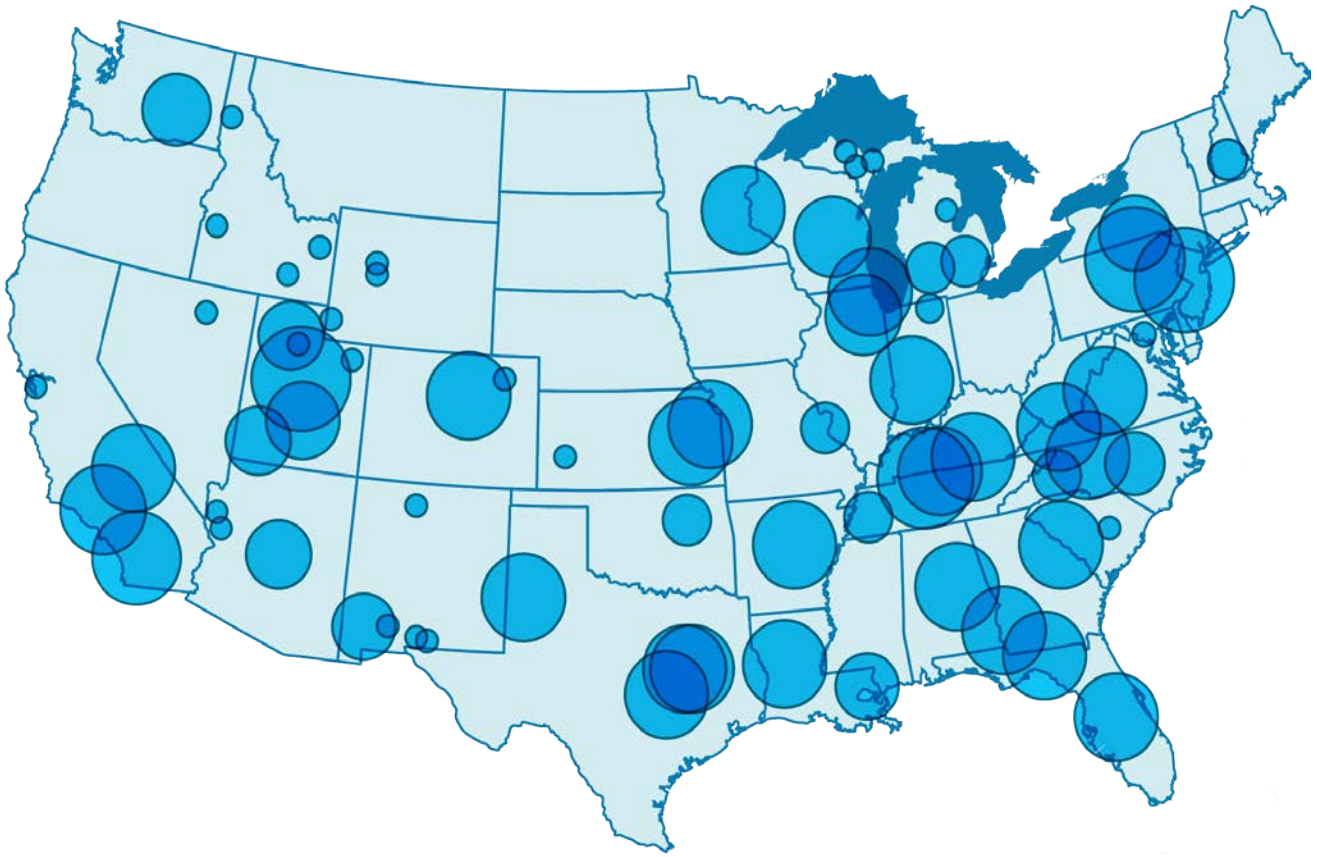
Nancy Howell Agee
CARILION CLINIC



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Department of Veterans Affairs

Dick Green, PHD
CableLabs

Vendors Testing the Center as We Progress Towards Formal Specifications and First Certification Event

Are we credible?

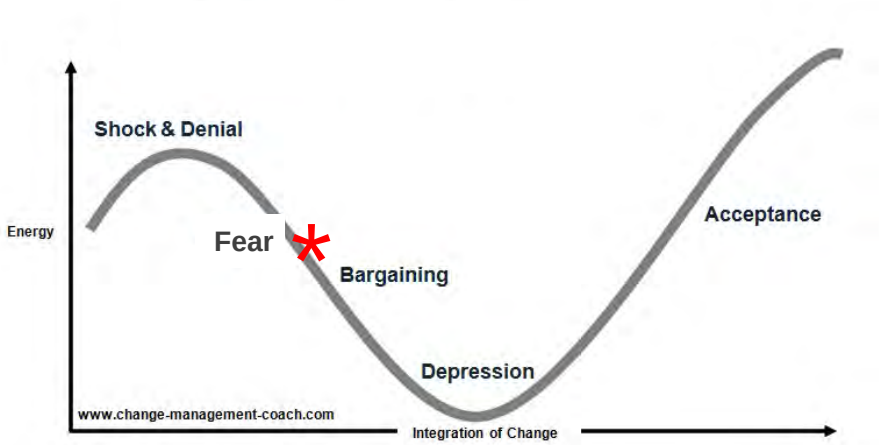
Do we have your support?

Are we accurately reflecting your requirements?

Will you follow through?

Is this a good investment?

Is this change avoidable?



Change is hard, even for vendors…

Consistent Messaging from Members is Critical to Encourage the Change to Interoperability

Strategy To Drive Interoperability

BUILD FOUNDATION	CONNECT EVERYTHING			CHANGE THE GAME
Trusted Devices and Infrastructure	**Interoperability Specifications**	***Accelerators***		**Next Generation Architecture**
		Device Driver Model	**Penetration and Scale**	
Address foundational issues of **wireless connectivity and** medical device **identity & authentication**	Equip ecosystem to **connect all devices and enterprise applications** through industry-specified interoperability platform interfaces	Clean up legacy and **eliminate economic barrier** that current device driver ecosystem presents to adoption and innovation	Work with community to make **basic interoperability accessible to all of healthcare**	Transform outcomes through **fully liquid data** – right data, right time, right place

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TRUSTED WIRELESS HEALTH

CENTER for MEDICAL INTEROPERABILITY

= TRUST

SECURITY

100% EAP certs & AAA

RADIO FREQUENCY EXCELLENCE

Design & 100% Verification

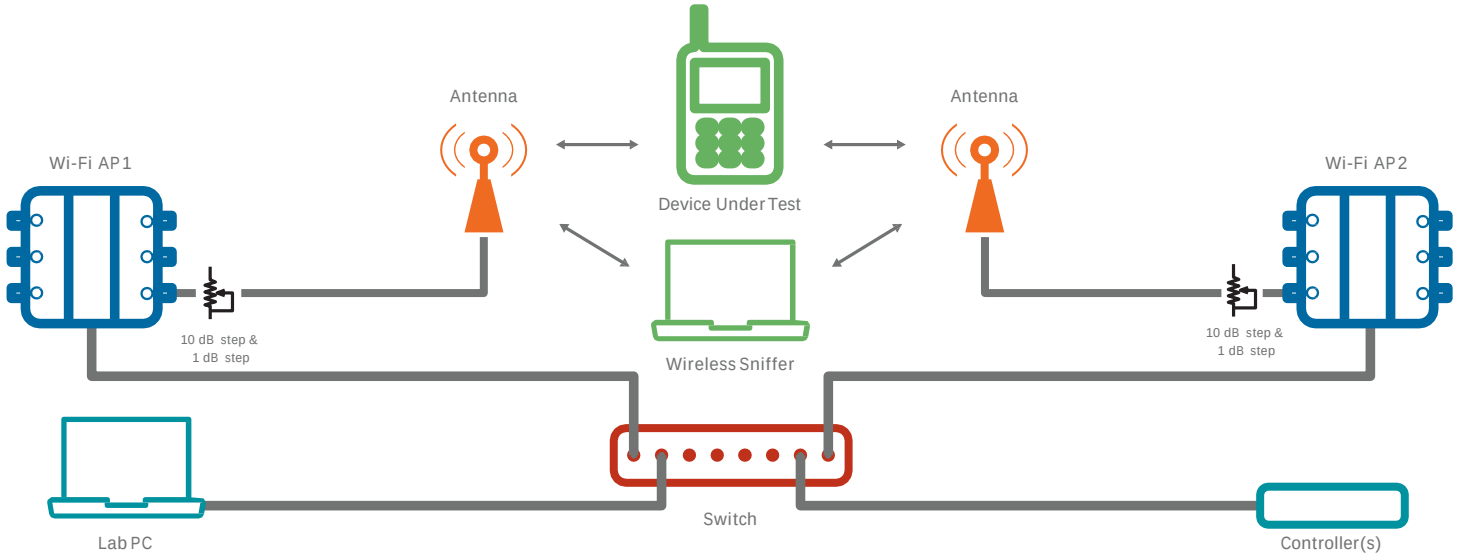
WI-FI TRAFFIC

Assessment, Remediation, & Control

TESTING & Certification

Association, Roaming, Throughput, & Standards

TESTING & CERTIFICATION



ASSOCIATION

At what minimal signal level does the device associate and stay associated?

ROAMING

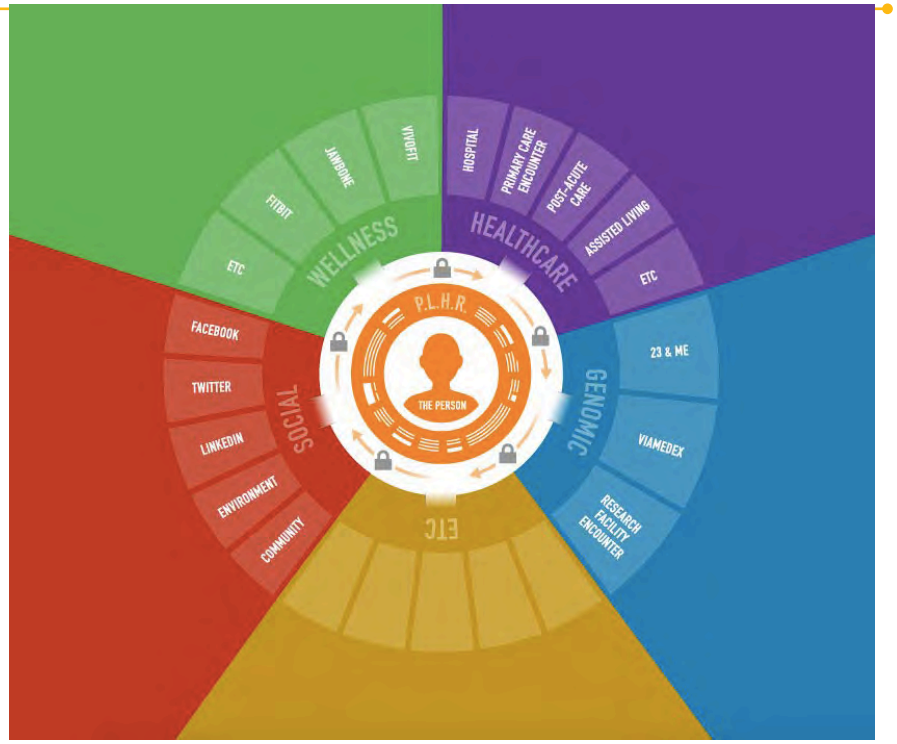
At what signal level does the device move to a known better AP? How “sticky” is the device?

THROUGHPUT

How well does the device send / receive data when signal is good?

Data Liquidity Begins with The Person

Current v. Future State



MOONSHOT MARATHON

Thank you

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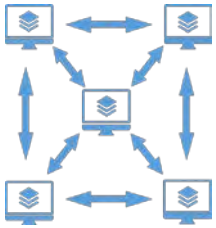
BLOCKCHAIN BASICS

Blockchain involves a decentralized network where information is distributed to all involved parties.

Parties can securely transact and share information for various uses within the dedicated Blockchain.

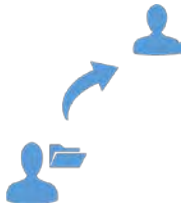
The data is entered into the chain through mathematical algorithms to ensure it is tamper-proof.

All copies of the blockchain are updated to maintain transparency within the network.



Decentralized

A blockchain is a Peer-to-Peer network, meaning there is no central authority, and the ledger is downloaded onto all computers in the network.

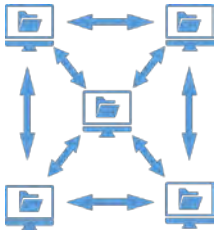


Secure

The names associated with the transactions may be anonymous, and all transactions are signed with private key cryptography.

Tamper-Proof

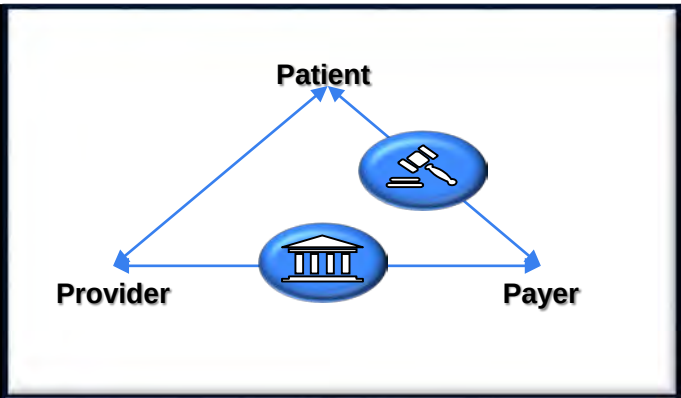
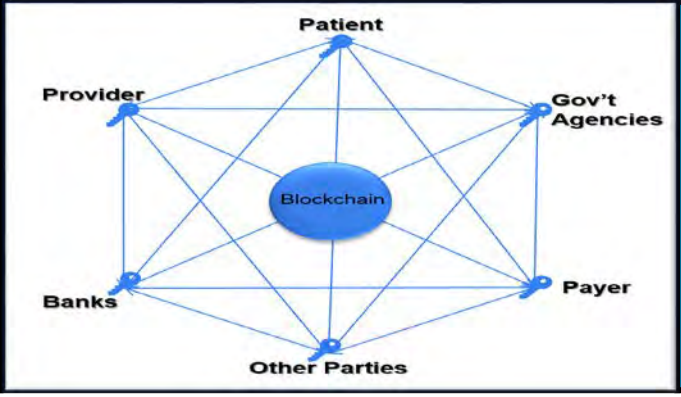
Backed by cryptographic algorithms, data stored in the blockchain is almost impossible to alter.



Transparent

All members of the network can see all transactions that have taken place.

Blockchain: From Current State to Future State in Healthcare

Current State		- **Providers control medical information** - **Patients have limited access to their own data**
Future State		- **Information is controlled by necessary parties on a shared system** - **Patients have unlimited access to their own data via laptops and mobile devices**

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Transition to standardization

Thinking inside the box

World merchandise trade

2012 prices*, $trn

Sources: World Trade Organisation; US Bureau of Labour Statistics; Daniel Bernhofen *et al*; *The Economist*

Ports worldwide

	1965	1970
Port labour productivity, tonnes per hour	1.7	30.0
Average ship size, tonnes	8.4	19.7
Number of loading ports in Europe	11	3
Insurance costs†, £ per tonne	0.24	0.04
Value of goods in transit‡, £ per tonne	2	1

*Deflated by US consumer prices
†Australia to Europe ‡Hamburg to Sydney