Leveraging Disruptive Innovations to Co-Create Value

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Objectives

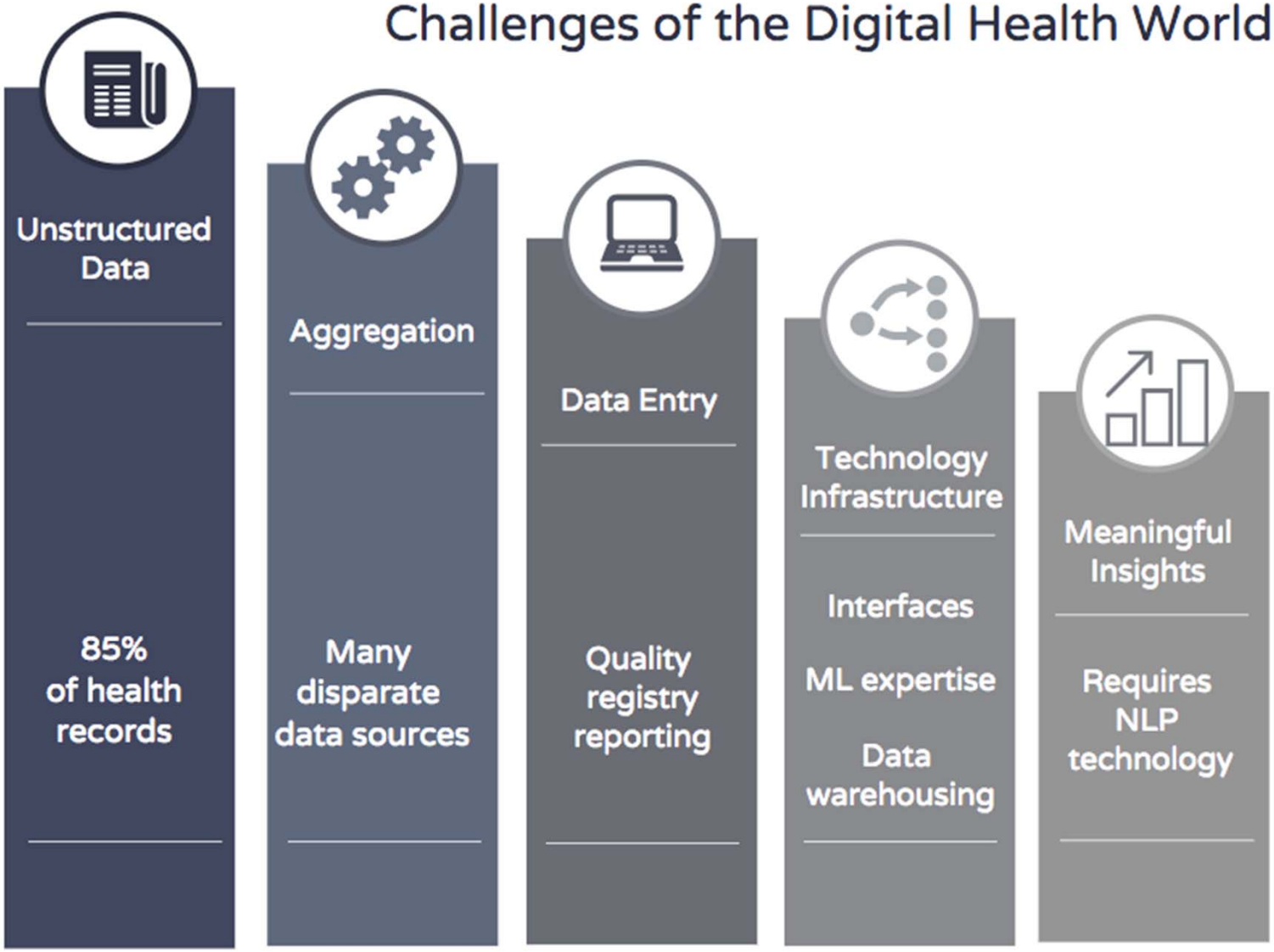
- Define barriers in maximizing value
- Introduce innovation and technology solutions
- Explore strategies to bridge the gap

$$\text{Value} = \frac{\text{QUALITY}}{\text{COST}}$$

(Outcomes + Patient Experience +Access)

Barriers:
Affect both sides of the equation

Challenges of the Digital Health World



Problem / Barriers Continued

Physician burnout

How do handle such large amounts of data?

Data manipulation

Data analysis

Reporting requirements

Quality adherence

How do we even measure quality and performance???

Poor efficiency with current technology restrictions

Human Capital required for reporting & coordination not sustainable

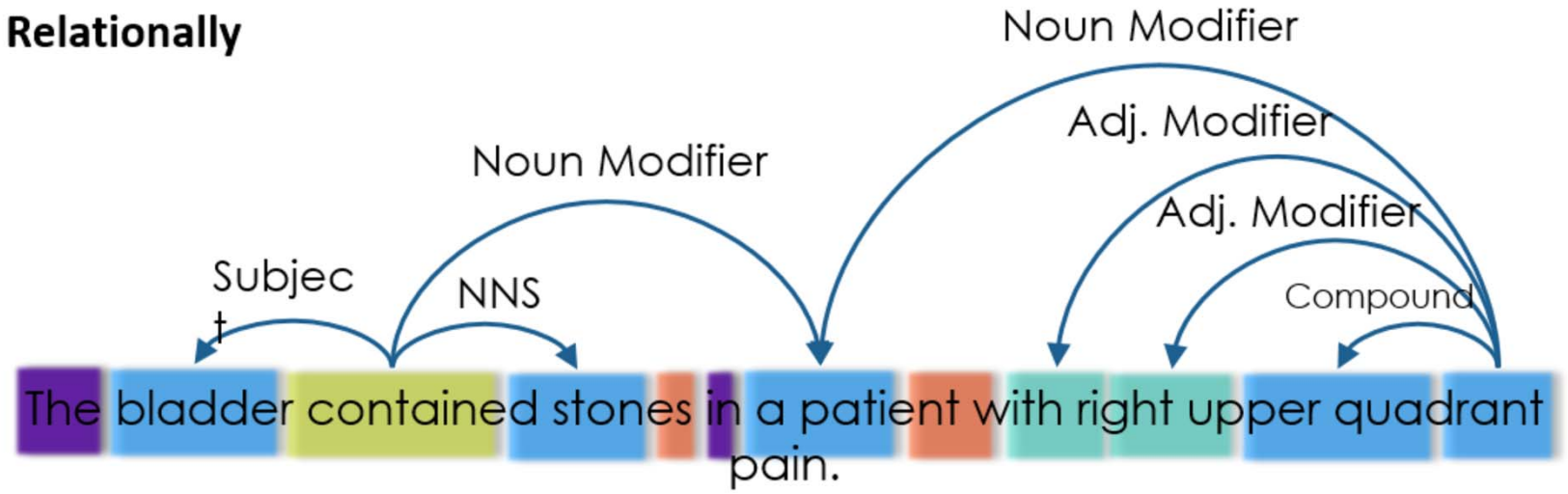
Solution: Technology and Innovations

- NLP
- ML
- Cloud-based platforms
- Blockchain
- Automation/AI

Natural Language Processing

Ability of computer program to understand human language as it is spoken.

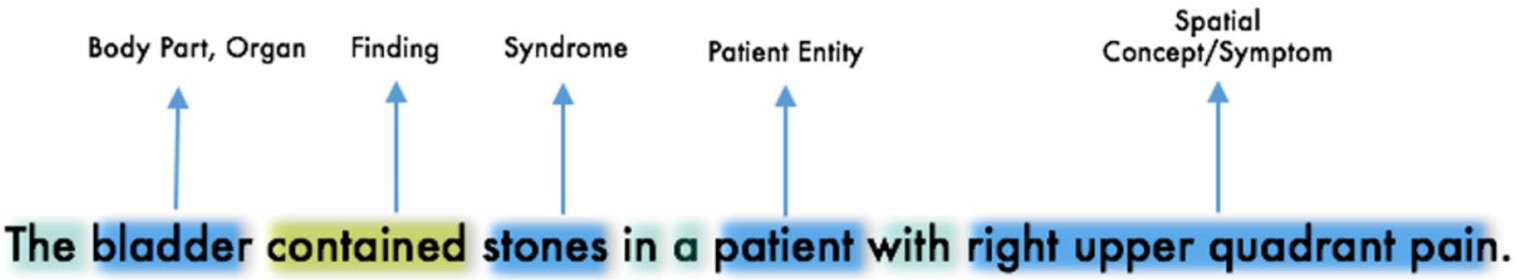
Natural Language Processing



Natural Language Processing

Grammatically

Semantically



Natural Language Processing: Example

Social Media in Business

Natural Language Processing: HealthCare Application

Example: Organ lesions in radiology reports

Natural Language Processing

Clinical Note

CT ABDOMEN WITHOUT CONTRAST AND CT PELVIS WITHOUT CONTRAST

REASON FOR EXAM: Evaluate for retroperitoneal hematoma, the patient has been following, is currently on Coumadin.

CT ABDOMEN: There is no evidence for a retroperitoneal hematoma.
The liver, spleen, adrenal glands, and pancreas are unremarkable. Within the superior pole of the left kidney, there is a 3.9 cm cystic lesion. A 3.3 cm cystic lesion is also seen within the inferior pole of the left kidney. No calcifications are noted. The kidneys are small bilaterally.

CT PELVIS: Evaluation of the bladder is limited due to the presence of a Foley catheter; the bladder is non-distended. The large and small bowels are normal in course and caliber. There is no obstruction.

Bibasilar pleural effusions are noted.

IMPRESSION:
1. No evidence for retroperitoneal bleed.
2. There are two left-sided cystic lesions within the kidney, correlation with a post contrast study versus further characterization with an ultrasound is advised as the cystic lesions appear slightly larger as compared to the prior exam.
3. The kidneys are small in size bilaterally.
4. Bibasilar pleural effusions.

Natural Language Processing

Clinical Note	Data Warehouse			
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Natural Language Processing

Clinical Note	Data Warehouse			
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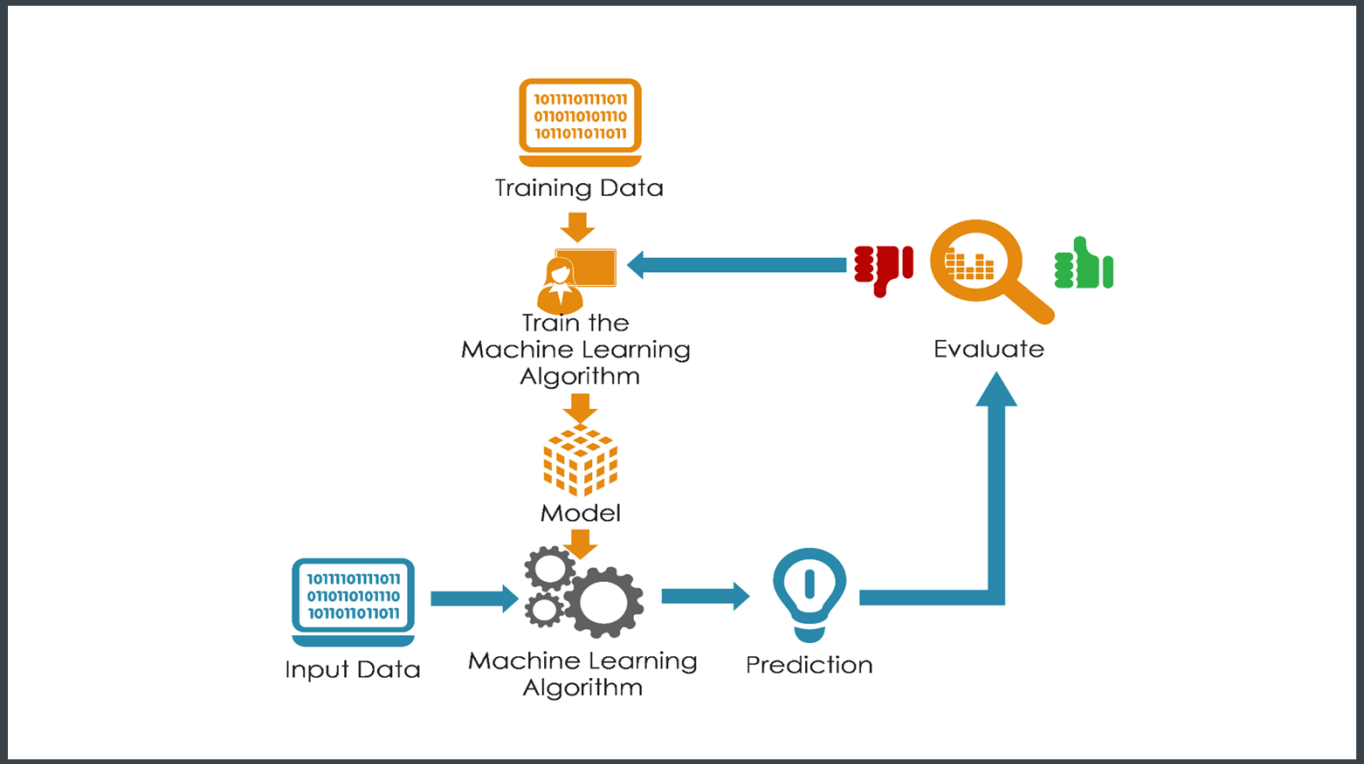
	retroperitoneal hematoma	liver	superior pole left kidney	Foley catheter
	No calcifications	spleen	3.3 cm cystic lesion	
	Bibasilar pleural effusions	adrenal glands	inferior pole left kidney	
	No retroperitoneal bleed	pancreas	larger cystic lesions	
	bladder non-distended			

Machine Learning

Application that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.

Machine Learning



Machine Learning: Example

Airline Industry

Facial recognition

Luggage size analysis – pre-board

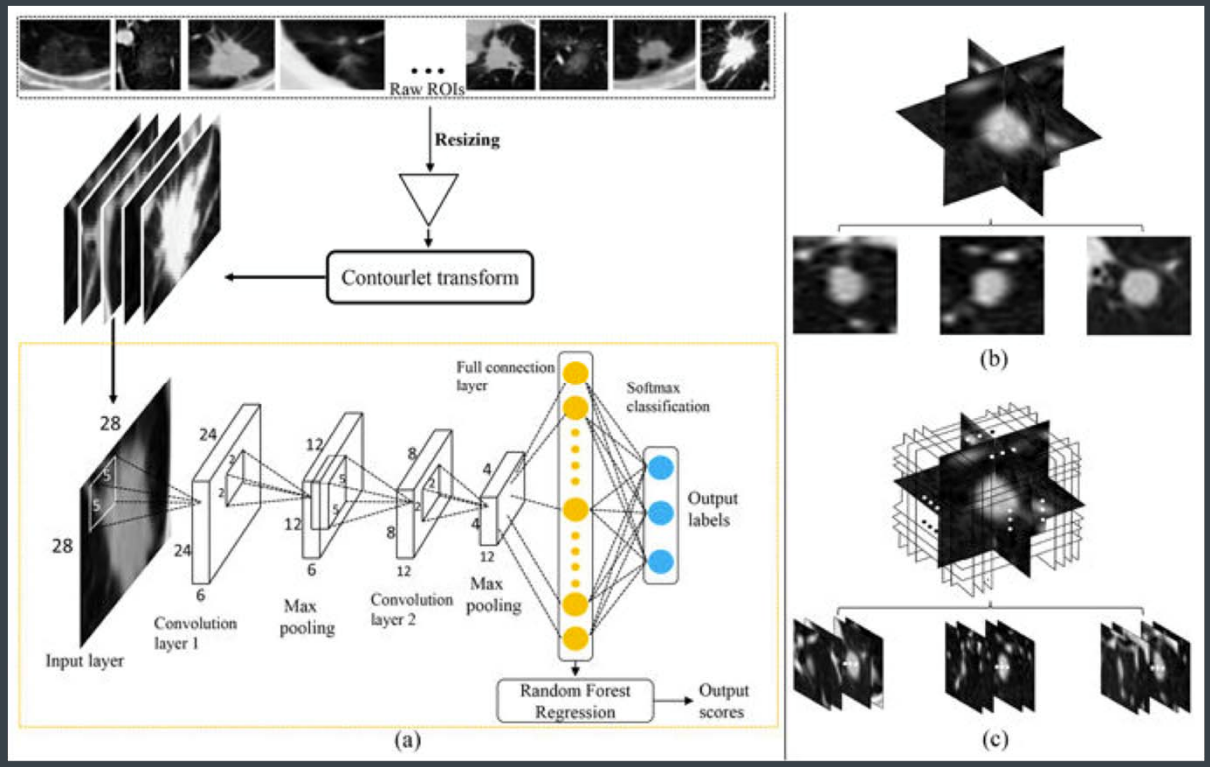
Flight pattern routing and re-routing

Machine Learning: HealthCare Application

Image analysis and deep learning model

Example: Lung nodules and lung masses

Machine Learning: HealthCare Application



Cloud-based Platforms

- Operate in the cloud
- Do not reside on local servers
- Can be updated on-the-fly
- Allow for more seamless aggregation of disparate data sources
- EHR agnostic capabilities

Cloud-based Platforms

- Well established in other sectors
- Example: QuickBooks online
- Example: Google Docs
- Example: Netflix

Cloud-based Platforms

HealthCare Examples:

- Lung Screening Software
- Breast cancer Screening Software
- Oncology platforms

Blockchain

Blockchain refers to a type of data structure that enables identifying and tracking transactions digitally and sharing this information across a distributed network of computers.

Blockchain

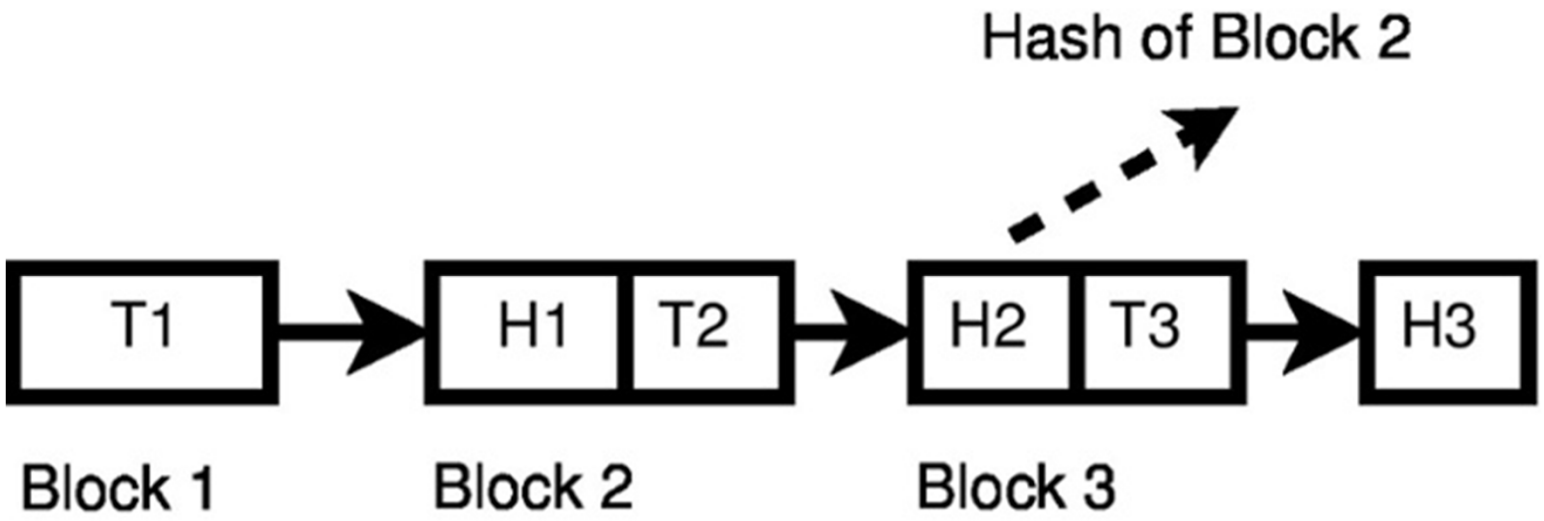
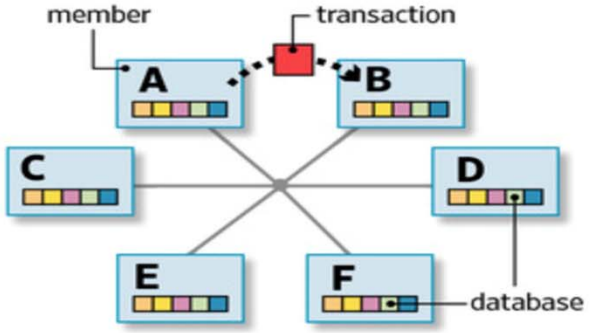


Figure Courtesy: Dr. Michael Scott

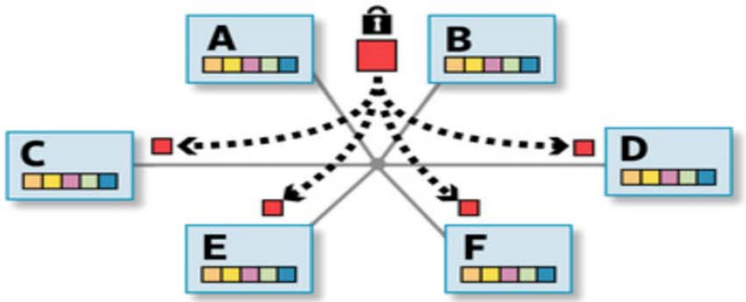
Blockchain

Blockchain

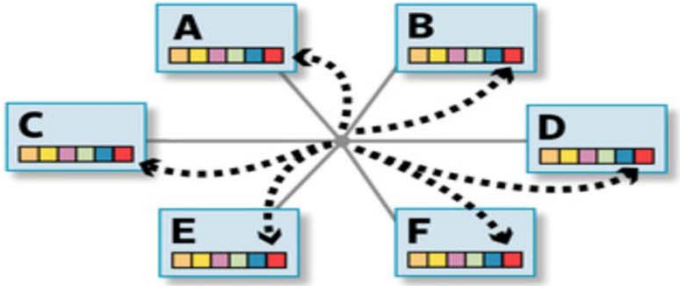
All members have a copy of the shared database/ledger. When a member wants to send money to another member (e.g., A to B), a "block," or chunk of data, is created to represent the transaction.



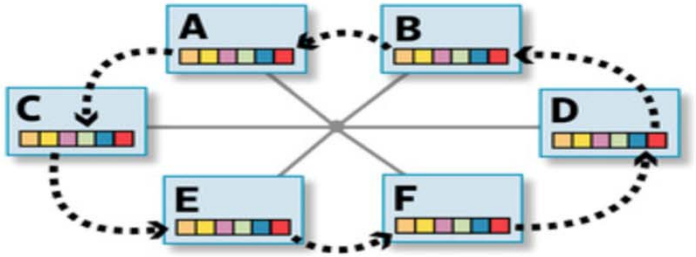
Cryptography is used to share the transaction with the group while also maintaining privacy if the parties desire. The network recognizes the transaction as valid because the digital signature—which only the signatory can see—is mathematically linked to a public signature that only a bona fide transaction could bear.



Once a block is confirmed, all members add the block to their copies of the database.



Complex mathematics are used to ensure that there is consensus among the database copies, which prevents tampering.



Sources: Smart Dubai; Collin Thompson, Medium.com

THE WALL STREET JOURNAL.

Blockchain: HealthCare Example

- Replace a financial transaction with a medical event
- Each patient with unique digital ID and all events or transactions secured on the blockchain
- Extremely secure
- Universal access
- World without EHR?
- Result: a true living, breathing , dynamic digital patient record

Automation/AI

- Computers and/or machines performing repetitive tasks, labor intensive jobs, time consuming jobs
- Applying AI (Artifical Intelligence) allows for human-like thinking and behavior with the automation of tasks

Automation/AI: Examples

Numerous examples throughout history and society

Apple Siri, Amazon Alexa, Google Assistant

Amazon packaging and logistics automation

Video game NPCs

Home security monitoring

Driverless cars vs. self-driving cars

Automation/AI: HealthCare Examples

Virtual Scheduling

Smart billing/Smart coding

Maximizing patient movement and efficiency during an encounter

Auto completion of records when data analytics available

AI can even provide for diagnostic assisting to care providers

Industry Examples

Manufacturing

- Predictive Maintenance
- Demand Forecasting
- Process Optimization

Retail

- Predictive Inventory Planning
- Upsell & Target Marketing
- Customer ROI & Lifetime Value

Travel & Hospitality

- Aircraft Scheduling
- Customer Complaint Resolution
- Traffic Patterns & Congestion Management

Financial Services

- Risk Analytics & Regulation
- Customer Segmenttaion
- Credit Worthiness Evaluation

How Can We Bridge the Gap?

Bridging the Gap:

Co-Creation:

Initiative or strategy that brings together or engages different parties or groups to produce a mutually valued outcome

Groups: Hospitals, Administrators, Physicians, Technology companies, and even Patients

Bridging the Gap:

Co-Creation:

Allows for transparency

Creates a culture focused on value

Helps shift current paradigms in healthcare philosophy

Bridging the Gap:

Co-creation:

Data driven

(Who houses data?)

Ultimately impacts the value equation

How Can We Bridge the Gap?

Unlimited possibilities and potential

Go small

Go progressive

Innovate

Deviate

Myriad tech companies for partnering

The Time is Now

EHR: 100M+ patients U.S.

Government mandate

Increase Cost

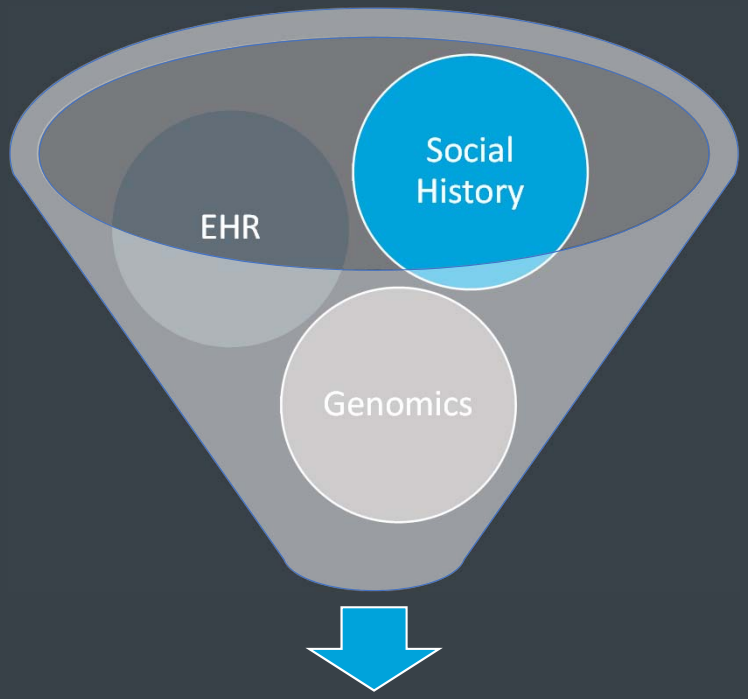
Decrease Reimbursements

Quality Emphasis

Technology + Co-creation: Service Line Example

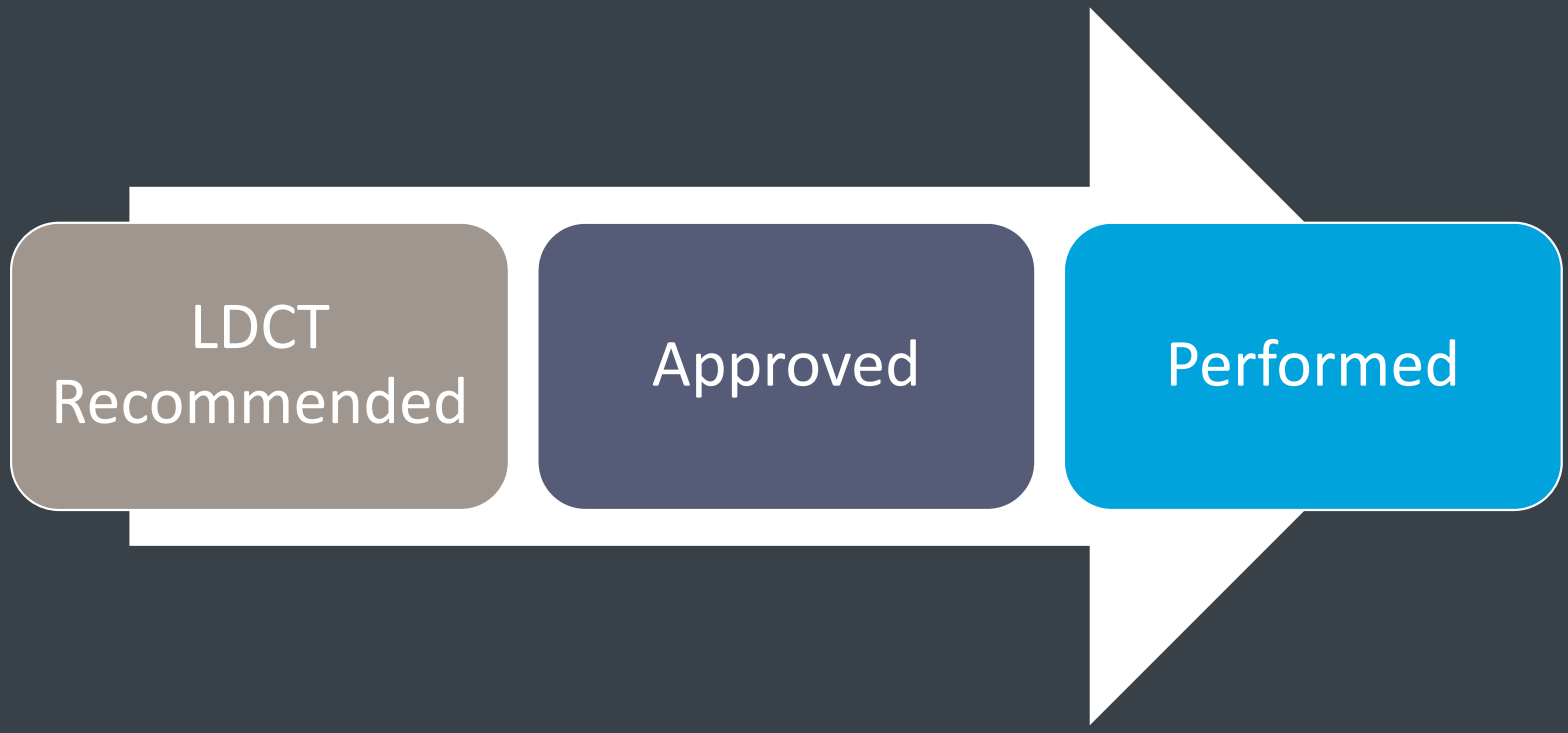
Lung Cancer Screening

Analysis and Comprehension

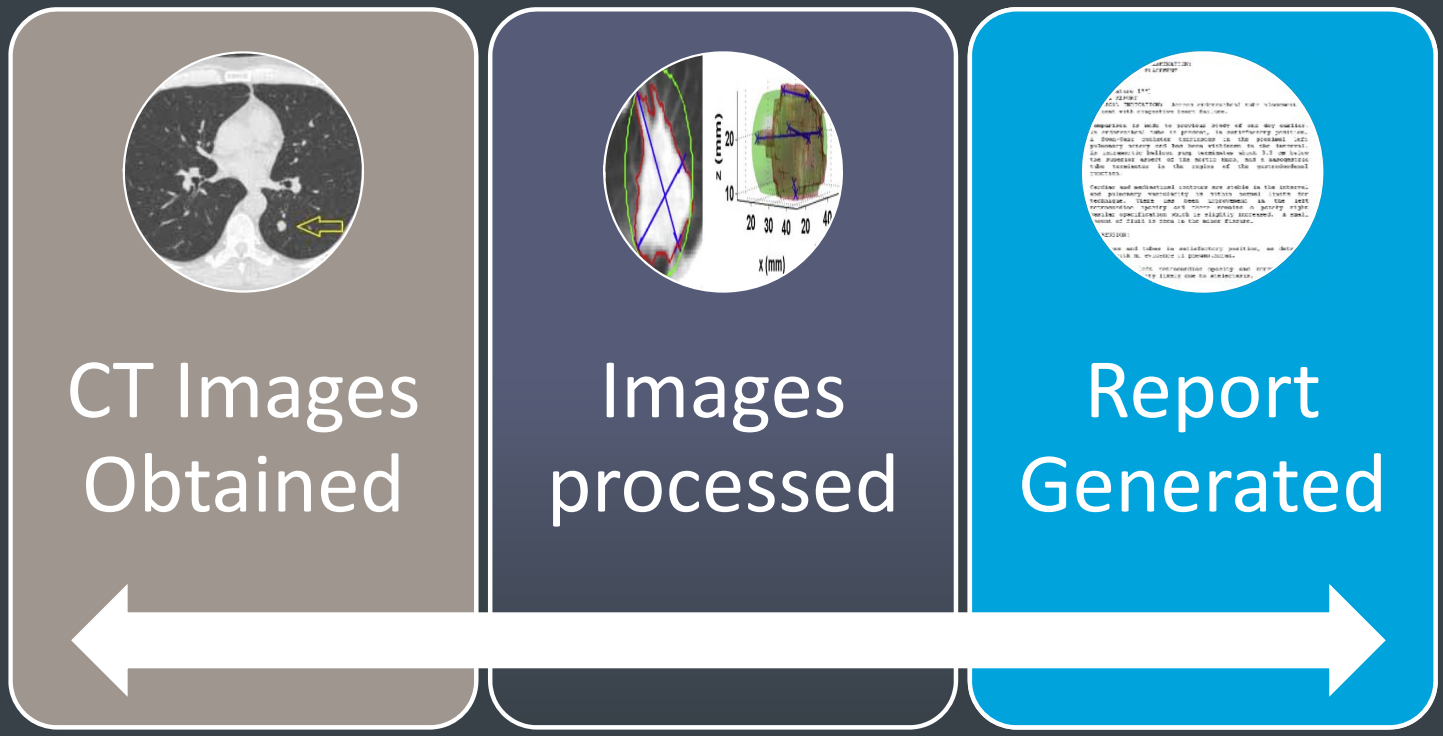


Risk of Lung Cancer

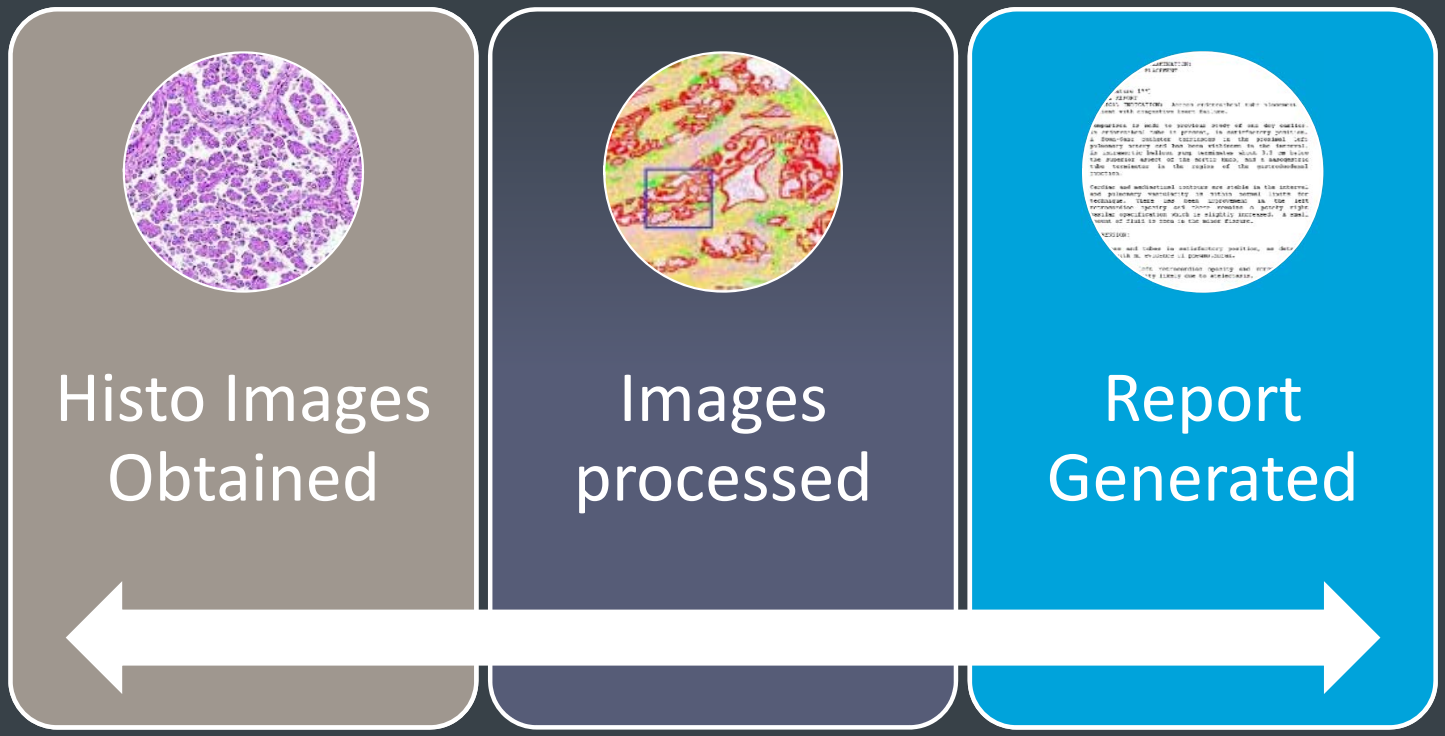
Pathway Recommendation



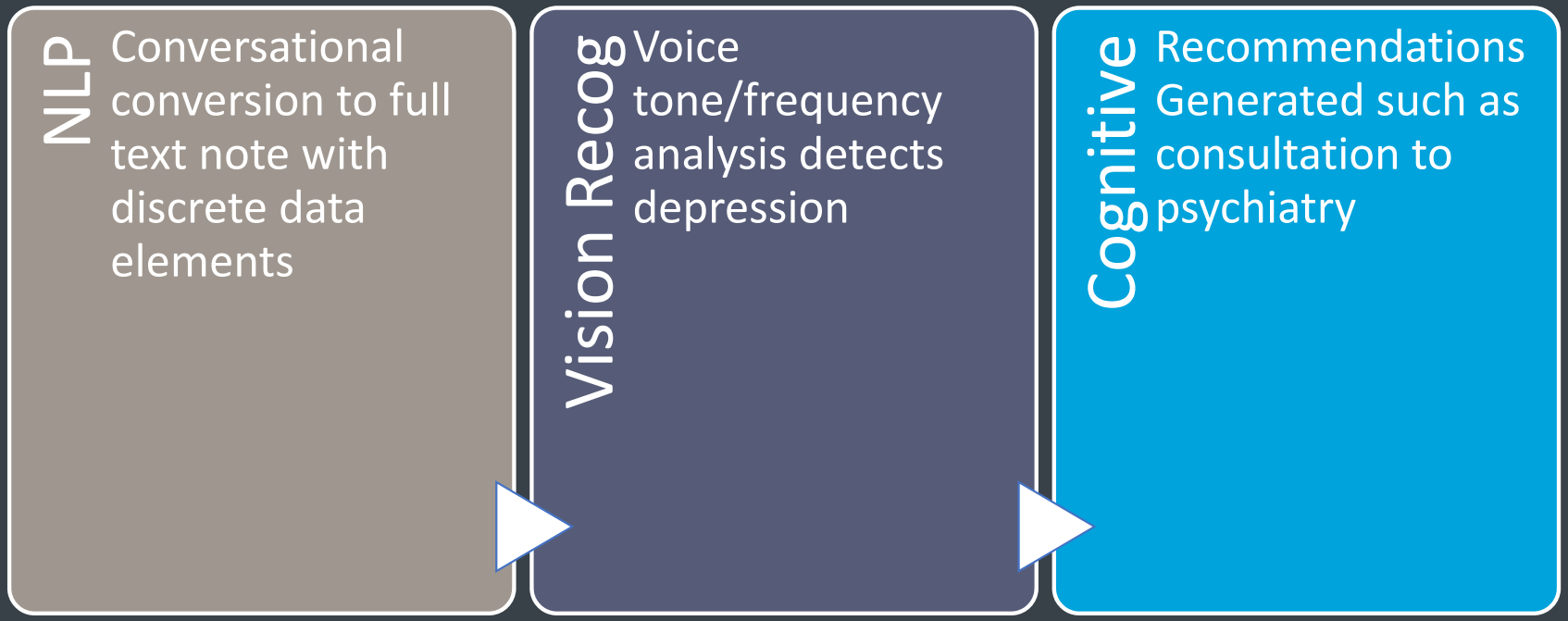
Imaging



Pathology



Clinic


NLP
Conversational conversion to full text note with discrete data elements
Vision Recog
Voice tone/frequency analysis detects depression
Cognitive
Recommendations Generated such as consultation to psychiatry

Review

Value Equation

Barriers to equation variables (data structure, data aggregation, analysis, technology, etc.)

Technology & Innovation Solutions (NLP, ML, AI, blockchain, Cloud)

Bridging the gap: Co-Creation

Provide a possible application of above in healthcare (Lung CA Screening)

Thank You