

Artificial Intelligence Round Table

Ga HIMSS Regional Event

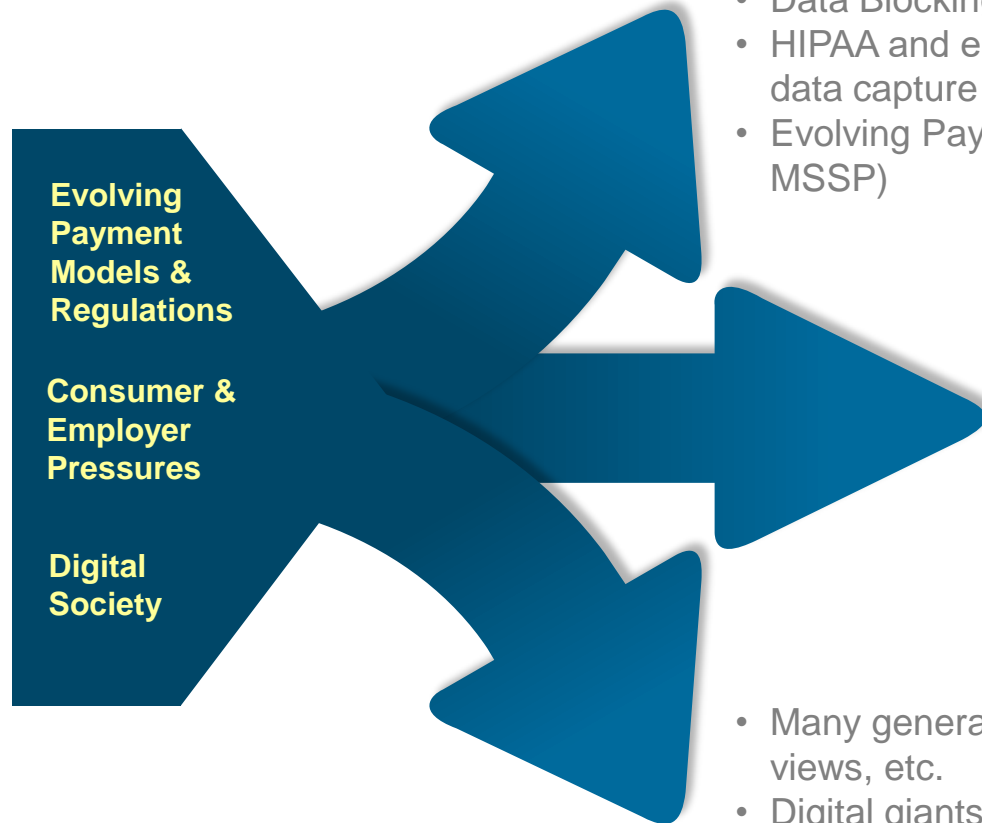
Columbus, GA

Paula J Edwards, PhD
June 17, 2019

Topics

- Why Artificial Intelligence (AI) in healthcare?
- What is AI? Machine Learning (ML)?
- How is it actually being used in healthcare?
- Round table discussion

Healthcare Industry Is Rapidly Changing



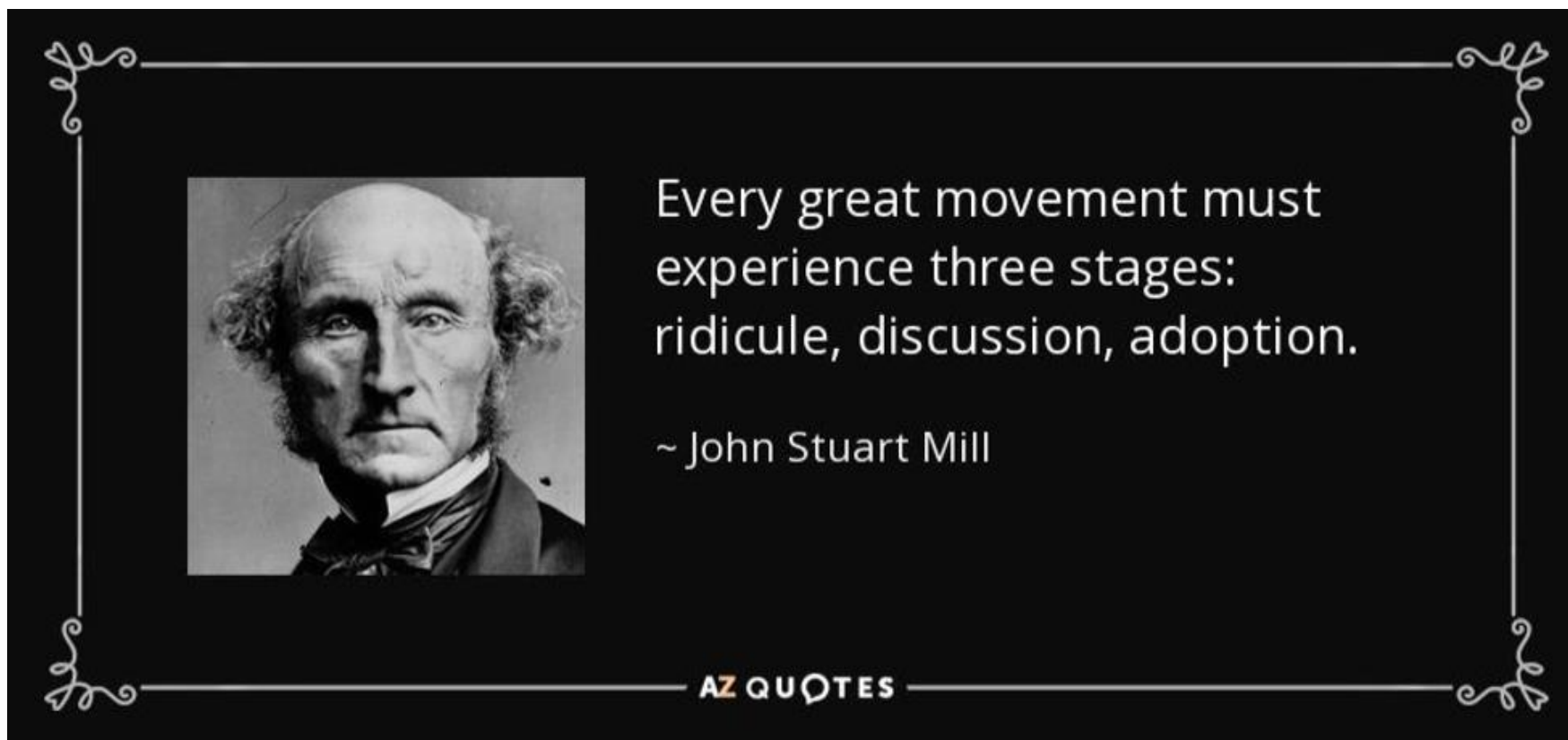
- MACRA
- Promoting Interoperability
- Data Blocking (ONC Proposed Rule)
- HIPAA and emerging “GDPR” – especially with data capture and exchange
- Evolving Payments (e.g., Medicare Advantage, MSSP)

- Haven
- Walmart
- Amazon (on its own)
- More direct to employer (e.g., bundles, direct contracting)

- Many generations with differing needs, views, etc.
- Digital giants and new entrants with lower barriers to enter (in some areas)
- Combinatorial technologies and trends

Artificial Intelligence and Machine Learning are being heralded as key enablers to success

AI & Machine Learning In Healthcare



AI & Machine Learning In Healthcare

Enabling Predictive and Prescriptive Analytics

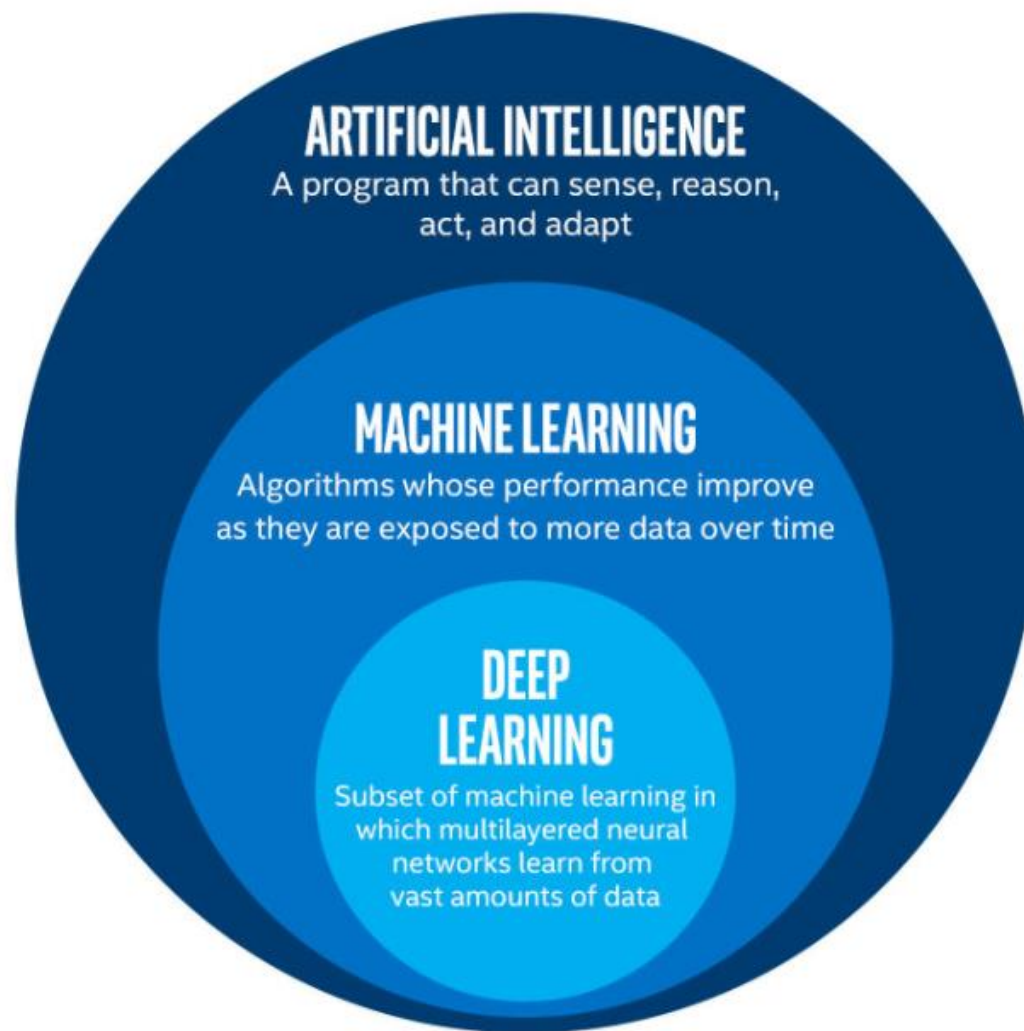
HIMSS Analytics Adoption Model for Analytics Maturity (AMAM)		2017
Stage 7	Personalized Medicine & Prescriptive Analytics	0.0%
Stage 6	Clinical Risk Interventions & Predictive Analytics	0.0%
Stage 5	Enhancing Quality of Care, Population Health and Understanding the Economics of Care	28.6%
Stage 4	Measuring & Managing Evidence Based Care, Care Variability & Waste Reduction	9.5%
Stage 3	Efficient, Consistent Internal/External Report Production and Agility	9.5%
Stage 2	Core Data Warehouse Workout	23.8%
Stage 1	Foundation Building: Data Aggregation and Initial Data Governance	9.5%
Stage 0	Fragmented Point Solutions	9.5%

Duke
UNC
Rush }
Geisinger }

Gartner's Analytics Ascendancy Model
Prescriptive Analytics
Predictive Analytics
Diagnostic Analytics
Descriptive Analytics

Source: HIMSS Analytics. "2017 Essentials Knowledge Series: Clinical & Business Intelligence." Sep 25, 2017.

What is AI? Machine Learning?



What is AI? Machine Learning?

Machine Learning vs Artificial Intelligence	
Machine Learning is a type of Artificial Intelligence that gives the ability for a computer to learn without being explicitly programmed. It uses an algorithm to parse data, learn from it, and make decisions accordingly.	Artificial Intelligence is the theory and development of computer systems able to perform tasks intelligently similar to a human being.
Functionality	
Machine Learning focus on accuracy and patterns.	Artificial Intelligence focuses on intelligent behavior and the maximum change of success.
Categorization	
Machine Learning can be categorized to Supervise Learning, Unsupervised Learning, and Reinforcement Learning.	Artificial Intelligence based applications can be categorized as applied or general.

Source: <https://www.differencebetween.com/difference-between-machine-learning-and-vs-artificial-intelligence/>

Remind me: What is AI? Machine Learning?

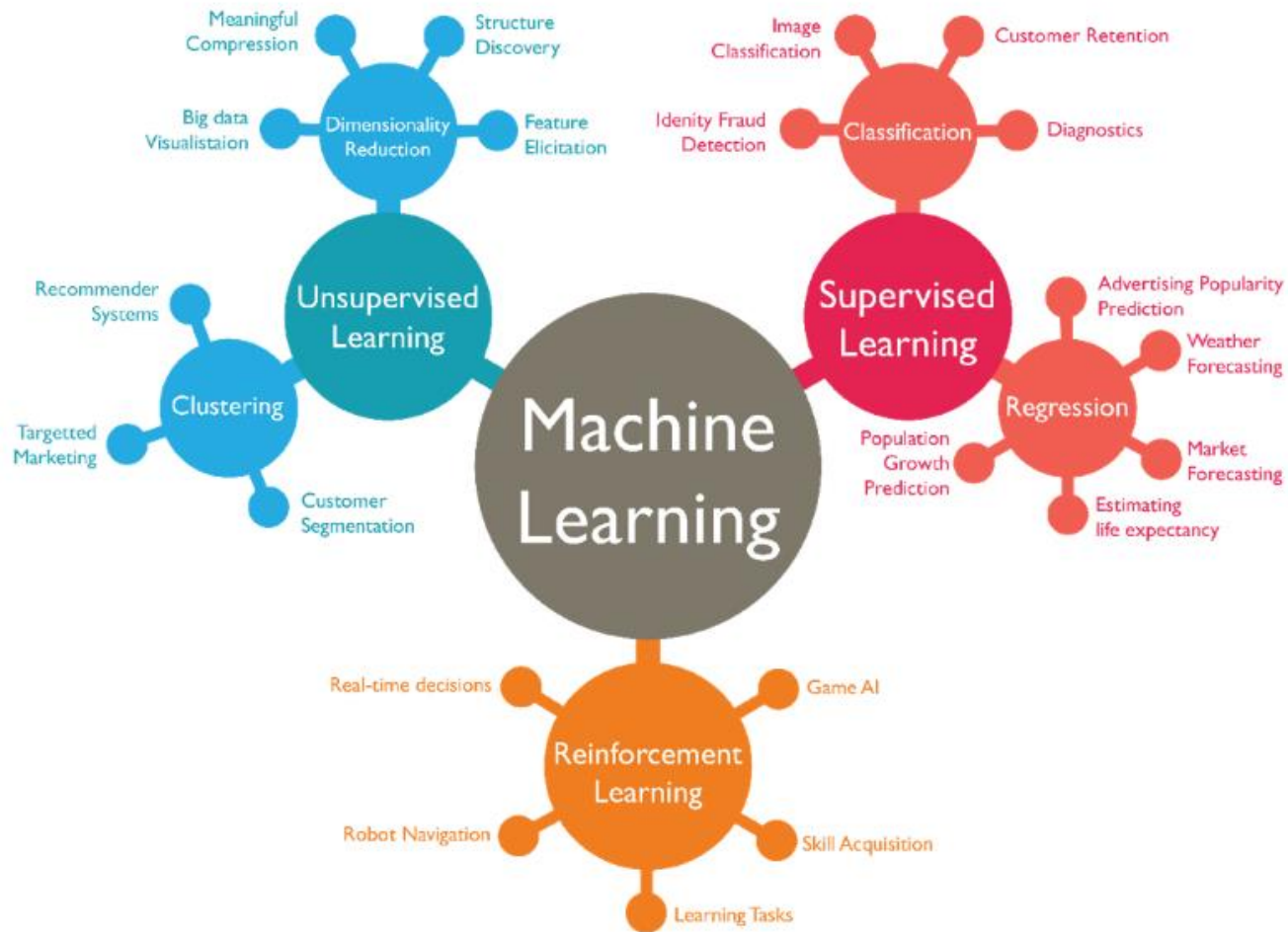


Image via [Mactores](#)

Conventional AI Applications in Healthcare

APPLICATION	POTENTIAL ANNUAL VALUE BY 2026	KEY DRIVERS FOR ADOPTION
Robot-assisted surgery	\$40B	Technological advances in robotic solutions for more types of surgery
Virtual nursing assistants	20	Increasing pressure caused by medical labor shortage
Administrative workflow	18	Easier integration with existing technology infrastructure
Fraud detection	17	Need to address increasingly complex service and payment fraud attempts
Dosage error reduction	16	Prevalence of medical errors, which leads to tangible penalties
Connected machines	14	Proliferation of connected machines/devices
Clinical trial participation	13	Patent cliff; plethora of data; outcomes-driven approach
Preliminary diagnosis	5	Interoperability/data architecture to enhance accuracy
Automated image diagnosis	3	Storage capacity; greater trust in AI technology
Cybersecurity	2	Increase in breaches; pressure to protect health data

SOURCE ACCENTURE

© HBR.ORG

Harvard Business Review: <https://hbr.org/2018/05/10-promising-ai-applications-in-health-care>

Example AI/ML Case Studies Presented at HIMSS2019

WHAT

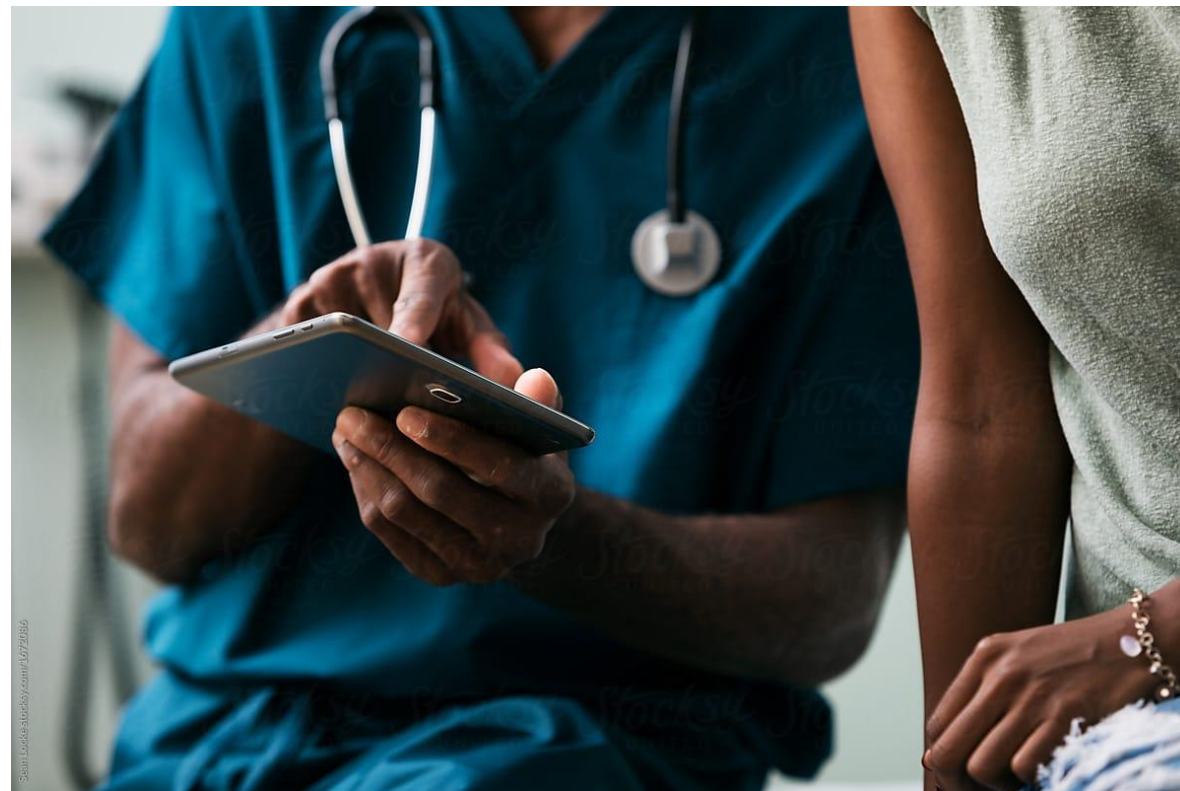
Provide ranked treatment options for breast cancer patients

HOW

- EHR Abstracted observational database of cancer patients
- Compares outcomes of similar patients to current patients
- IBM Watson for Oncology (WfO)

IMPACT

Physician selected 'Not Recommended' option 24.5% of time without support vs 4.7% of time with support



 Hackensack Meridian Health

Example AI/ML Case Studies Presented at HIMSS2019

WHAT

Reduce Clinical Variation & LOS

HOW

- Unsupervised learning – topology – to group patients
- Identify 'goldilocks group' – better outcomes, lower cost – and develop care path

IMPACT

\$198K in savings for Pneumonia, COPD, CHF, Septic Shock, Sepsis w/o Shock



 Flagler Hospital

Example AI/ML Case Studies Presented at HIMSS2019



 Cleveland Clinic

WHAT

Keepers vs Leakers

HOW

- K-means clustering
- Identify unique traits of 'leakers'

IMPACT

Found 'leakers' tended to be in far western suburbs, had twice the rate of cognitive disease

Example AI/ML Case Studies Presented at HIMSS2019



 Geisinger

WHAT

COPD Chronic Care Management

HOW

- Identify at-risk & undiagnosed patients
- Identify factors driving risk & interventions to prevent avoidable ER or IP stay
- Jvion Cognitive Machine

IMPACT

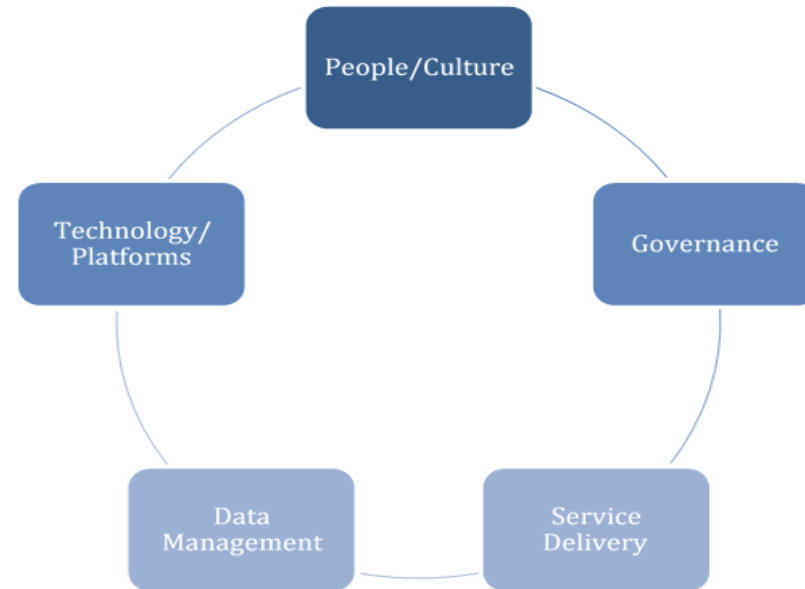
- Identified COPD patients at 30x increased risk
- 50% reduction in avoidable admissions for COPD

Round Table Discussion

- Is your organization using AI/Machine Learning today? If so, what are you using it for?
 - Are you using self-developed models or using vendor-developed AI/ML models/solutions?
- What areas in your organization have the greatest potential to benefit from use of AI/ML?
- What 'keeps you up at night' related to use of AI/ML in your organization?
- What barriers impede use of AI/Machine Learning in your organizations?
- What facilitators could help you start/expand/sustain your use of AI/ML?

Closing Thoughts

To use AI and Machine Learning to drive change, it takes more than just data & technology...

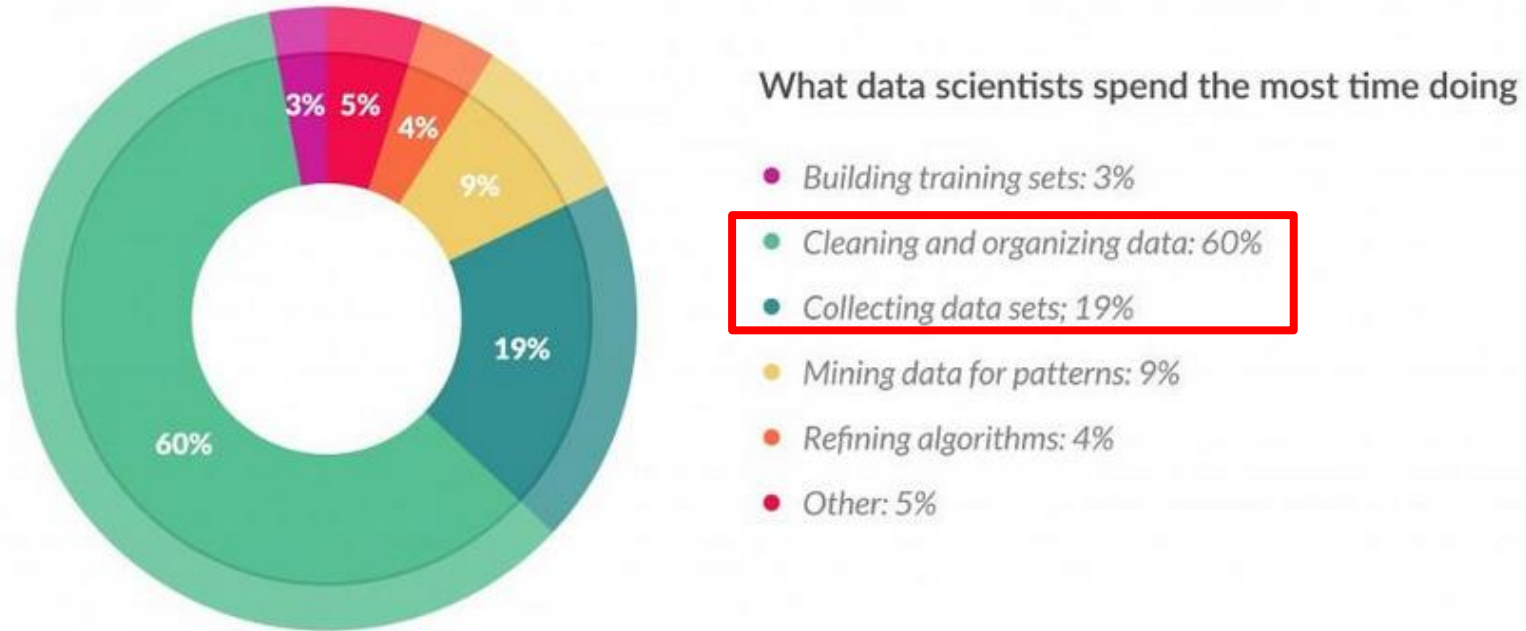


Appendix

Getting started

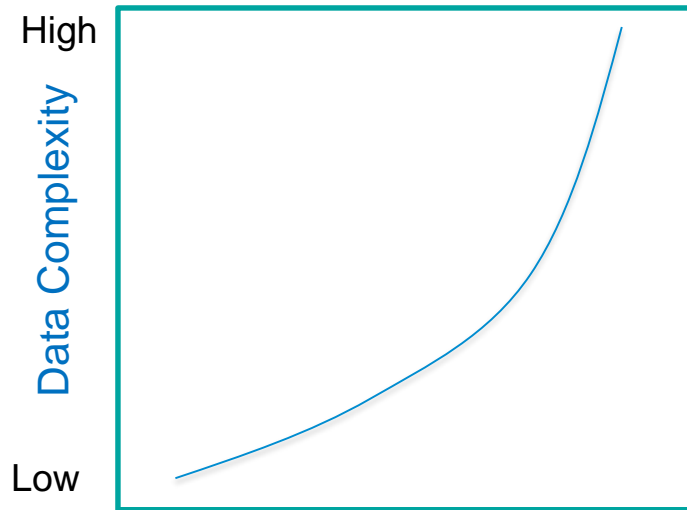
- Start small
- Bake in ROI from the start
 - Choose a high-profile project
 - Prove the value & impact on the patients & the organization
 - Who are stakeholders best equipped to help realized value
- Fail fast and often (and as cheaply as possible)
- Good methodology is crucial
 - Bring physicians in early
 - Use an iterative approach
 - Include model refresh as models get stale over time
- Transparency and explainability are key to success
- Operationalizing AI/ML requires a different skillset than developing the model
- Consider biases and ethics

Facilitator: Platforms and Governance to Shorten 'Time-to-Insight'

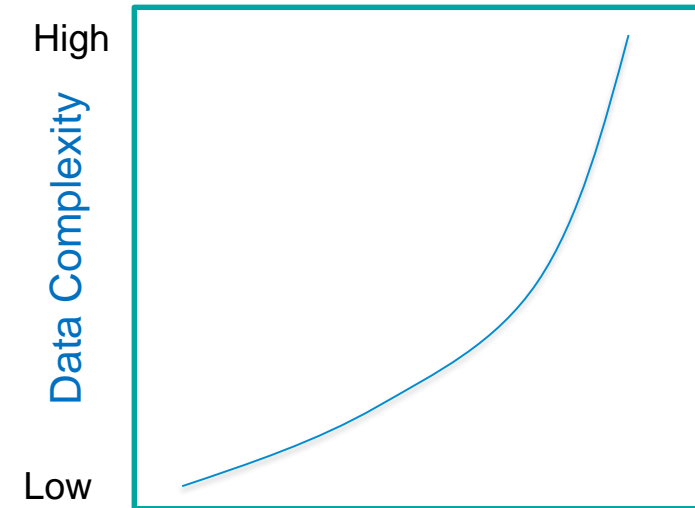


Source: Press, G. "[Cleaning Big Data](#)". Forbes. March 23, 2016

Facilitator: Data Stewardship to Shorten 'Time-to-Insight'



Knowledge Needed to
Access Information



Effort Needed to Access
Information

Lack of data stewardship and lack of the fit-for-purpose analytics tools increase the knowledge and effort required for self-service access

Assessing Model Fit & Utility

The screenshot shows a news article from HealthData Management. The main headline is "Most studies evaluating AI in radiology didn't validate the results". The author is Marla Durben Hirsch, and it was published on April 11, 2019. The article discusses a report on the performance of AI algorithms in medical imaging, noting that many studies do not validate their results on actual patient care. The article includes social media sharing icons and options to print or reprint.

HealthData Management All Sections ▾

NOW READING: **The Latest** Most studies evaluating AI in radiology didn't validate the ... **HIT Think** Why humans still hold the advantage in decision ... Tech, telemedicine aids care at new Mount Sinai surgery suite Anthem jo to find ber

Most studies evaluating AI in radiology didn't validate the results

By Marla Durben Hirsch

Published April 11 2019, 7:40am EDT

More in Radiology Artificial intelligence Machine learning Medical imaging

A new report has found that most research applying machine learning to review medical images never validated the outcomes obtained.

The revelation—contained in a **report** entitled Design Characteristics of Studies Reporting the Performance of Artificial Intelligence Algorithms for Diagnostic Analysis of Medical Images: Results from Recently Published Papers—casts doubt on whether AI research can be applied to actual patient care.

Print Reprint

“Of 516 studies published between Jan. 1, 2018, and Aug. 17, 2018, **only 6 percent of the studies performed any external validation.** However, none of those studies adopted all of the recommended design features for robust validation of the clinical performance of the artificial intelligence algorithms.”

Sources:

- https://www.healthdatamanagement.com/news/most-studies-evaluating-ai-in-radiology-didnt-validate-the-results?utm_campaign=MorningRounds-Apr%2011%202019&utm_medium=email&utm_source=newsletter
- <https://synapse.koreamed.org/DOIx.php?id=10.3348/kjr.2019.0025>

Assessing Model Fit & Utility

Confusion Matrix		Actual		
		Positive	Negative	
Predicted	Positive	a	b	Positive Predictive Value = $a / (a+b)$
	Negative	c	d	Negative Predictive Value = $d / (c+d)$
		Sensitivity = $a / (a+c)$	Specificity = $d / (b+d)$	Accuracy = $(a+d) / (a+b+c+d)$

