



# AI in Healthcare: Evolution of Practice

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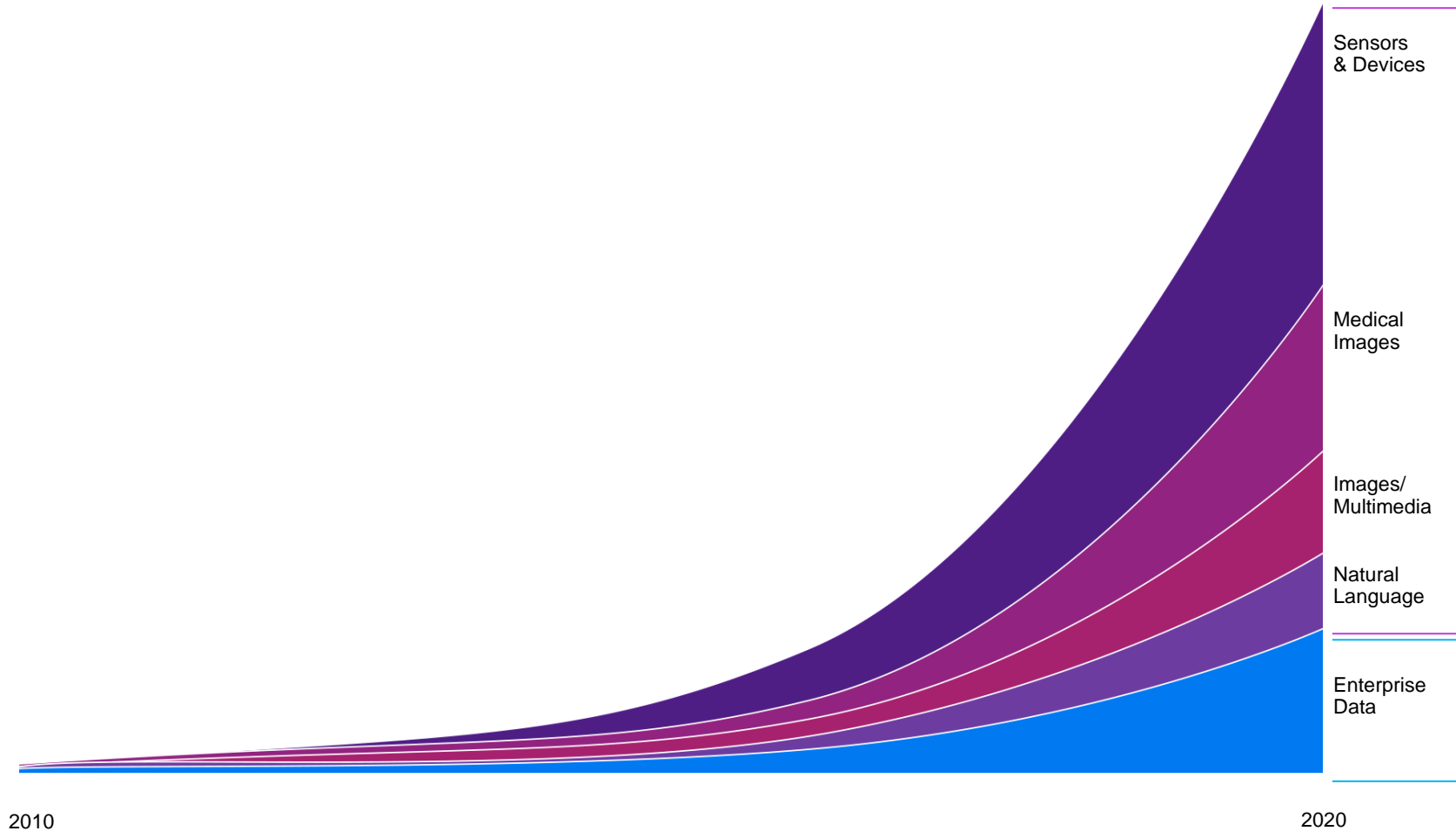
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**Hi**mss<sup>®</sup>

**CENTRAL & SOUTHERN OHIO** *Chapter*



# Growing data volume and complexity



# By The Numbers



**Every 73 days<sup>1</sup>**

The rate medical data is expected to double every by 2020

**2 billion<sup>2</sup>**

The number of people over the age of 60 by 2050

**\$47 trillion<sup>3</sup>**

Cumulative estimated global economic impact of chronic disease between 2011 and 2030

**12.9 million<sup>4</sup>**

Global shortage of health-care workers by 2035

1. <https://www-03.ibm.com/press/us/en/photo/46588.wss>

2. [http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015\\_Report.pdf](http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf)

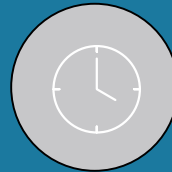
3. [http://www3.weforum.org/docs/WEF\\_Harvard\\_HE\\_GlobalEconomicBurdenNonCommunicableDiseases\\_2011.pdf](http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf)

4. <http://www.who.int/mediacentre/news/releases/2013/health-workforce-shortage/en/>

# Challenges with delivering effective care



**45% of  
medicine** is not  
evidence based<sup>1</sup>



**29 hours**  
Approximate amount of time  
Doctors would have to read  
each workday to keep up with  
new professional insights<sup>2</sup>



**4.25 billion**  
Estimated number of retail  
prescriptions that will be filled in  
the U.S. in 2019<sup>3</sup>

Sources: 1) <http://www.nejm.org/doi/full/10.1056/NEJMsa022615#t=abstract> 2) J Med Libr Assoc. 2004 Oct; 92(4): 429-437. How much effort is needed to keep up with the literature relevant for primary care? Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC521514> 3. <https://www.statista.com/statistics/261303/total-number-of-retail-prescriptions-filled-annually-in-the-us/>

# We must merge HEALTH + Healthcare data

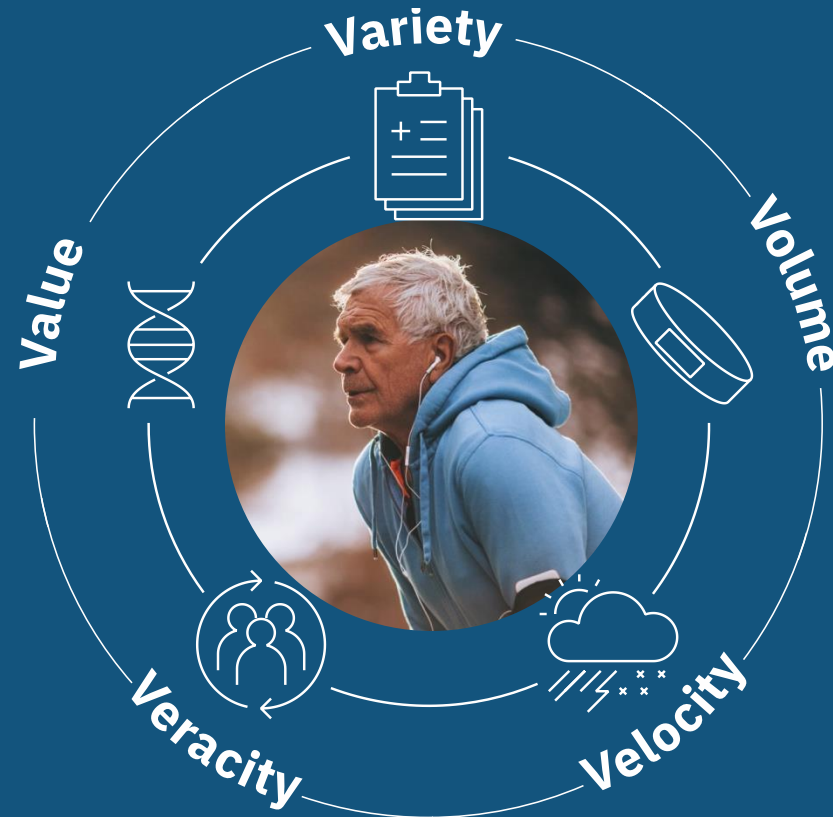


*Source: Adapted from Health Policy Brief, "The Relative Contribution of Multiple Determinants to Health Outcomes," Health Affairs, August 21, 2014.*

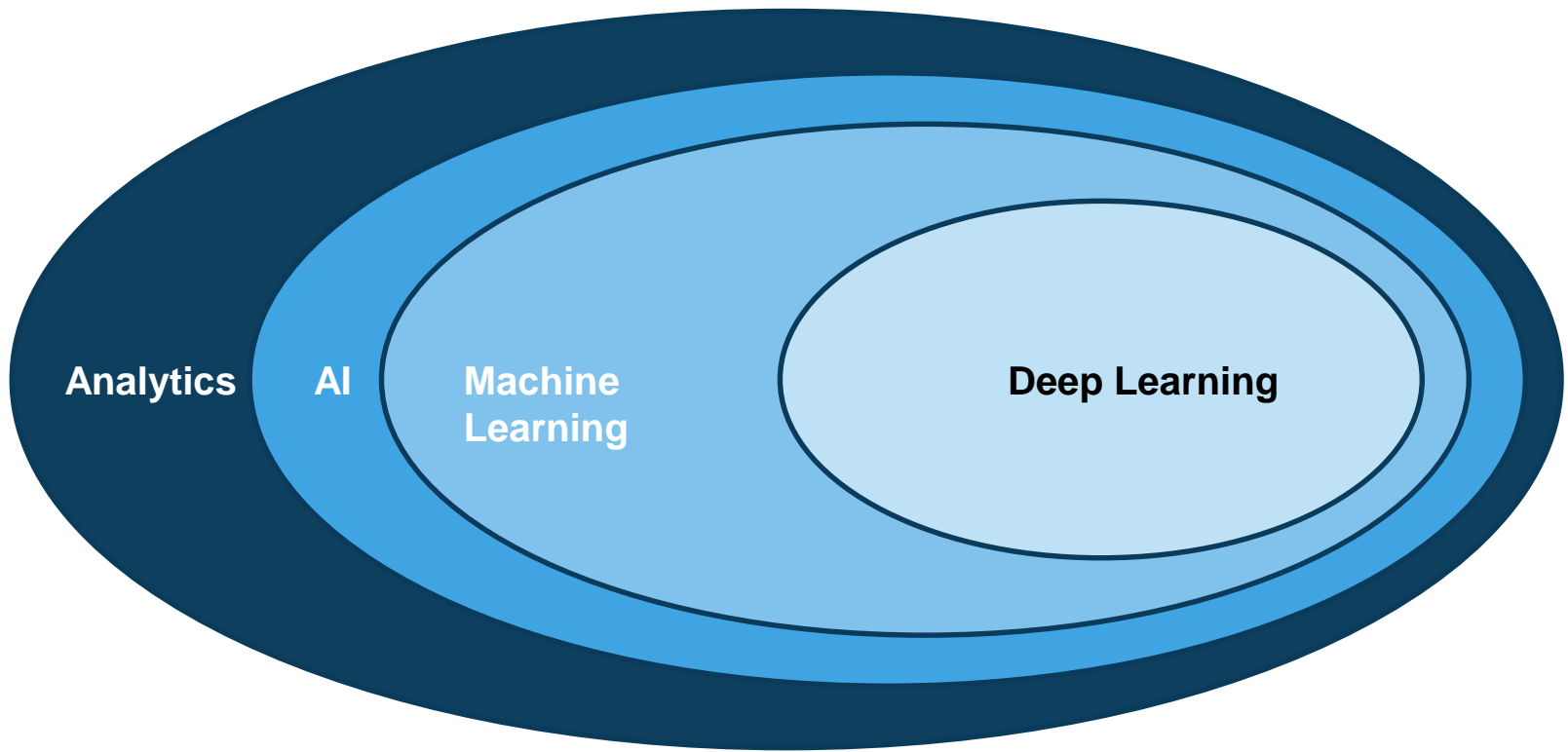
AT THE INTERSECTION OF HEALTH, HEALTH CARE, AND POLICY

HealthAffairs

# Translating Big Data into Value



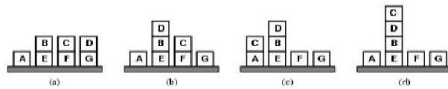
# The AI Landscape





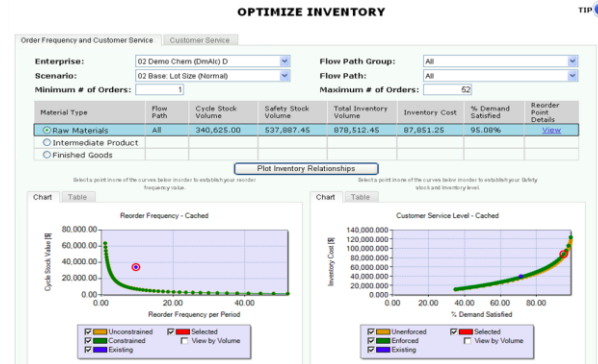
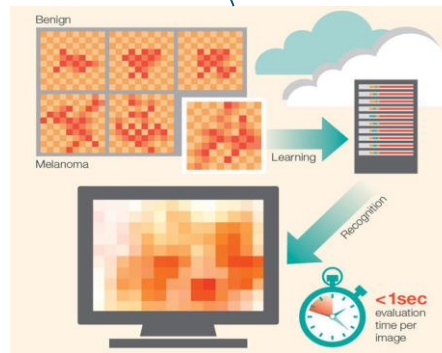
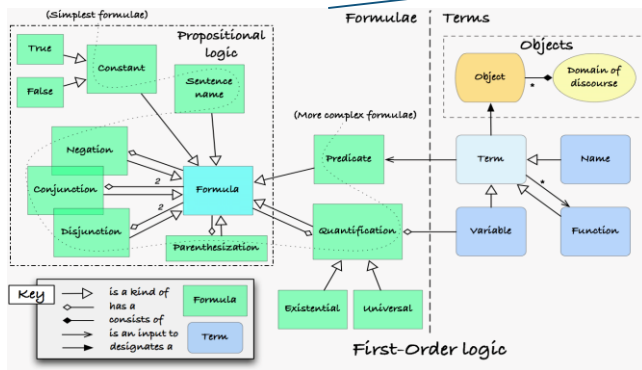
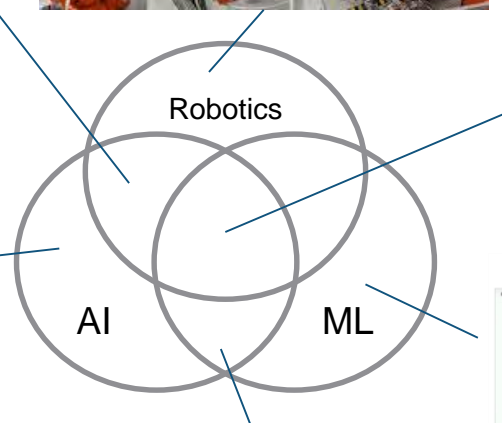
# AI capabilities in combination are plentiful

## Block world example



Initial state (a)  
 Action:  $Move(x, y)$ ,  
 PRECOND:  $Clear(x) \wedge Clear(y) \wedge On(x, z)$   
 EFFECT:  $On(x, y) \wedge Clear(z) \wedge \neg On(x, z) \wedge \neg Clear(y)$   
 The agent first need to formulate a goal:  $On(C, D) \wedge On(D, B)$   
 Plan is created incrementally, return *NoOp* and check percepts

AI 1  
 19 August 1993



# Healthcare Opportunity: Knowledge + Data-Driven Insights



Scientific papers  
Evidence-Based Guidelines  
Reports, Books  
Articles, Publications

Published  
Knowledge

Observational  
Data

Electronic Medical Records  
Claims, Labs, Images  
Health risk assessments  
Internet of Things  
Social, environmental, behavioral

**Closing the translational knowledge gap**

**Delivering real-world evidence**

# Humans + Machine = "AI" or "Augmented Intelligence"

## *People excel at:*



Common sense



Dilemmas



Morals



Compassion



Imagination



Dreaming



Abstraction



Generalization

## *AI systems excel at:*



Natural Language



Pattern Identification



Locating Knowledge



Machine Learning



Minimize Bias



Endless Capacity

# Thank You!

**“Wherever the art of Medicine is loved, there is also a love of Humanity.”**  
**~Hippocrates**



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