

IBM Watson Health

Cognitive Powered Care Management

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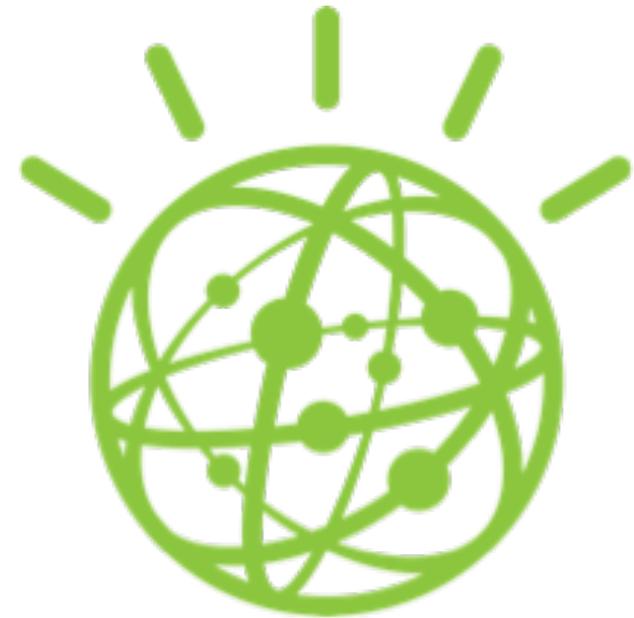
June 19, 2017

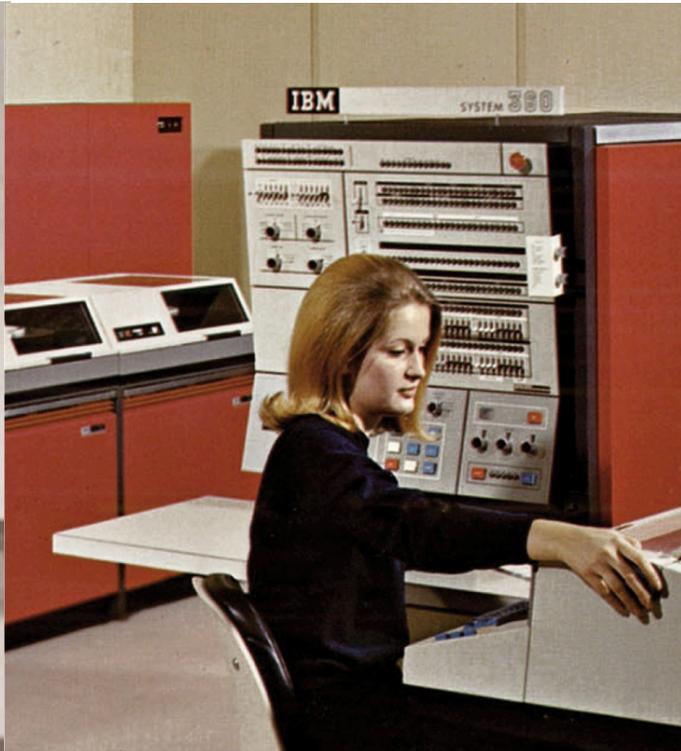
himss
NEW YORK STATE Chapter



Agenda

- What is a Cognitive System
- Watson Cognitive Learning
- Watson Healthcare Examples
- Cognitive for Population Health and Care Management
- The Journey to Cognitive in Healthcare





Tabulating Systems Era

1900 – 1940s

Programmable Systems Era

1950s – Present

Cognitive Computing Era

2011 –

What is a Cognitive system?

Understands

Process and deeply interpret the data, both structured and unstructured



Reasons

Link related elements, incorporate context, generate and score hypotheses, produce actionable insights

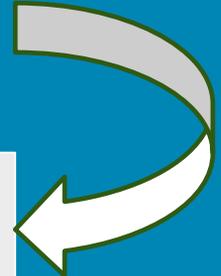


Learns

Collect feedback and learn from outcomes at all levels and granularities

Interacts

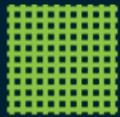
Capture context and problem, visualize results, collaborate with user



Cognitive systems excel at:



Natural
Language



Pattern
Identification



Locating
Knowledge



Machine
Learning



Eliminate
Bias



Endless
Capacity

Humans excel at:



Common Sense



Dilemmas



Morals



Compassion



Imagination



Dreaming

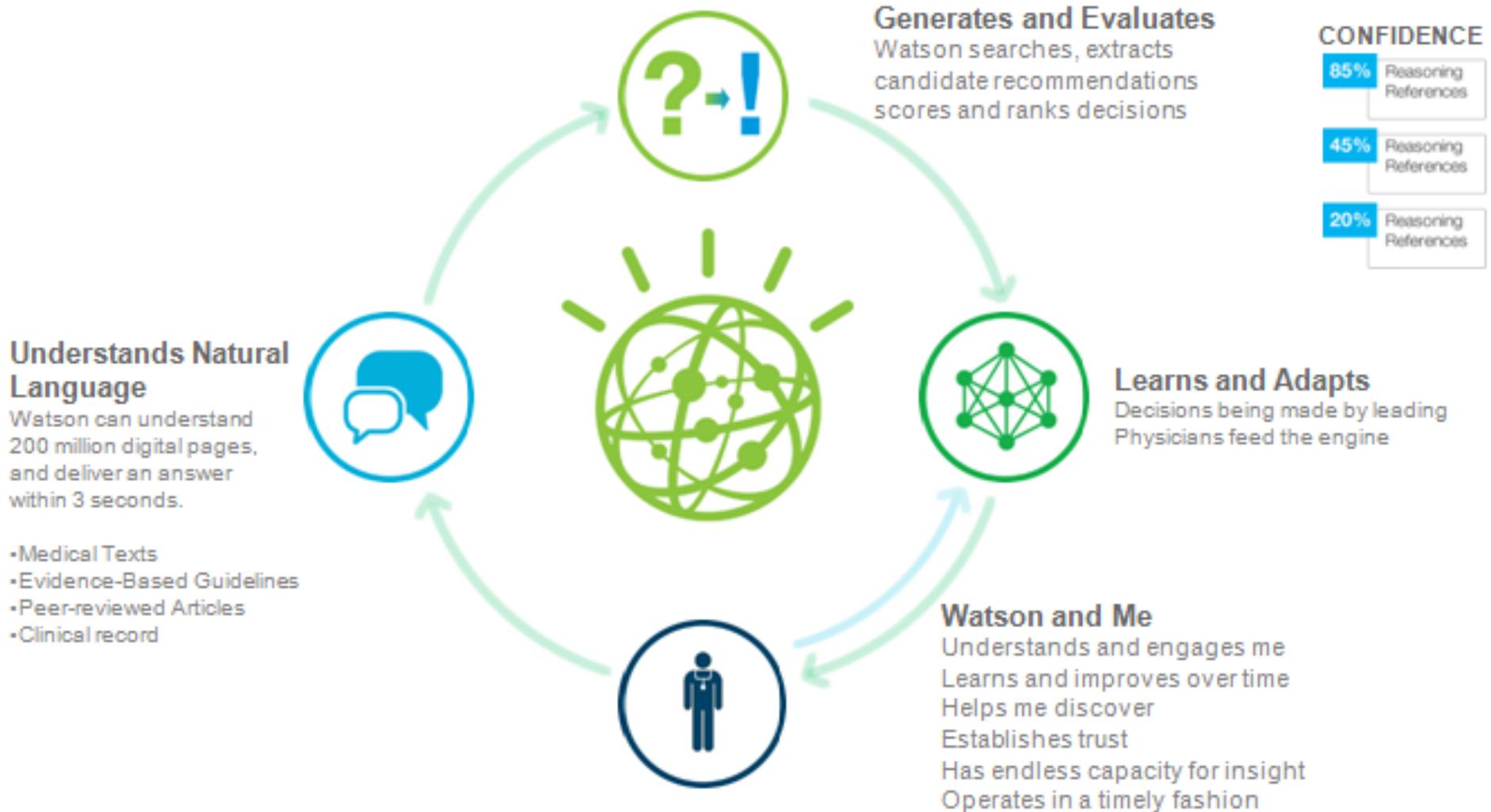


Abstraction



Generalization

Watson Cognitive Learning



*To date, an estimated 400 million people have interacted with IBM Watson.
All types of companies in many different industries have launched initiatives using Watson.*



A collaboration between **Sesame Workshop** and IBM is leveraging Watson's pattern recognition and natural language-processing skills to create preschool curriculums tailored to children's learning styles.



The **Weather Company's** arsenal of local data about weather conditions is put through IBM Watson to produce new understanding of weather patterns and more accurate forecasts.



Retail outlets such as **Macy's** and the **Mall of America** are employing Watson's language-processing tools to help shoppers navigate their stores. After North Face embedded Watson in its website to match users to winter jackets, the company saw a double-digit percentage boost in order value.

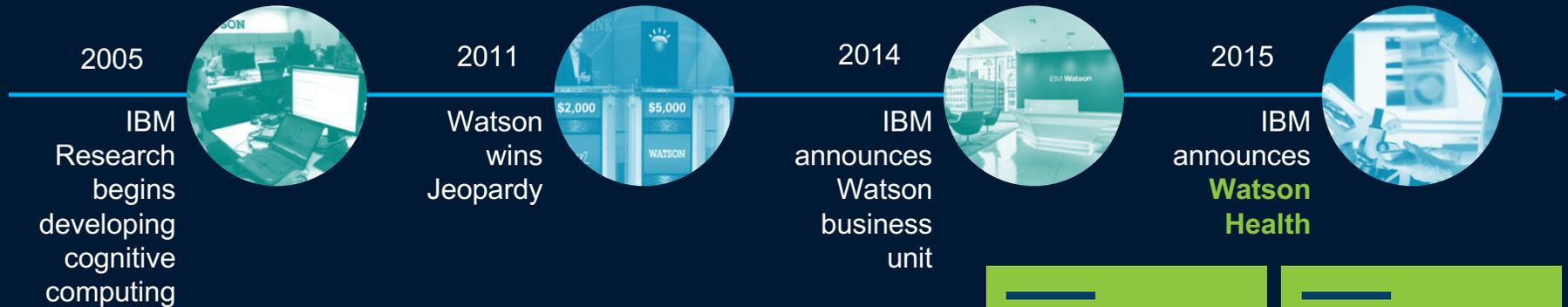


Walmart recently created a chat app called WorkIt that uses Watson to digest the retailer's employment issues and policies in order to answer questions that employees may not want to pose to managers.



The **Toronto Raptors** used Watson to analyze players and compare them on different dimensions like shooting, assists, and rebounds during the NBA draft.

IBM Watson Health is cognitive



<p>Watson for Clinical Trial Matching Identify all eligible trials for a patient</p>	<p>Watson for Oncology Lung, Breast, Colon/Rectal Treatment Plans</p>
<p>Watson Discovery Advisor Insights from vast medical and research literature</p>	<p>Electronic Medical Record Advisor</p>
<p>Watson for Genomics Insights into tumor DNA sequencing</p>	<p>Analysis of Medical Images MRI, mammogram, etc.</p>

Available
 In development/testing
 In research

Watson for Oncology

Gives oncologists assistance make more informed treatment decisions

Attacking the
cause of one
in four deaths



Business problem:

Need better individualized cancer treatment plans

Solution:

- Suggestions to help inform oncologists' decisions based on 600K+ pieces of evidence and 2M pages of text from 42 publications
- Analyzes patient data against thousands of historical cases and trained through 5000+ Memorial Sloan-Kettering MD and analyst hours
- Evolves with the fast-changing field

**IBM Watson
Oncology**

Built with Memorial Sloan Kettering



Memorial Sloan Kettering
Cancer Center.

Watson for Clinical Trial Matching

Matching patients with clinical trials is a challenge for clinicians



To ease this and other challenges, IBM Watson for Clinical Trial Matching (CTM) enables clinicians to quickly match patients with potential trials for cancers treatment using cognitive computing combined with natural language processing.



Watson uses cognitive technology and natural language processing to:

- Extracts information from patient records
- Reads and understands inclusion and exclusion criteria from clinical trials
- Enables clinicians to more quickly evaluate potential clinical trials for which patients may be eligible



Early Metrics:

- Percentage of breast cancer patients screened for a trial at POC 11 → 48%
- Time to screen one patient 30 → 8 minutes
- Patients enrolled in a trial from 3.2/4.0 → 6.3/month

Watson for Genomics

Business challenge:

- Analyzing the whole genome/exome sequence is manually time consuming and requires advanced analytics and domain expertise in genomic medicine to derive information that is pertinent to a patient

Watson solution:

- Initially focused on cancer, Watson for Genomics uses a variant call file generated by Next Generation Sequencing from a patients tumor leading to these 3 steps:

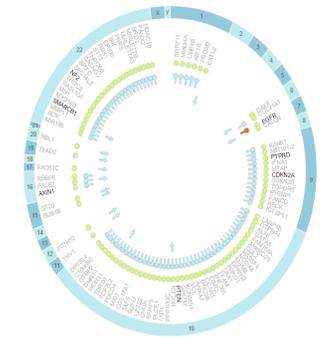
Use cases:

- For a cancer patient, allows for identification of driver mutations, their impact on pathways and the identification of drug targets with a list and categorization of drugs.



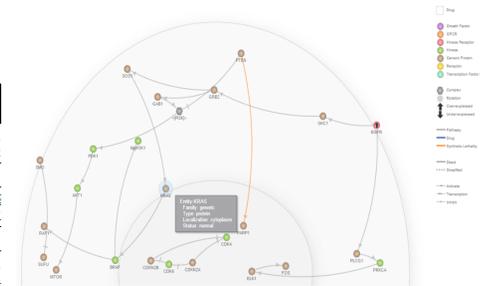
Molecular Profile Analysis

Gene	Driver Score	Expression Score	Copy Number Heterozygous Loss	Evidence
NF2 heterozygous loss	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
SMARCB1 heterozygous loss	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.579	[TS:Gene_TSG], [Vogelstein_TSG], [BM2020_TSG], [TAG_DB_TSG]
PTEN heterozygous loss	0.898	0.898	log2=-0.553	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.553	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.553	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-0.553	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
CDKN2A heterozygous loss	0.898	0.898	log2=-1.627	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-1.627	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-1.627	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]
	0.898	0.898	log2=-1.627	[TS:Gene_TSG], [Vogelstein_TSG], [Zack_DEI], [BM2020_TSG], [TAG_DB_TSG]



Pathway Analysis

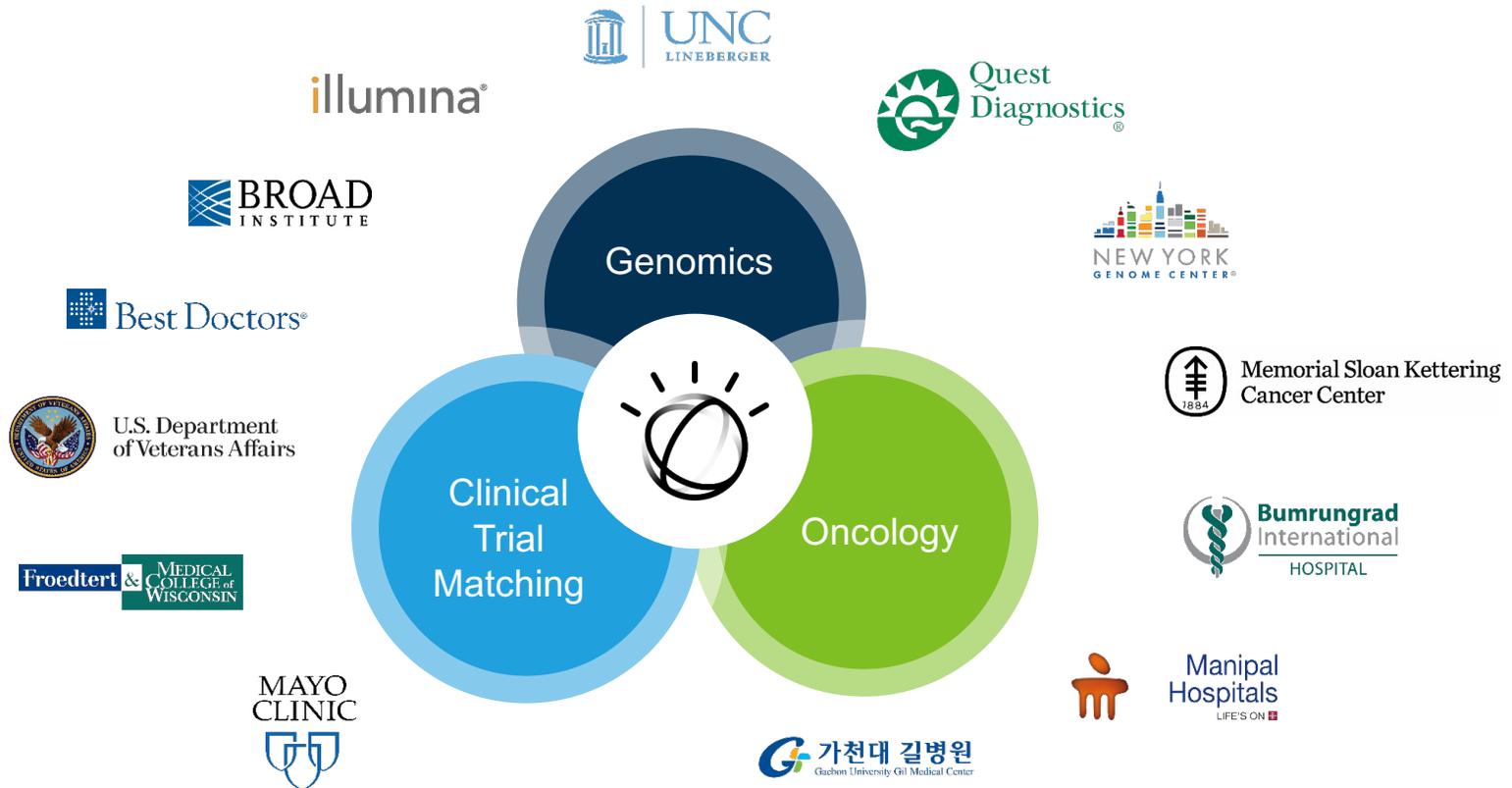
Target	Reason for Identification	Pathway Distance
PIK3CG	PIK3CG is downstream of EGFR.	4 PubMed: 10913131, 19233282, 8903320
	PIK3CG is downstream of PTEN.	1 PubMed: 12149650
PRKCA	PRKCA is downstream of EGFR.	2 PubMed: 1689310, 28290562, 2153914
EGFR	EGFR is a possible driver.	0
BRAF	BRAF is downstream of EGFR.	5 PubMed: 17563371, 17486115, 1049952



Drug Analysis

Actionable Alteration	D/P	Approved for Glioblastoma	Investigational for Glioblastoma	Approved for other cancers
PTEN heterozygous loss	P	Everolimus	Velliparib (ABT-888)	Olaparib (AZD-2281), Temezirolimus
EGFR amplification	D	Everolimus	AGC005	Luxitumab, Edoitinib, Panitumumab, Gefitinib, pafatinib, Afatinib, Vandetanib
	P			Labrafenib, Trametinib, Vemurafenib

Empowering the Oncology Community for Cancer Care



UNC Lineberger Cancer Center

- Patient files analyzed: 1,022
- >99% accuracy in identifying Molecular Tumor Board findings
- Identified additional therapeutic options in approximately 1/3rd of all cases (~335 cases)
- 292 patients are still living
- Of the living patients, 42 were identified to have “high action ability drugs” potential
- Institute researching patients for additional testing and changes to existing treatment

*Oct 7, 2016
IBM Watson
Oncology Advisor
on 60 Minutes*



https://www.youtube.com/watch?v=PXf8Nq_zx0A

Watson for Analysis of Medical Images

IBM Is Teaching Watson To Interpret Medical Images

But don't expect it to threaten radiologists' job security anytime soon.



Joe Satran
Staff Writer, The Huffington Post

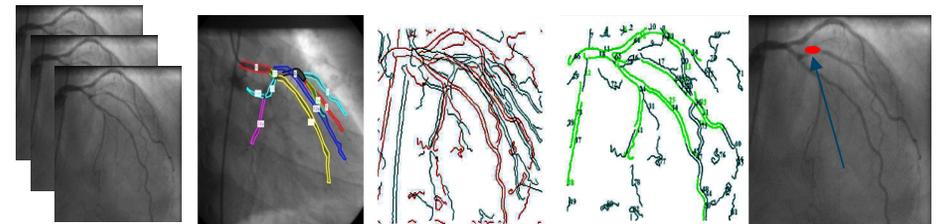
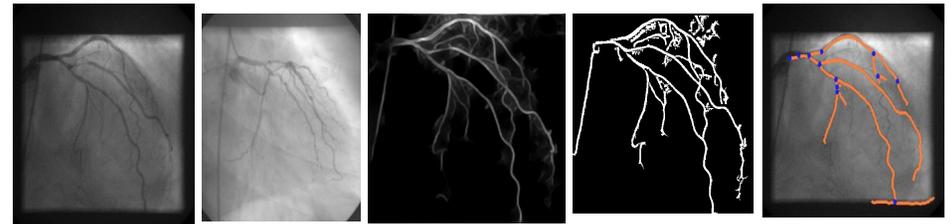


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Anomaly detection involves complex analytics

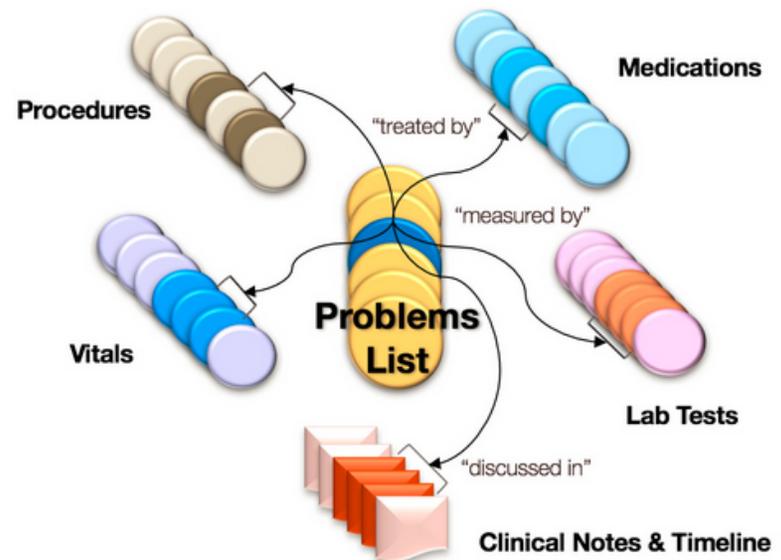
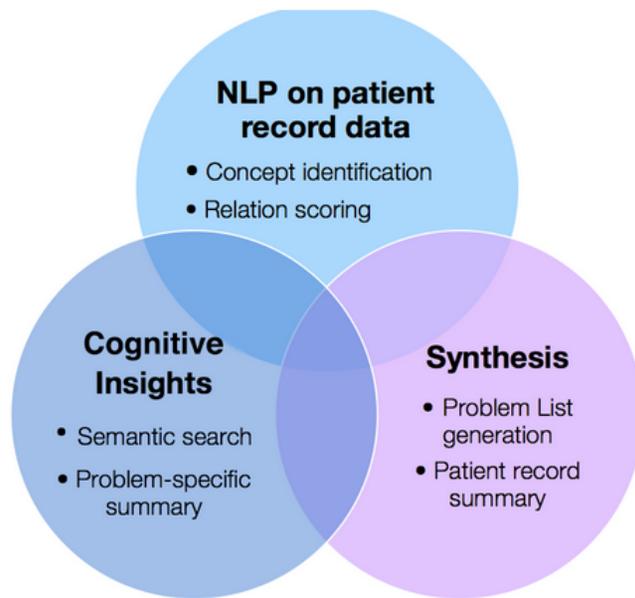
Is this image depicting normal or abnormal coronary anatomy?



EMR Assistant

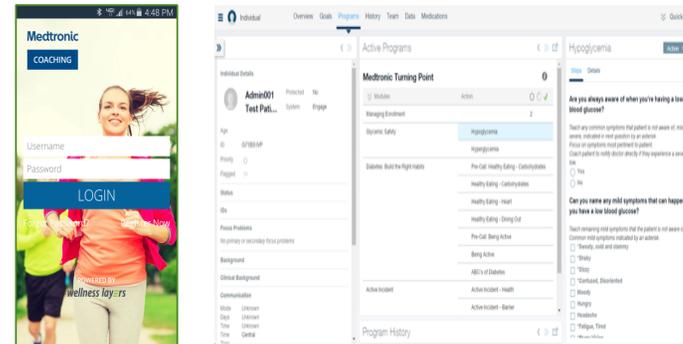
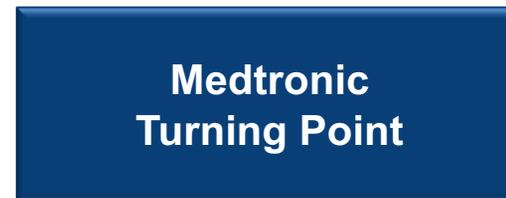
sifts through patient medical history to highlight essential information

- Navigate and process EMRs to unlock hidden insights within the data, with the goal of helping physicians make more informed and accurate decisions about patient care
- Collate key details in the past medical history and present to the physician a problem list of clinical concerns that may require care and treatment, highlight key lab results and medications that correlate with the problem list
- Classify events throughout the patient's care and present within a chronological timeline



Watson + Medtronic

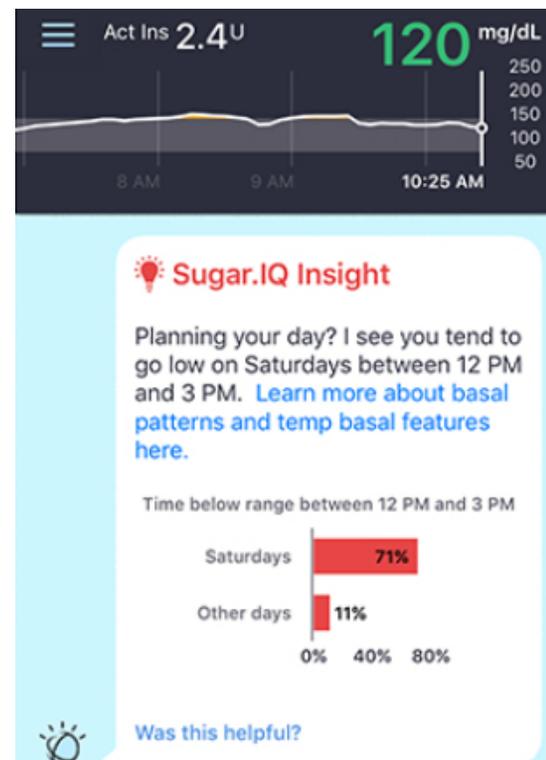
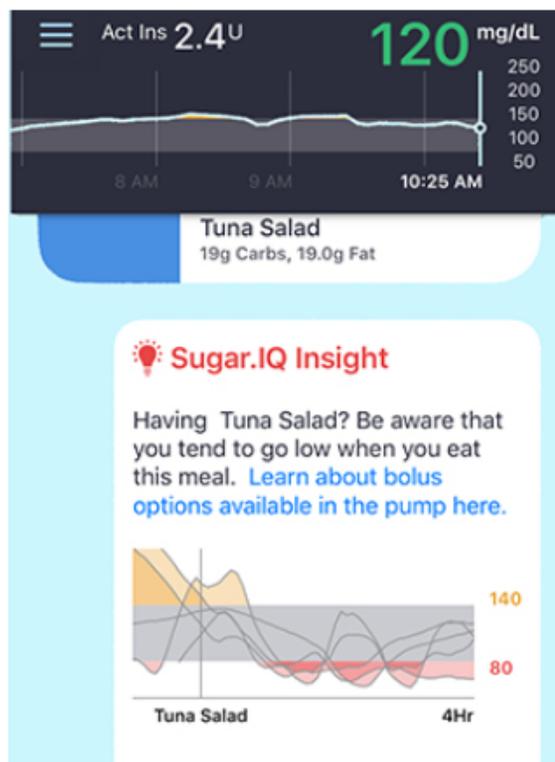
Diabetes Care using a Patient Engagement App and Care Management Protocols



Personalized Diabetes Mobile Companion for the Individual

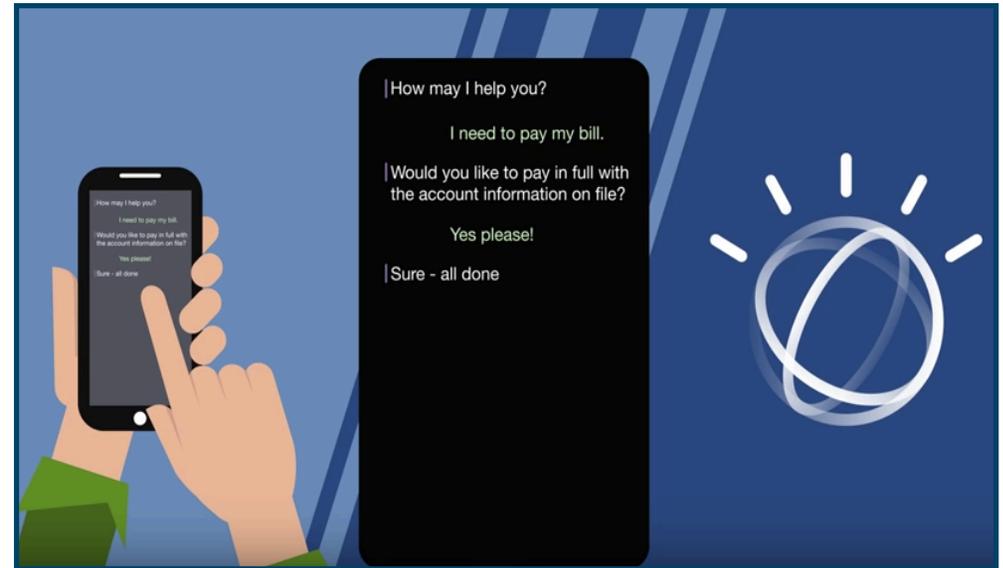
Integrated Evidence Based Diabetes Care Management Program

- Uses real-time continuous glucose monitoring and insulin information from Medtronic pumps and glucose sensors
- The cognitive computing software can inform users about how specific foods will influence their glucose levels, track diets over time and spot otherwise hidden patterns in that data
- Sugar.IQ acts as a personal assistant and can detect patterns and predict diabetic events three to four hours before they occur with a 75-86% accuracy rate
- Helps users better understand how their behavior affects their glucose levels in real-time



Watson for Benefits

- A Cognitive Self-Service Agent who can answer member questions anywhere, anytime, in natural language
- IBM's Cognitive Benefit Analyzer tool integrates with benefit rules systems to help deliver a cognitive conversation regarding benefit coverage
- Initial focus: Member Management, Benefits, Provider Network, Shopping, Appeals & Grievances



 **Improve** member engagement with the knowledge of your best agents – providing consistent and accurate answers and advice

 **Reduce** operating costs with improved deflection rates (automated calls), lower average handling times, increased first call resolution, decreased training costs, and improved agent efficiency through agent assist

 **Improve** accuracy and compliance – providing a greater member experience

 **Greater** member satisfaction and retention via an improved member experience

The New Model of Care

PAST



FUTURE



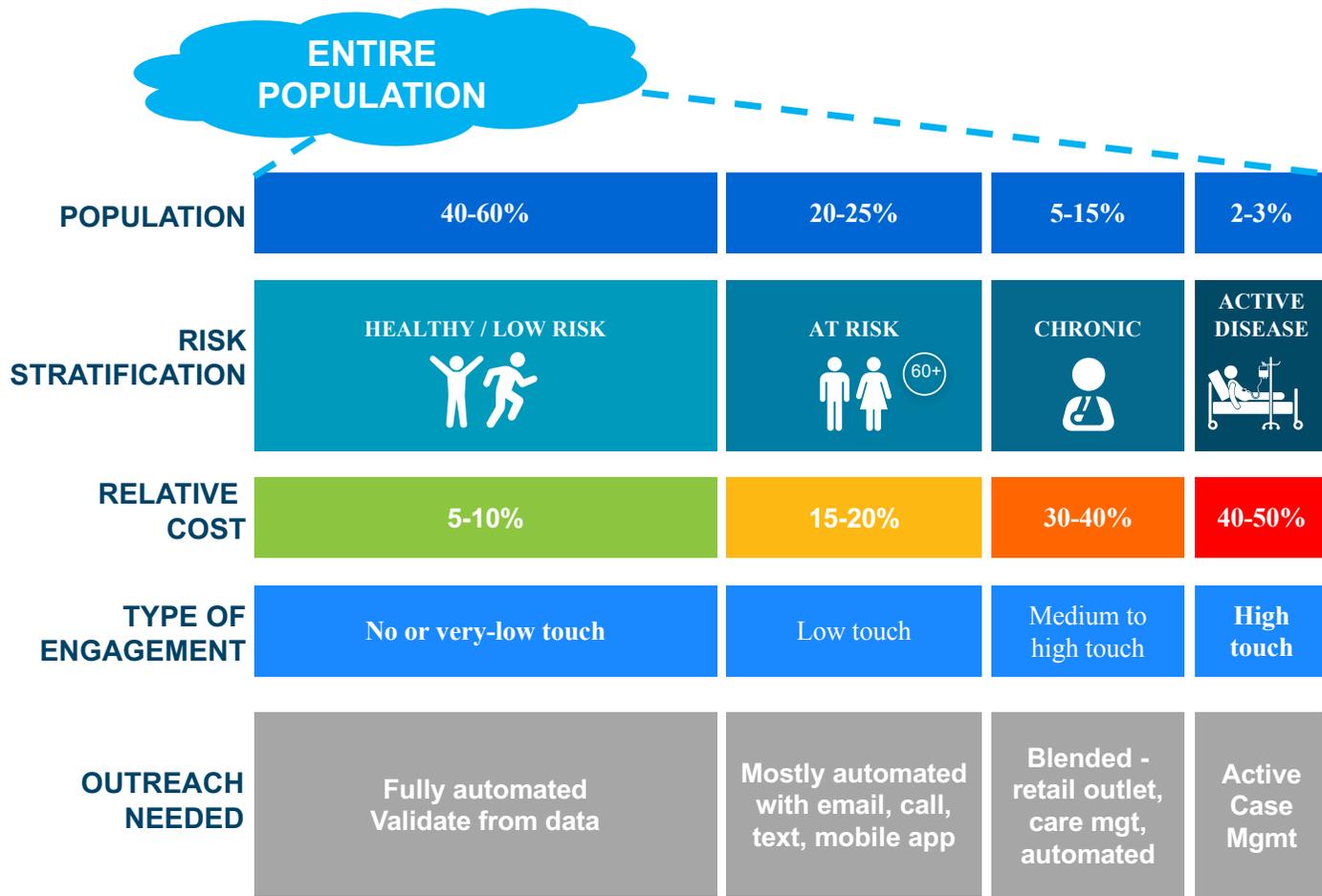
Compete on Volume

- Individual Patients
- Focus on Episodic Encounters

Compete on Outcomes

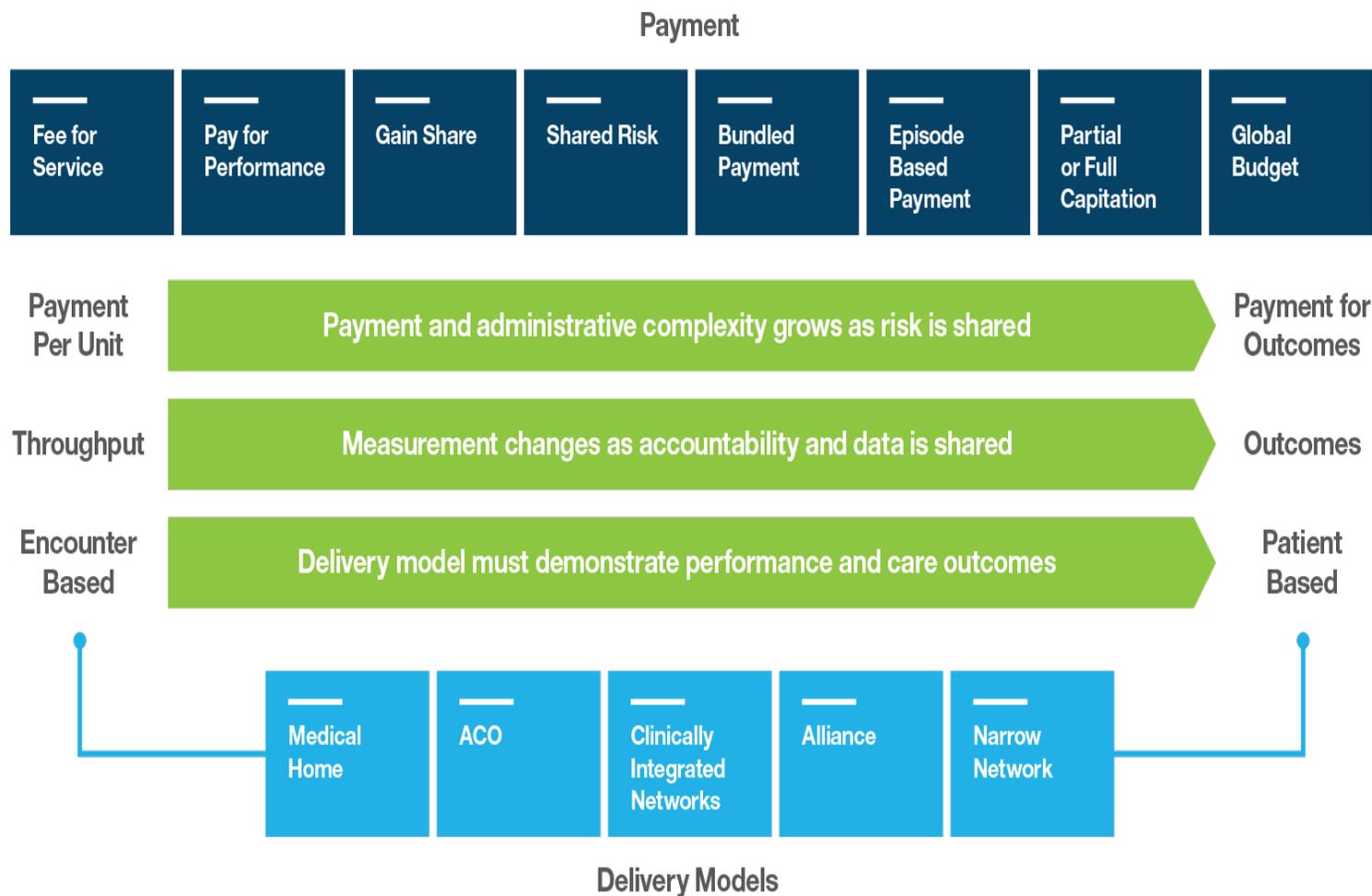
- Population Health Management
- Focus on Health and Wellness

Population Health Management

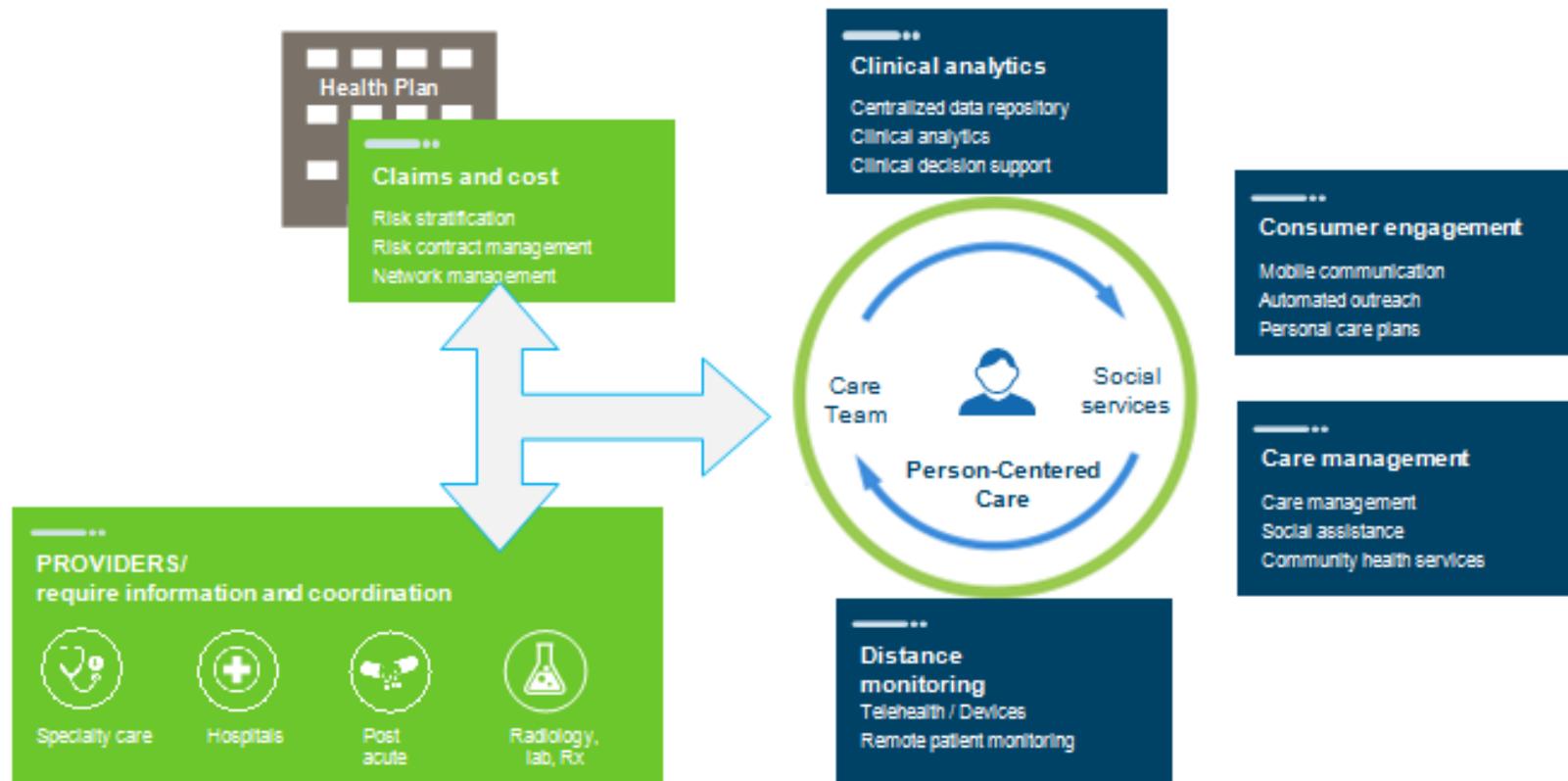


***~20% of population
drives ~80% of cost***

Payment Influences Delivery Models



Clinician-Enablement for Population Health Management

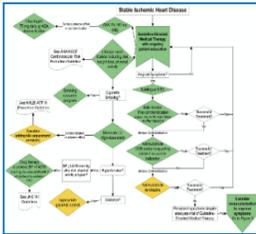


Apply Cognitive Learning – Individual and Population Health

Medical Literature



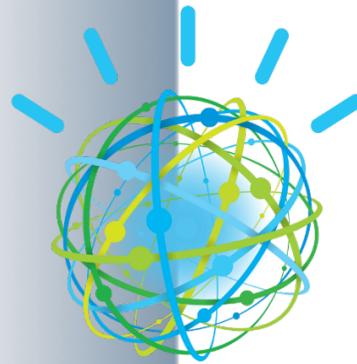
Guidelines



Institutional Knowledge



IBM Watson Health



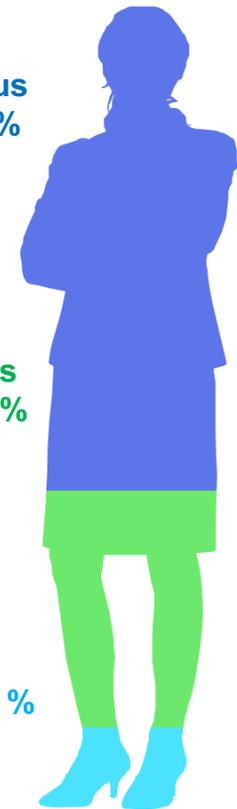
Exogenous data – 60%



Genomics data – 30%



Clinical data – 10%



What **Makes** Us Healthy

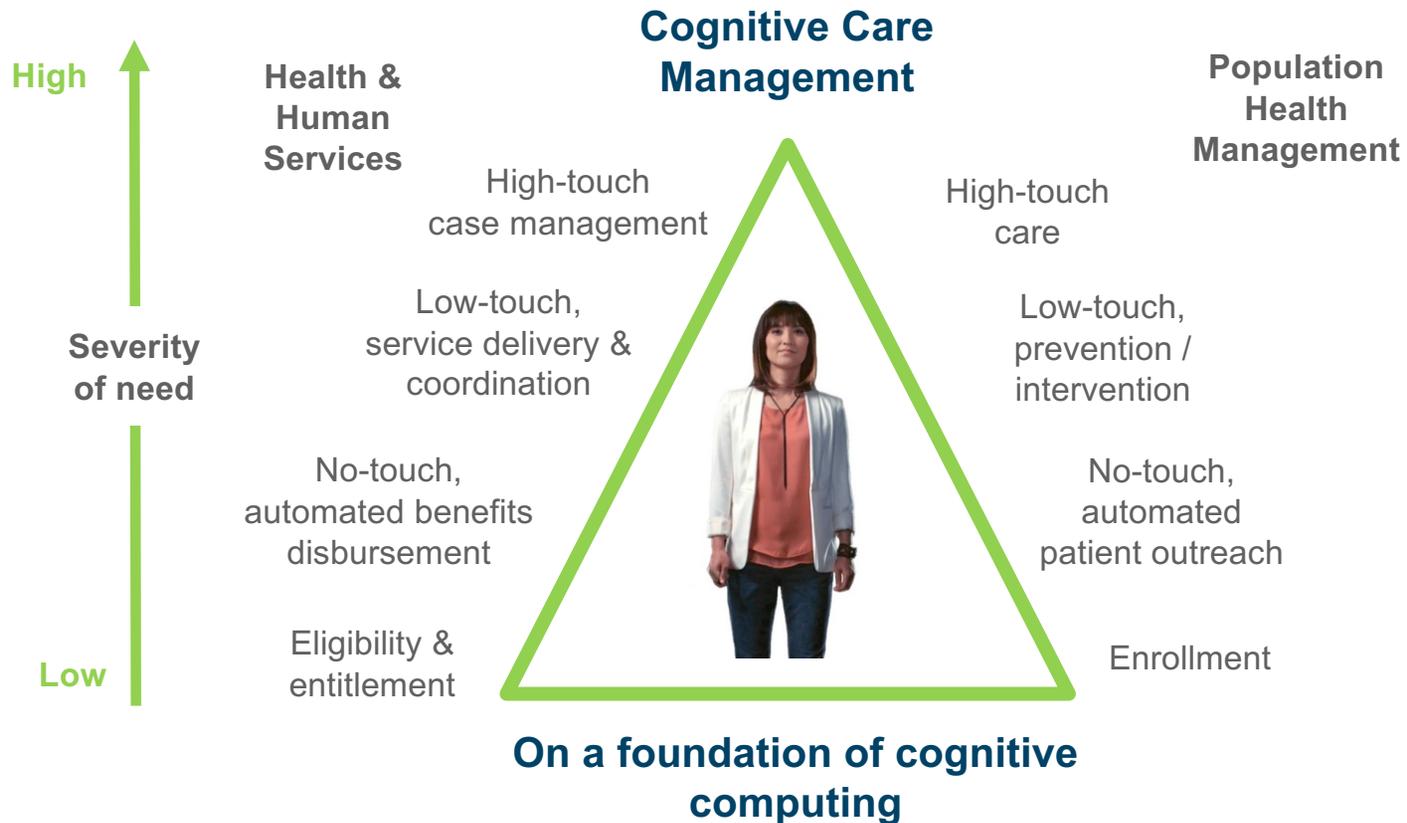


What We **Spend** On Being Healthy



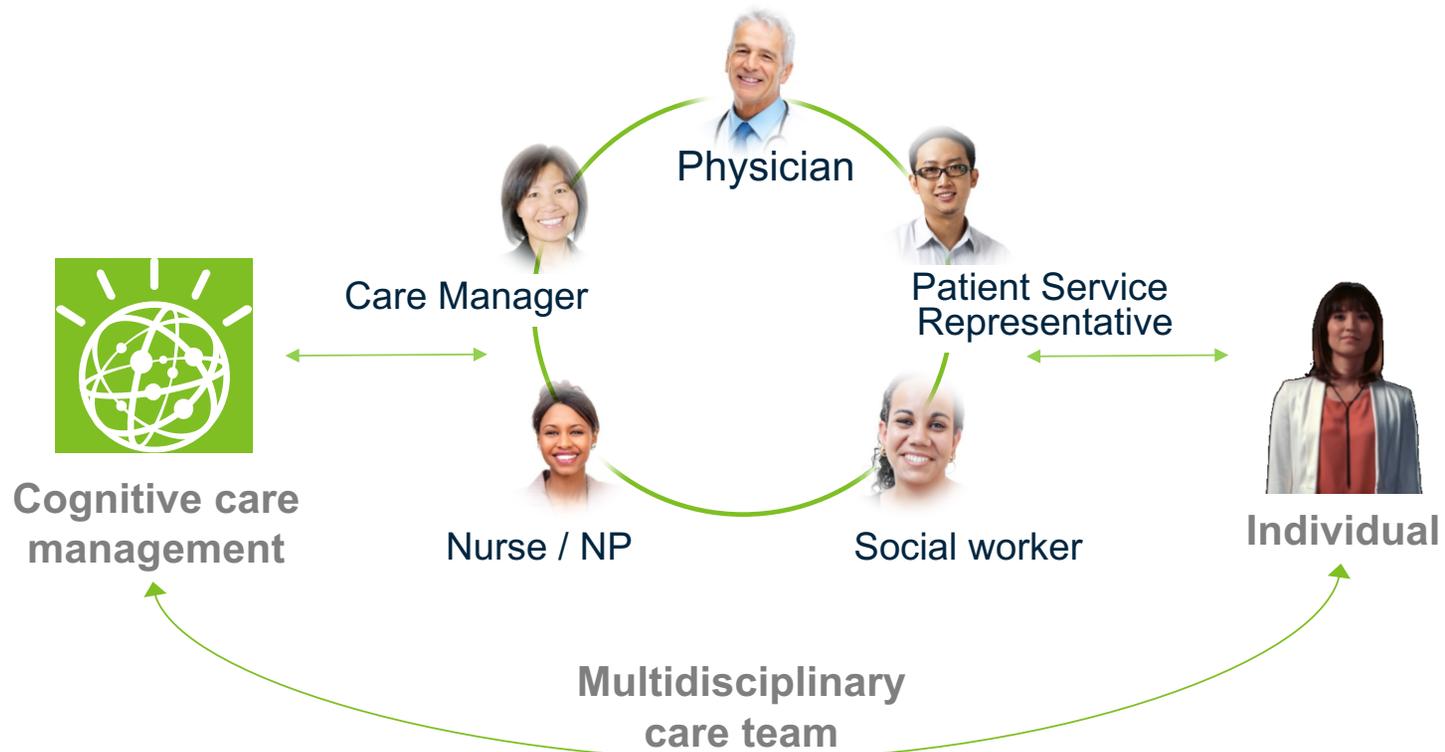
SOURCE: Bipartisan Policy Center Report - "F" as in FAT: How Obesity Threatens America's Future, 2013

Social determinants of health converge with traditional care



Care Management – the Future

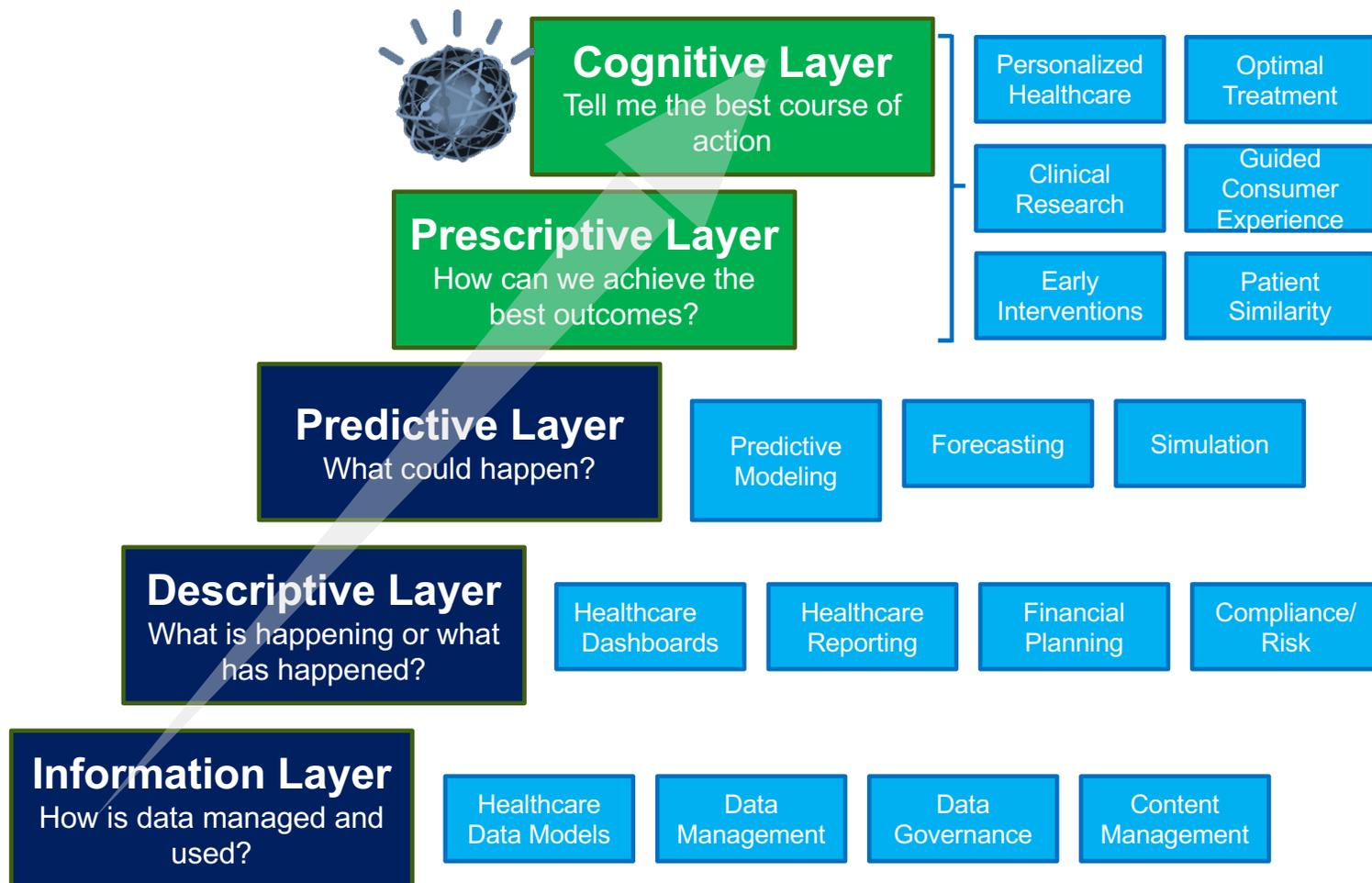
Everyone has a cognitive care plan that helps determine the most effective mix of high-touch and low-touch interventions



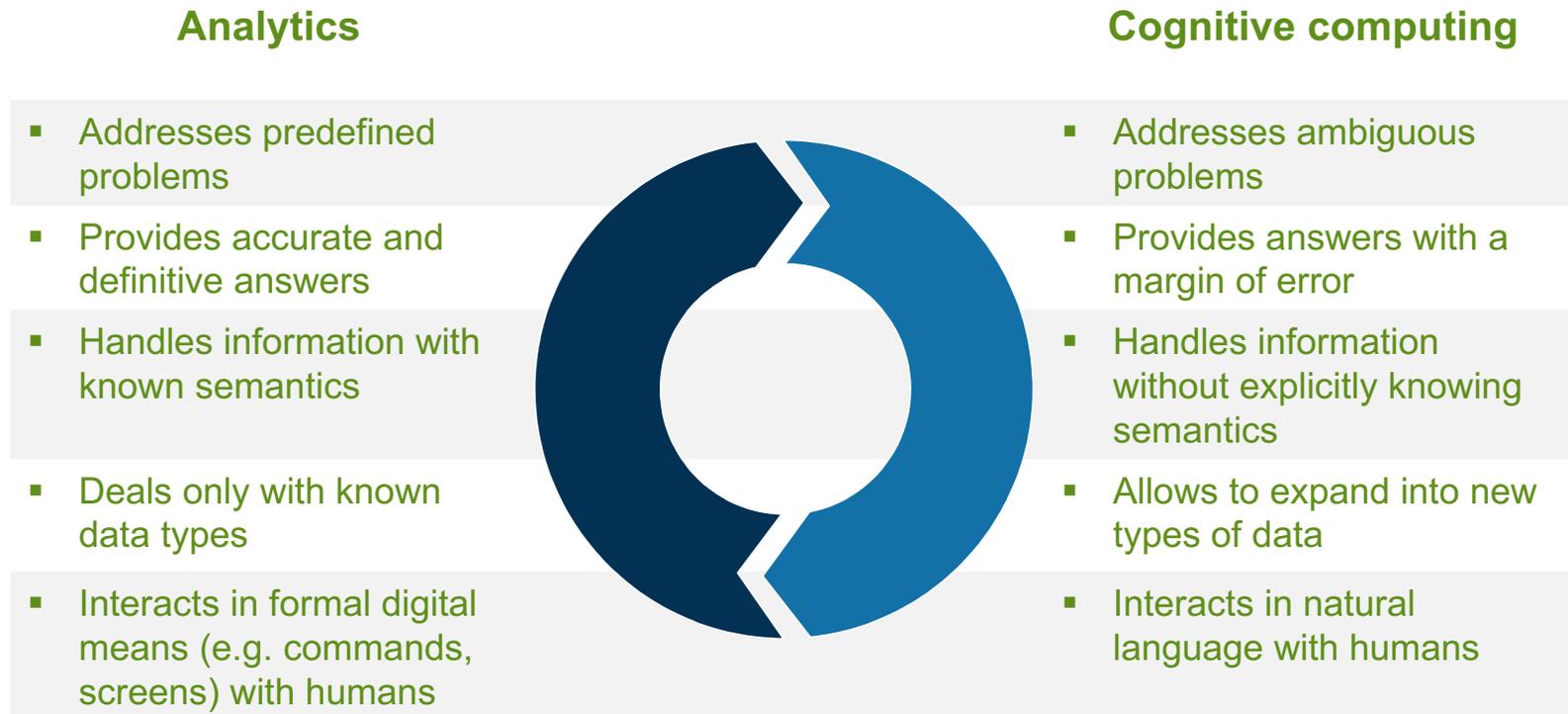
Driving Engagement Across Communities of Care



The Journey to Cognitive in Healthcare



Cognitive computing complements traditional analytics by creating a value continuum for healthcare professionals



❖ | *Analytics' data-driven approach and cognitive computing's knowledge driven approach solve different elements of business problem – thus combining them together delivers greater value*

IBM Watson Health

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NEW YORK STATE *Chapter*

Thanks!

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