

BusinessConnect

A New Era of Smart

June 12, 2014



From Analytics to Cognitive Systems - a New Era of Computing

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Vice President

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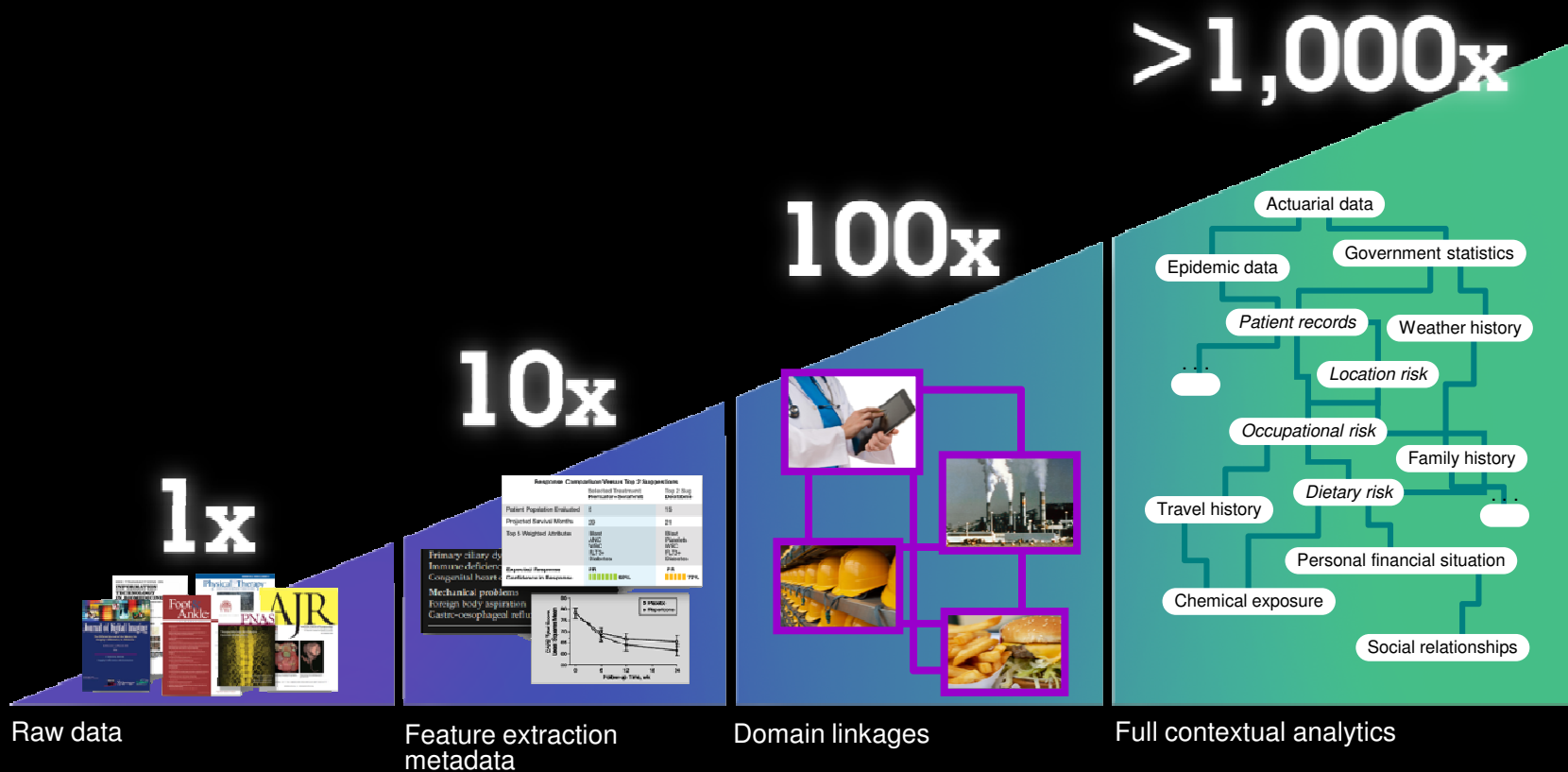
The Next 'Natural' Resource



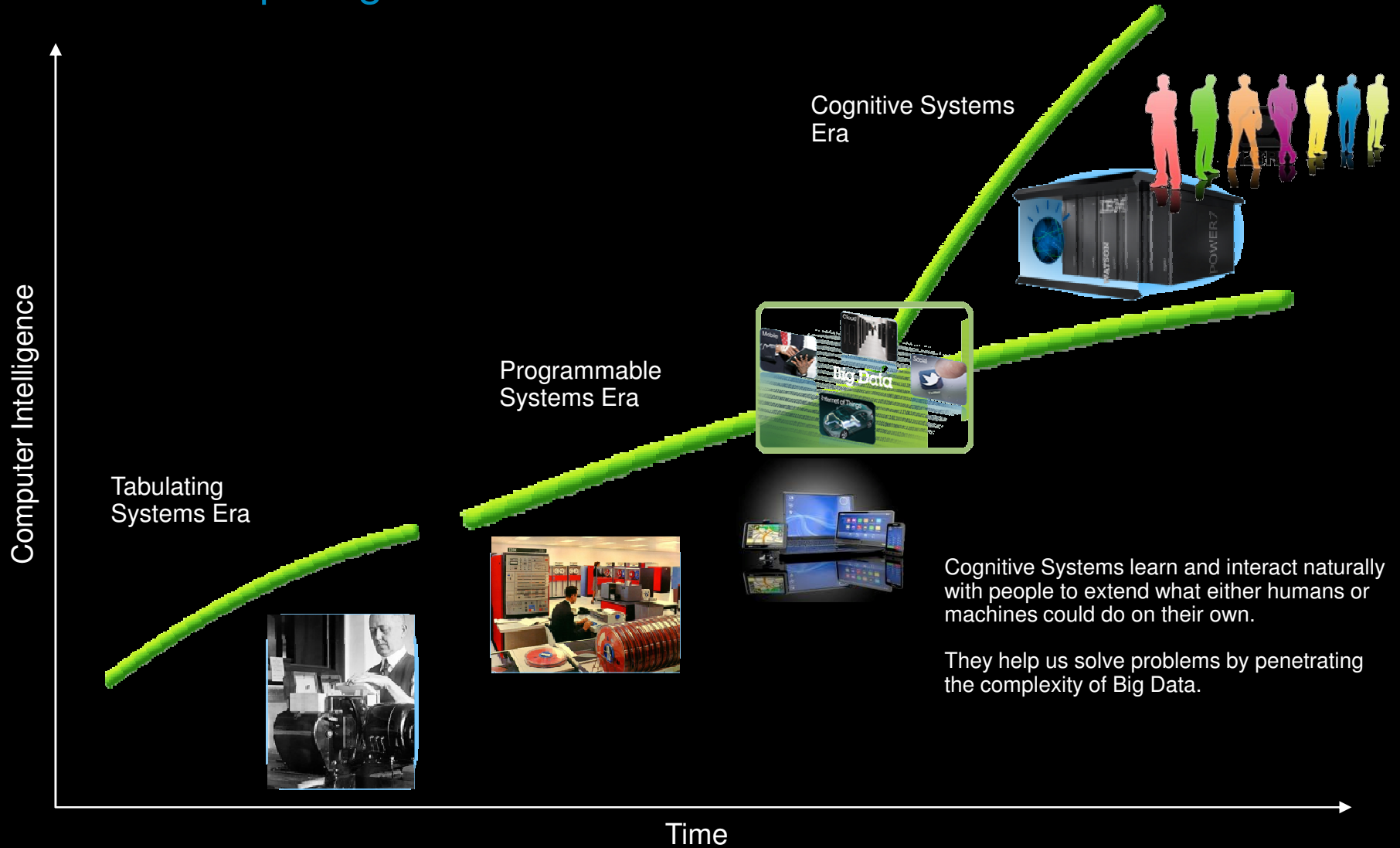
- 4-V's: Volume, Velocity, Variety, Veracity
- Data/Information Overload



Context Multiplier Effect



Eras of Computing



Eras of Computing

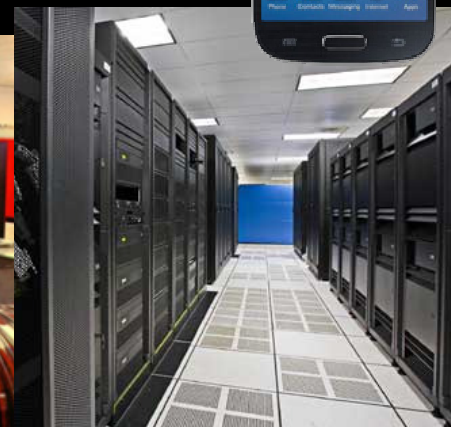
- Tabulating Systems Era
 - Automation of tasks
 - Productivity and shift from menial work



Eras of Computing

Programmable Systems Era

- Automation of processes and transactions
- Enable global enterprise and empower the individual



Eras of Computing

- Cognitive Systems Era
 - Penetrate complexity
 - Scale and magnify human capability
 - Unlock time value of insight



Winning the Jeopardy! Challenge - a Milestone in Computing History

Question Answering

1. Broad/open domain
2. Complex language
3. High precision
4. Accurate confidence
5. High speed



Paganini “24 capricci” set the standard for etudes for this instrument

If leadership is an art then surely he has proven himself as a master painter at GE



The New IBM Watson Group



TECH | 1/08/2014 @ 11:16PM | 10,623 views

IBM Announces \$1B Watson Group, Moves Jeopardy Ace Computer To NYC

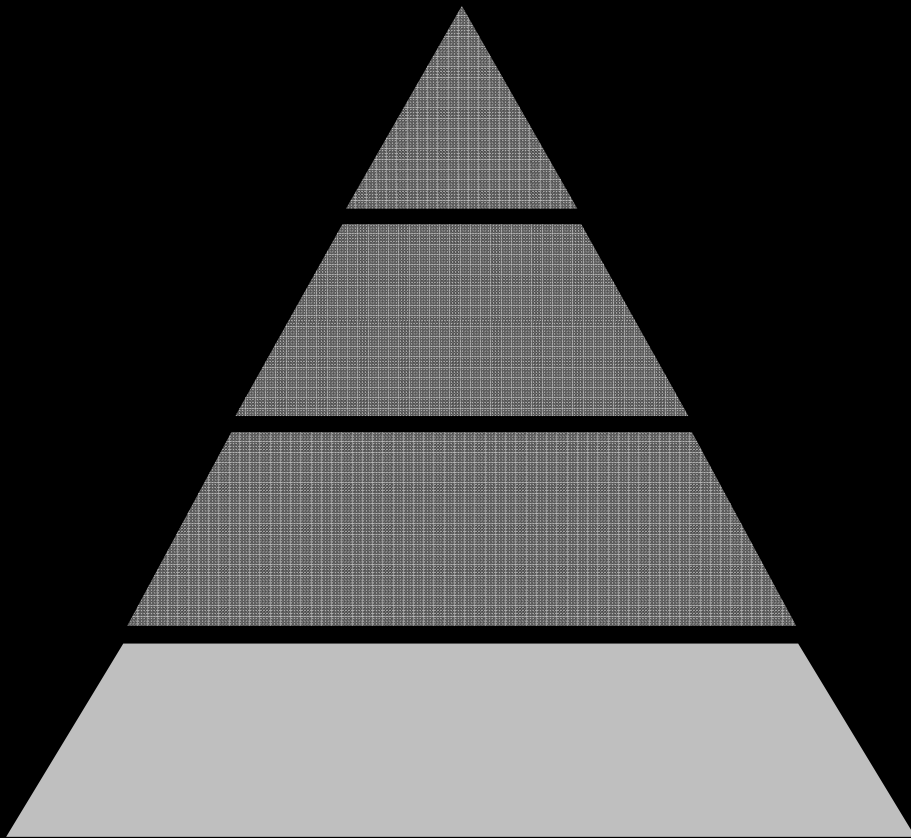
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Three years after its splash appearance on Jeopardy, IBM is turning to the Watson computer system for inspiration again—this time as the centerpiece of a major new business unit in the Big Apple. The company will announce a major new business unit, at an event Thursday that it's created the IBM Watson Group to build out an ecosystem around Watson—and hopefully start making big-picture money off it—out of a major new office in New York City's East Village.



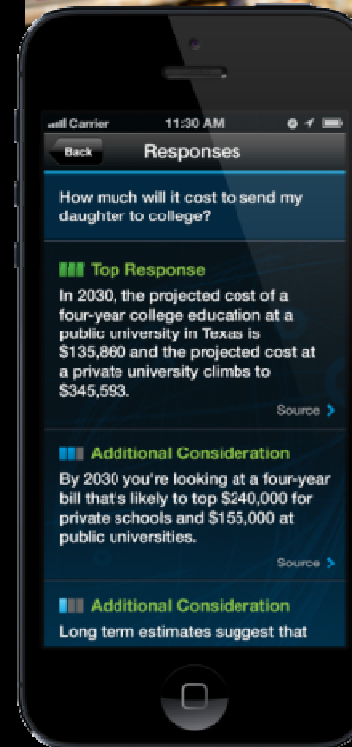
The new IBM Watson at work. (Credit: IBM)

Cognitive Computing – *Four broad capabilities*



Cognitive Computing – Assistance

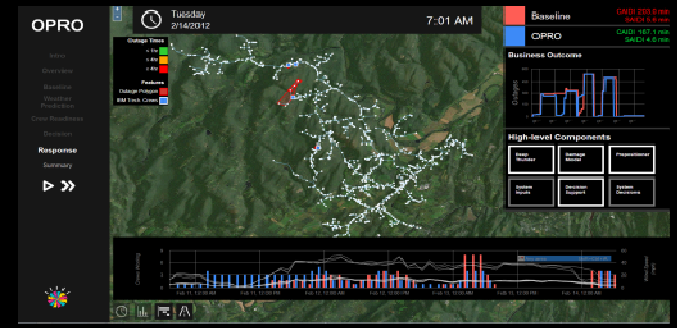
Leverage encyclopedic domain knowledge



e.g. Watson Advisor



Cognitive Computing – Understanding *Map emergent patterns and connections*

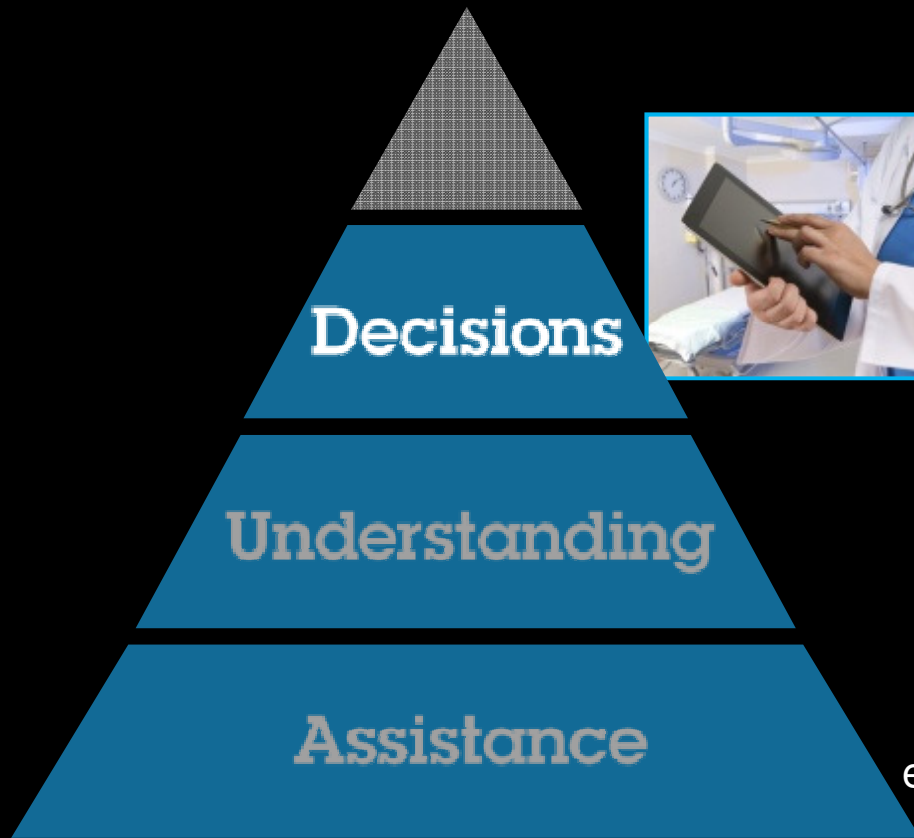


e.g., Using a weather forecast to understand the impact on infrastructure



Cognitive Computing – Decisions

Analyzing conflicting points of view



IBM WATSON

Scenario: 66 The radiological examination shows radiolucent tumor with thickened cortex. There are spotty calcifications.

Solution: 66 The radiological examination shows radiolucent tumor with thickened cortex. There are spotty calcifications.

Statistics: 66 The adjacent cortex is thickened and eroded and tumor has extended into the soft tissue.

66 There are large areas of radiolucency and radiopaque changes.

66 Microscopic examination of the excised mass shows a cellular tumor...

66 The tumor cells are seen...

- bone
- Ewing sarcoma
- Enchondroma
- Chondrosarcoma
- Periosteal reaction
- Osteogenic sarcoma
- Giant cell tumor of bone
- Synovial sarcoma



e.g., Watson PATHS



Cognitive Computing – Discovery

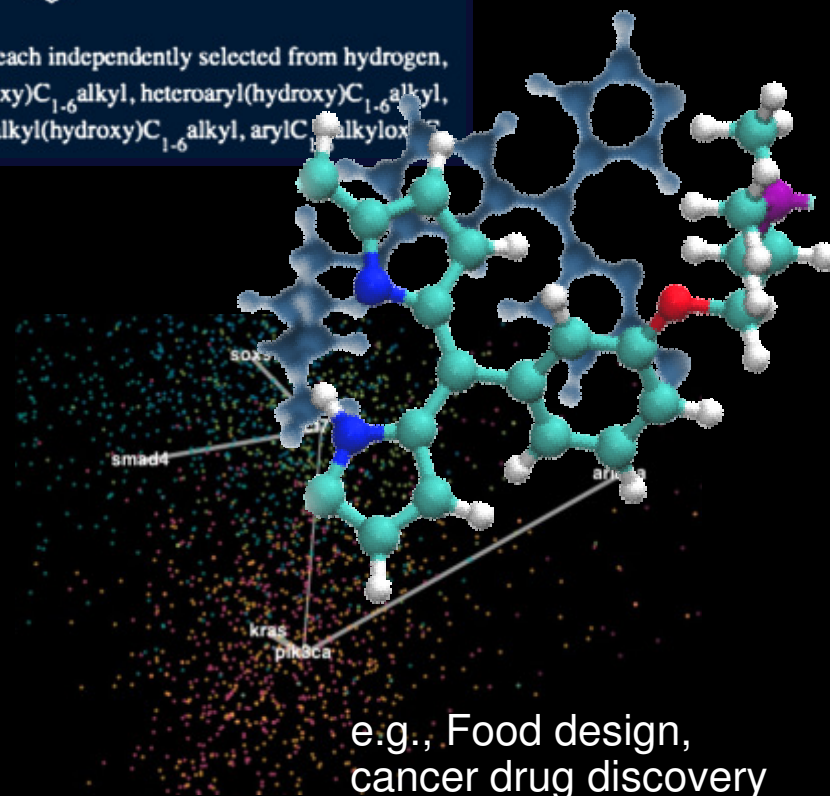
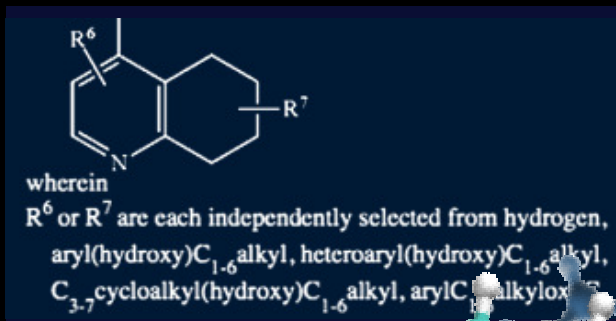
Create new insights and find new value

Discovery

Decisions

Understanding

Assistance



The Human/Computer Partnership

People and computers collaborating
with the goal of scaling and magnifying human cognition

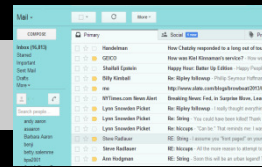


Enhancing Human Capability

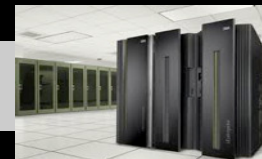
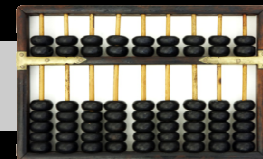
Physical limitations



Connectivity limitations



Productivity limitations



Complexity limitations

We need enhanced cognition.



Enhancing Human Capability

For the Enterprise...

Finance	Operations	Marketing & Sales	R&D and Design
Mergers, Acquisitions & Divestitures	Crisis and Emergency Management	Product Pricing & Launch	Brainstorming & Discovery
Investment Decisions	Project Planning	Selection of Markets & Geos	Innovation Portfolio Planning
Strategic Planning & Scenario Analysis	Discovery & Diagnosis	Competitive Analysis	Product Design

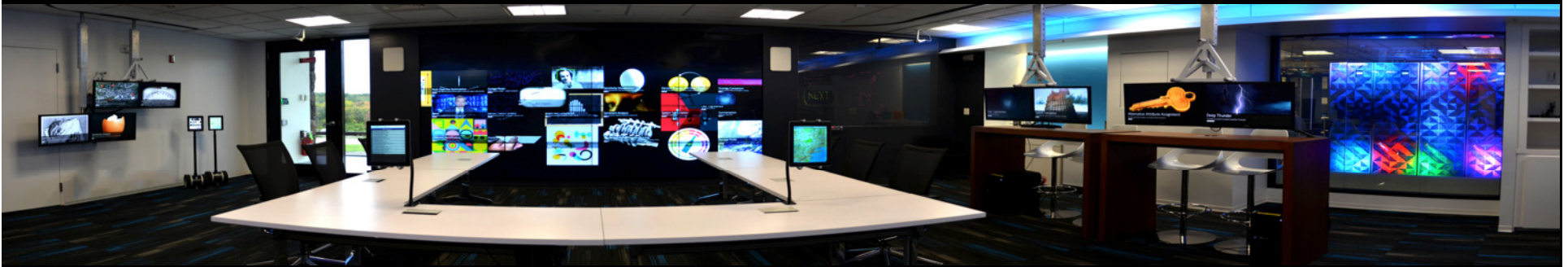
For the Individual...

Education	Large Purchases	Financial Investments	Medical
Selecting a college	Purchasing a home	Retirement investment decisions	Selecting medical plans
Financing education	Purchasing a car	Stock market investments	Deciding on treatment options



Cognitive Environments

An infrastructure inhabited by a society of cogs, humans and devices that enables them to behave as one shared integrated resource, enabling human-computer collaboration at the speed of thought



The Cognitive Experience Lab @ T.J.Watson Research Center

A cognitive room is just one possible instantiation of a customized cognitive environment.

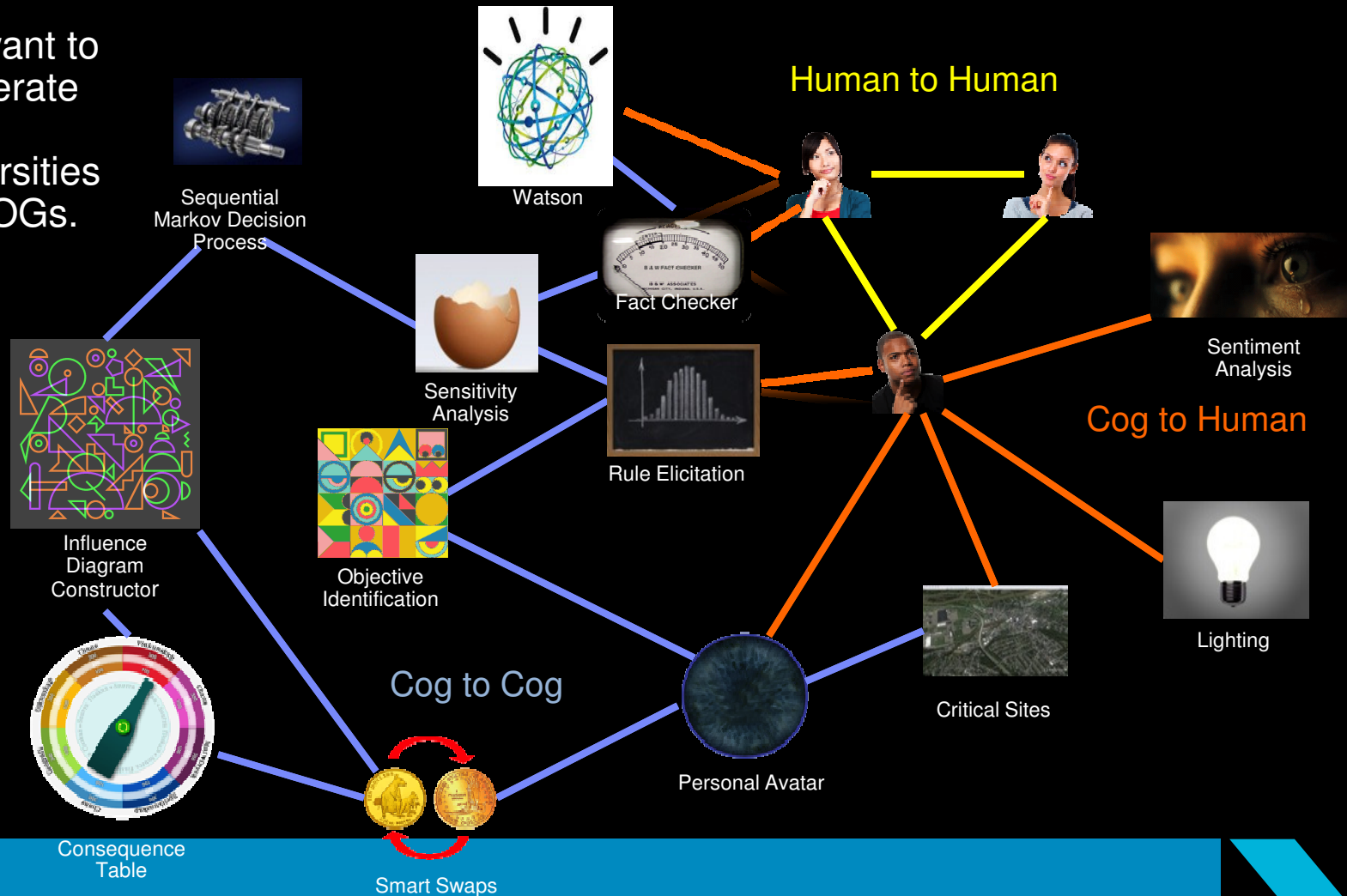
We envision people will create a huge variety of customized cognitive environments
(offices, homes, cars, etc)



The Society of Cogs

Cognitive agents that collectively learn and leverage sophisticated models of humans, engaging with them via adaptive multi-modal interfaces

We want to cooperate with universities on COGs.



MD Anderson Cancer Center - Oncology Expert Advisor

THE UNIVERSITY OF TEXAS
MD Anderson Cancer Center
Oncology Expert Advisor, powered by IBM Watson
JSAllen ? IBM.

Home Patients Cohorts Therapy

Patient List > Raymond Svenson
Patient: [Raymond Svenson](#)

- Summary
- Timeline
- Current Labs
- Past Labs
- Prognosis
- Latest Therapy
- Therapy History
- Suggested Therapies
- Patient Similarities

Name Raymond Svenson

Age 73 Certified

Sex Male

Race White

Date of Birth 12/24/1939

Last Followup Date Alive as of 10/01/2013

Updated 10/12/2013 3:41pm ETD

Height	Weight	Temperature	BP	Pulse
163.5 cm	57.2 kg	36.7 °C	127 / 80	90 BPM

Last Update: Thu Oct 03 2013 10:18:07 PM

▼ Important Developments ! 2 results Clear Alerts

- ! Patient has neutropenia. See the [Timeline](#).
- ! Patient has thrombocytopenia. See the [Timeline](#).

Patient Short Synopsis

Leukemia Service Date	08/21/2013
Current Diagnosis <i>06/15/2013</i>	Acute Myelocytic Leukemia
Genetic Mutations <i>09/23/2013</i>	FLT3-ITD, View Full Report...
Last Therapy <i>08/27/2013</i>	2010-0374 - Azacitidine+PKC412
Last Therapy Response	Pending
Zubrod Score <i>10/10/2013</i>	<input type="text"/> History
Current Symptoms <i>10/01/2013</i>	Nausea
Current Medications <i>09/11/2013</i>	.pkc-412, .ondansetron (zofran) - New, Ambisome (liposomal Amphotericin B) - New, Bd Pre-filled Saline Blunt Can (sodium Chloride 0.9 %), Heparin Lockflush(porcine)(pf) (heparin, Porcine (pf)), Levofloxacin, Levothroxine (synthroid), Potassium Chloride - New, Prilosec (omeprazole), Simvastatin (zocor), Tamsulosin (flomax), Valacyclovir (valtrex)
Comorbidities <i>09/19/2013</i>	Blood Coagulation Disorder, Anemia, Leukopenia, Chronic Obstructive Lung Disease, Hypokalemia, Hypothyroidism, Inflammatory Disease Of Mucous Membrane, Mycosis, Pneumonia
Social History <i>09/19/2013</i>	Quit Smoking
Family History of Cancer	No Known Family History of Cancer
Surgeries	No Known Surgeries



MDACC Oncology Expert Advisor

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center Oncology Expert Advisor, powered by IBM Watson JSAllen IBM.

Home Patients Cohorts Therapy

Patient List > Raymond Svenson Patient: Raymond Svenson

Azacitidine+PKC412 2010-0374 salvage-1 08/27/2013 Date Not Available

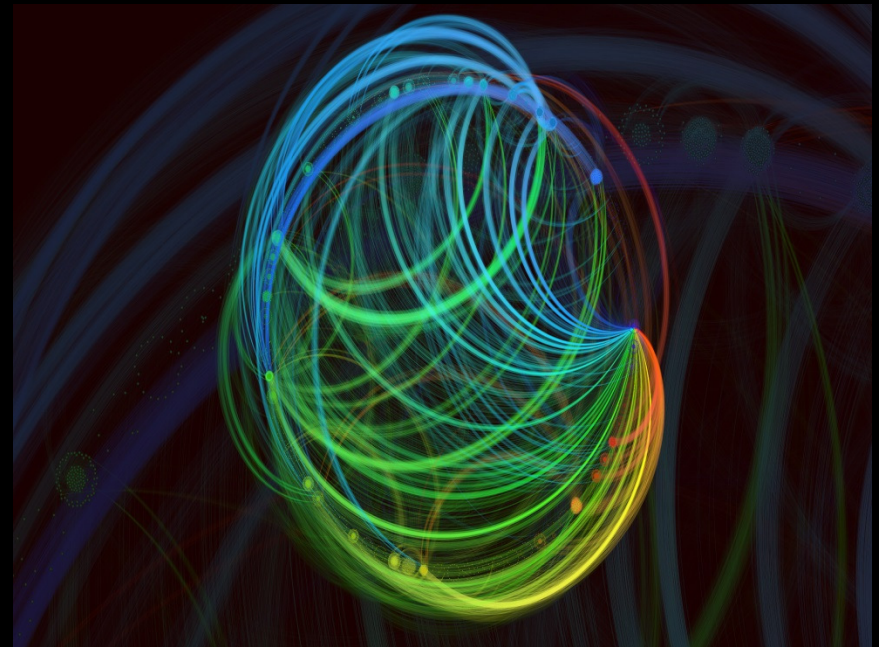
OEA Suggestions Approved Therapies Genomic Based Rx Clinical Trials

Therapy	Confidence	Audit	Rating
Salvage fludarabine + cytarabine + GCSF +/- idarubicin	Very High	Audit	(0 comments)
Salvage clofarabine + cytarabine + GCSF	Medium	Audit	(0 comments)
Subcutaneous Cytarabine, 5-azacytidine, Decitabine	Medium	Audit	(0 comments)
Salvage cladribine + cytarabine + GCSF +/- mitoxantrone or idarubicin	Medium	Audit	(0 comments)
Salvage HIDAC +/- anthracycline	Medium	Audit	(0 comments)
Intermediate-intensity therapy (clofarabine)	Medium	Audit	(0 comments)
Standard-dose Cytarabine 100-200, Idarubicin 12 or Daunorubicin 45-90 or Mitoxantrone 12	Medium	Audit	(0 comments)
Salvage etoposide + cytarabine +/-	Low	Audit	(0 comments)



How do we Take Inspiration from the Brain?

- Post silicon technology – e.g., organic superconductors
 - Our understanding of these mechanisms is still extremely limited
 - Architecture - Non-Von Neuman programming models
 - SyNAPSE

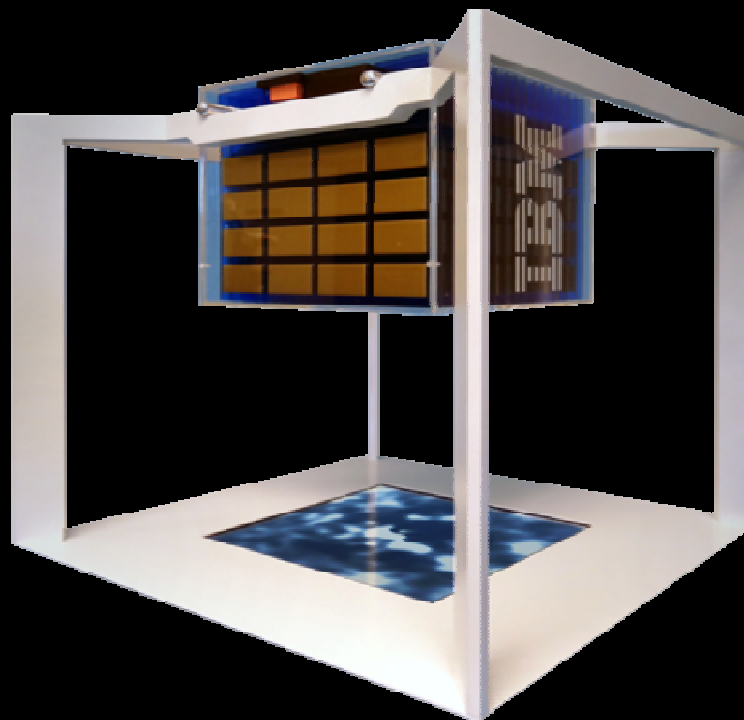
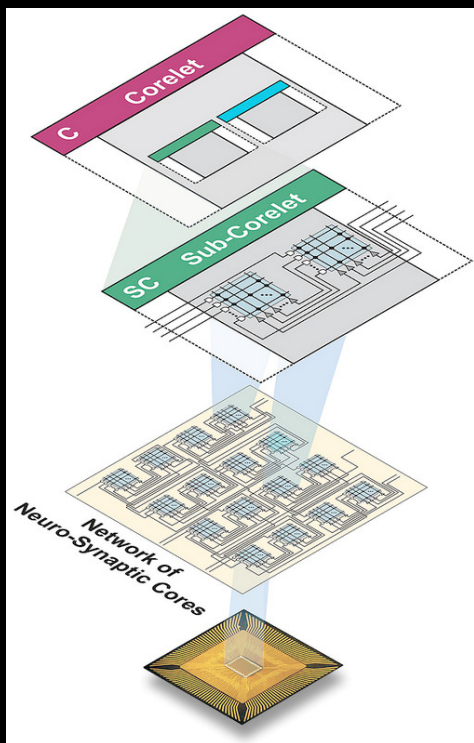


Monkey Brain wiring diagram



Cognitive Computing – SyNAPSE

Ultra-low power neurosynaptic supercomputer



2013 Milestones

- Non-Von Neuman “Corelet” programming model (August)
- First Silicon (September)

2014:

- enable developers to create and test uses for SyNAPSE

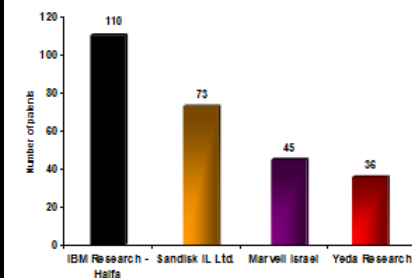


IBM Research – Haifa

- Established in 1972
- Largest IBM Research facility outside the US
- Spanning all IBM Research strategy areas
- Working with IBM business units and IBM clients worldwide
- Collaborating with academia and industry
- About 100 patents / year



Top Israeli leaders for US patents



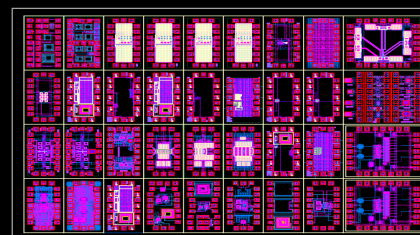
Innovation from IBM Research – Haifa



Cloud Computing



Storage



Quality



Big Data Analytics



Cognitive Computing



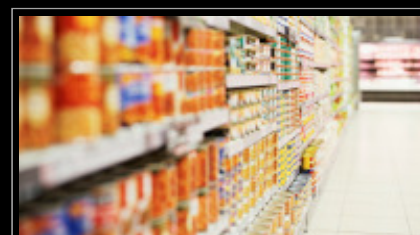
Social Analytics



Mobile



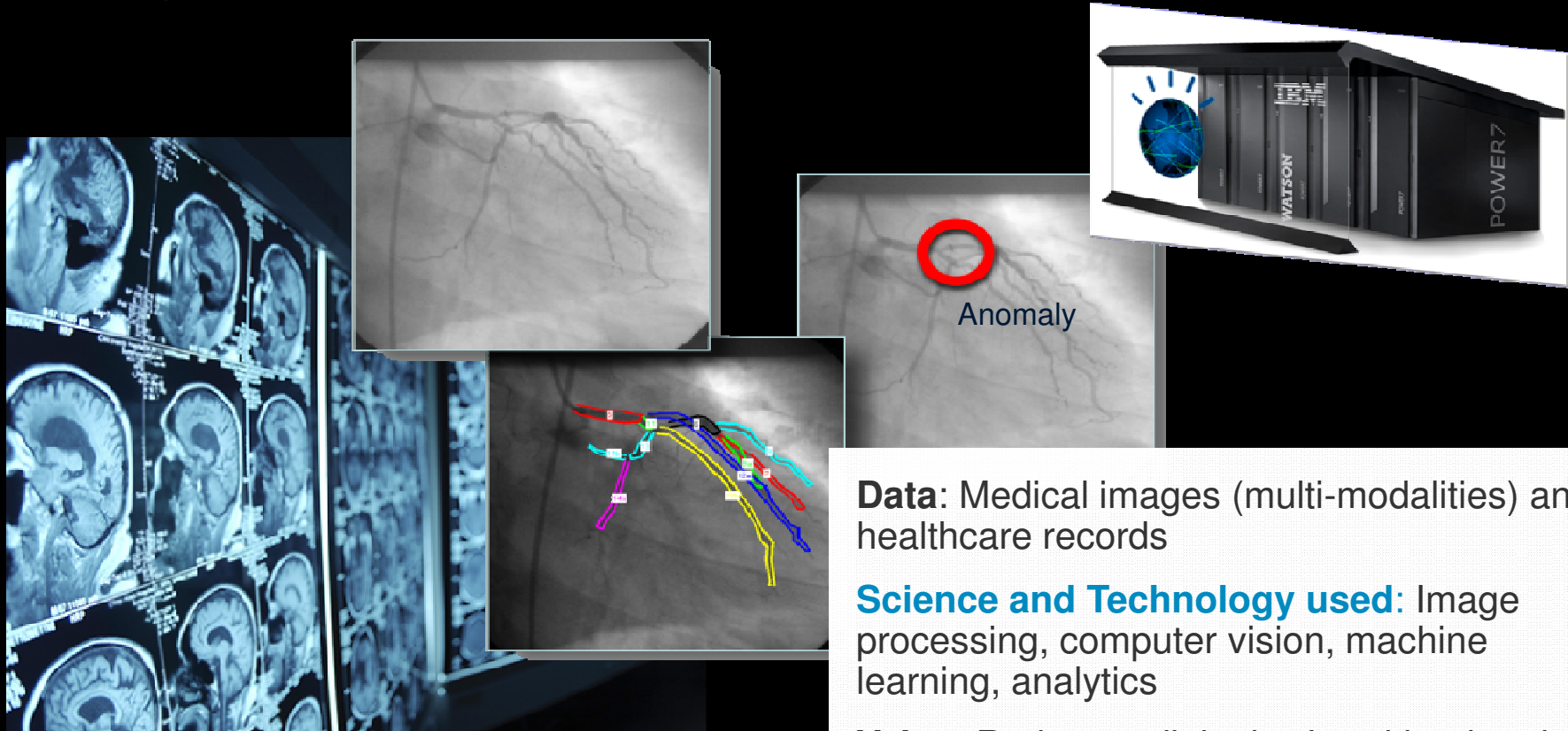
Healthcare



Retail



Medical Sieve - Cognitive radiology assistant for the 21st century



Data: Medical images (multi-modalities) and healthcare records

Science and Technology used: Image processing, computer vision, machine learning, analytics

Value: Reduce radiologists' workload and improve diagnostic quality



IBM Research

