The World is Our Lab

IBM Research – Innovation that Matters

Oded Cohn
Director IBM Research - Haifa
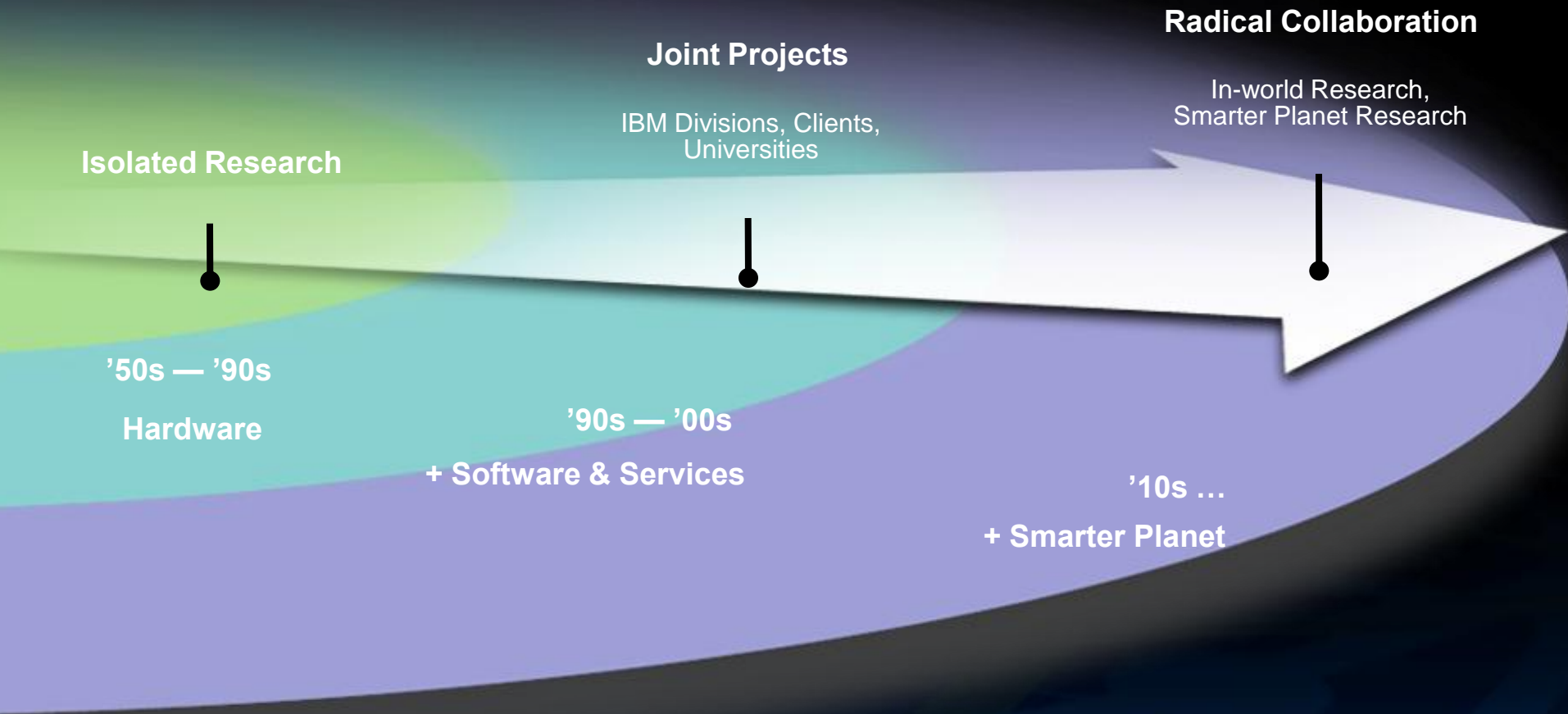
IBM Research: The World is Our Lab

Almaden
Watson
Austin
Dublin
Zurich
Haifa
China
India
Tokyo
Kenya
Brazil
Melbourne

- ● IBM Research labs
- ● Labs added since 2010

Open collaborations

The Eras of IBM Research: "The World Is Now Our Lab"

Radical Collaboration

In-world Research,
Smarter Planet Research

Joint Projects

IBM Divisions, Clients,
Universities

Isolated Research

'50s — '90s

Hardware

'90s — '00s

+ Software & Services

'10s …

+ Smarter Planet

Arad Group – Water management analytics

Energy & Utilities

Customer: Arad Group

Data: Water meter readings

Technology: Big Data analytics and anomaly detection

Value: Reduced water costs, improved customer service, 50% more reliable detection of faulty meters

Energy & Utilities

Customer: Water provider in Sonoma County, USA

Data: Pressure valve readings

Technology: Analytics, hydraulic models

Value: Reduced leaks and bursts by 19%. Fewer spikes in pressure, improved water quality, reduced operating expenses

Augmented reality – Mobile shopping advisor app

Retail & Mobile

Data: Product images and information. Shoppers use smartphone to pan products on store shelves

Technology: Image recognition, augmented reality, analytics

Value: More personalized experience for shoppers – recommendations and offerings based on preferences

Predictive analytics for epilepsy patients

Healthcare

Customer: UCB pharma

Data: Millions of records for patient data and scientific literature

Technology: Machine learning analytics and patient similarity analysis

Value: Support for decisions about which treatment will work best. More personalized care and improved outcomes.

IBM

Traffic management system

Transportation

Customer: City of Stockholm

Data: License plate data for 82 million vehicles handled by charge system

Technology: Image recognition, traffic management

Value: City traffic down by 18%. CO_2 emissions reduced by 14% -18%. Morning traffic jams on access roads cut in half.

Galway 'SmartBay' – Monitoring for quality and hazards

Environment

Customer: Marine Institute Ireland

Data: Sensor data for floating hazards, pollution levels, and marine life

Technology: Data acquisition, water quality analysis, automated alert system

Value: Automated information gathering and faster response to avoid flooding, danger to fish, and climate change threats

Hot-water-cooled supercomputer technology

Computing & Environment

Customer: Leibniz Supercomputing Centre

Technology: LRZ "SuperMUC" system was built with IBM System x iDataPlex Direct Water Cooled dx360 M4 servers, with more than 150,000 cores to provide a peak performance of up to 3 petaflops

Value: First commercial IBM hot-water cooled supercomputer will consume 40% less energy

Battery 500 – A 500 mile electric vehicle

Automotive

Technology: Instead of using heavy metal oxides, lithium-air batteries borrow oxygen from the air as the vehicle is being driven, creating an air-breathing battery with very high specific energy density

Value: Boost the range of rechargeable batteries for all-electric cars from less than 100 miles (160 km) today to as far as 500 miles (804 km)
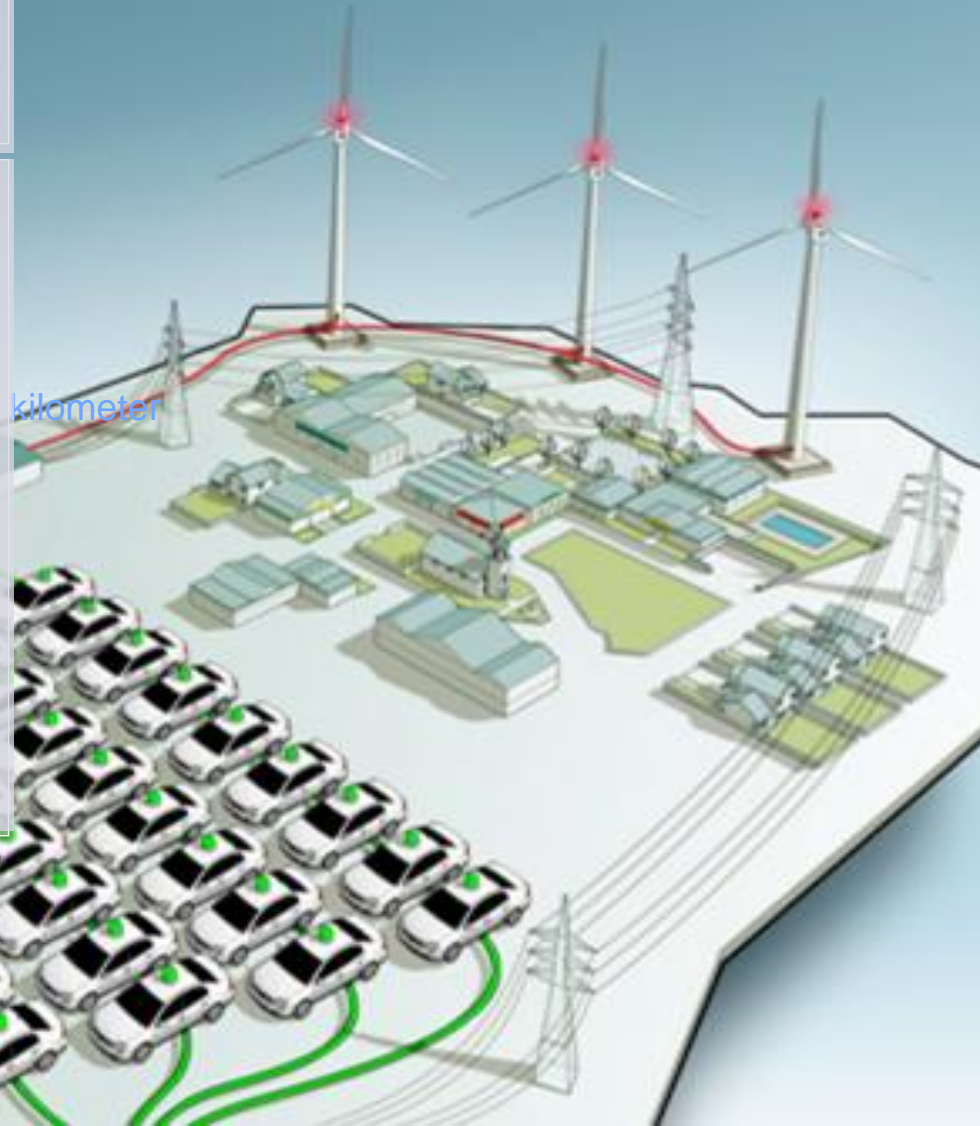
ECOGRID – Energy grid using renewable sources

Energy & Environment

Partner: EDISON research group

Technology: Smart technologies to control charging and billing and to ensure the stability of the overall energy system

Value: Develop an energy grid that uses at least 50% of renewable energy sources, such as wind power, solar energy and biogas

Square kilometer

Brunei – Weather modeling to preserve natural resources

Weather & Climate

Client: Government of Borneo

Technology: Deep Thunder for analytics and precision weather forecast models

Value: Improved agriculture and energy development

Pacific Northwest Smart Grid Demonstration

Energy

Partners: Pacific Northwest, 5 states, 11 utilities, and academia

Technology: Transactive energy management system deploys thousands (even millions) of software control agents to manage all responsive assets in the system

Value: Smart grid that can manage peak demand, facilitate renewable resources, and optimize efficiency and reliability

KEY

Distributed Generation

Plug-in Vehicles

Smart Appliances

Energy Storage

Renewables Integration

Tech/Data Testing

Reliability & Outage Recovery

Pacific Northwest SMART GRID
DEMONSTRATION PROJECT

Shell Oil – Forecasting oil production

Natural Resources

Partners: Shell Oil

Data: Oil production data, seismic information, production data

Technology: Subsurface modeling uses virtual sensors to incorporate seismic data

Value: Prediction of future production from wells

UBS – Zone Trusted Information Channel

Finance

Partners: UBS

Technology: Electronic identification offers secure access to hard disk from anywhere

Value: Secure internet connection to simplify e-banking

Smart messaging analysis prevents mobile spamming

Telecom

Partner: Fujian Mobile

Data: SMS

Technology: Offline analytics toolkit, anomaly detection, online pattern recognition, message filtering

Value: SMS spam prevention increased customer satisfaction, paving the way to legitimate mobile advertisements

Watson – Improved diagnosis for cancer treatment

Healthcare

Partner: Memorial Sloan Kettering

Technology: IBM Watson

Data: Sloan Kettering's clinical knowledge, molecular and genomic data, repository of cancer case histories, updated guidelines, and published research

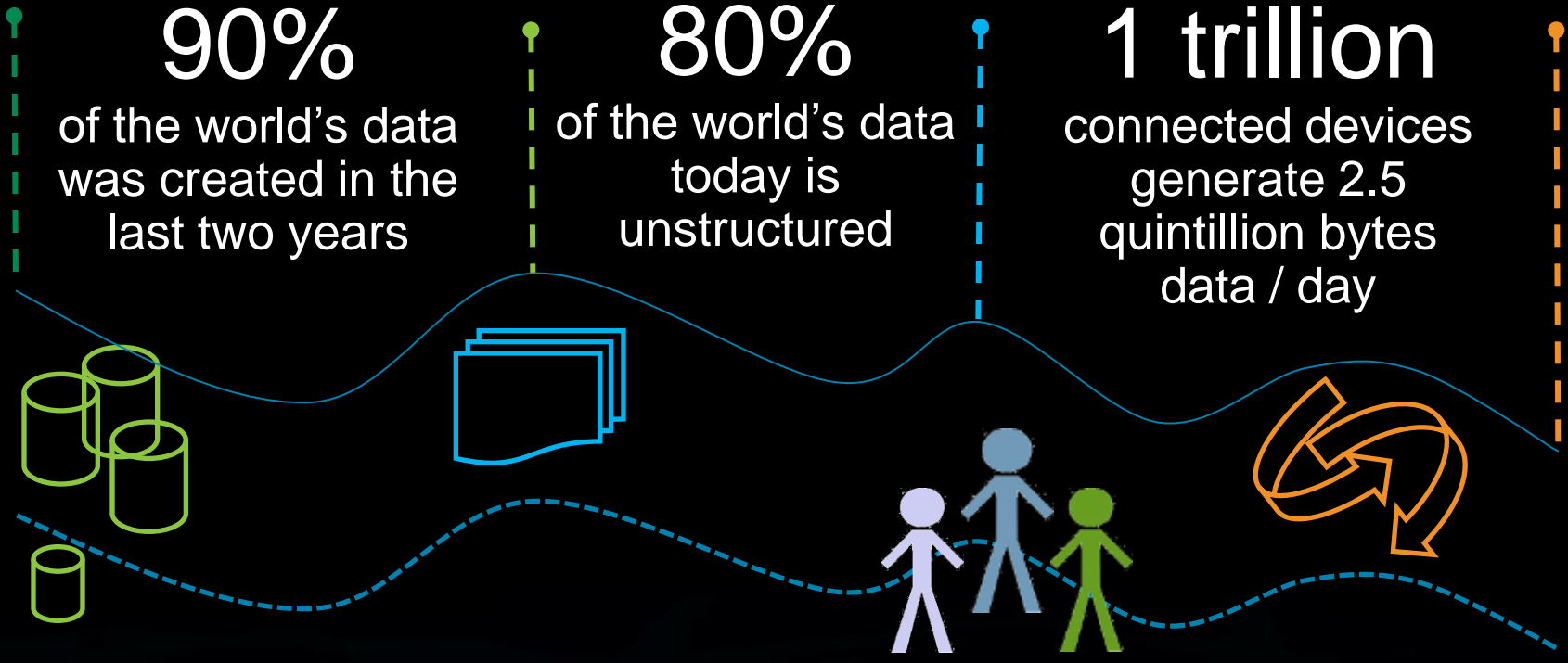**Value**: Outcome and evidence-based decision support system

Let's talk about Watson

What is IBM Watson? Why is it important?

How is IBM putting Watson to work?

What can we expect in the future?

Businesses are "dying of thirst in an ocean of data"

90% of the world's data was created in the last two years

80% of the world's data today is unstructured

1 trillion connected devices generate 2.5 quintillion bytes data / day

1 in 2 business leaders don't have access to data they need

83% of CIOs cited BI and analytics as part of their visionary plan

2.2X more likely that top performers use business analytics
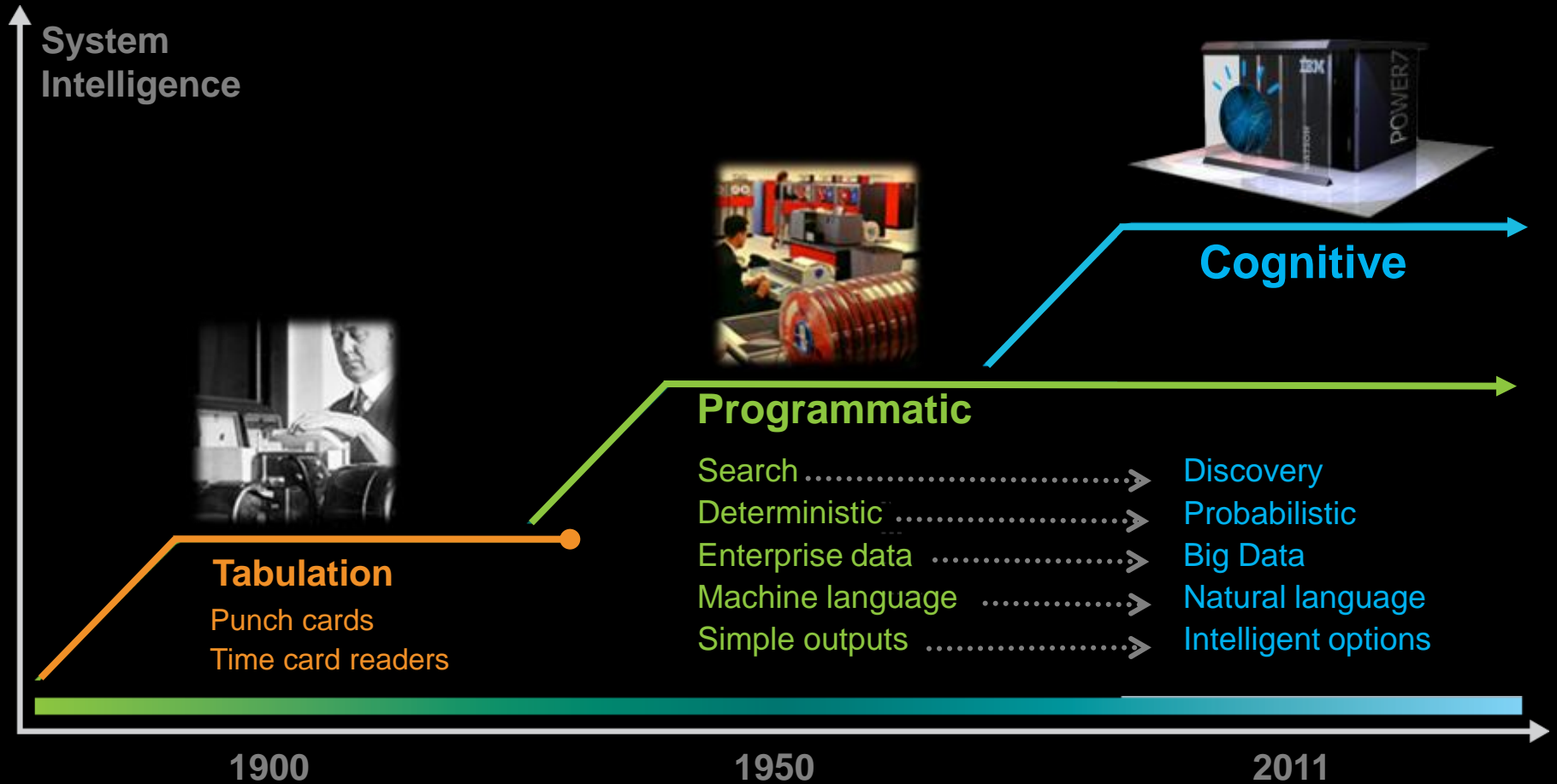
IBM Watson combines transformational technologies

2 Generates and evaluates evidence-based hypothesis

1 Understands natural language and human communication

3 Adapts and learns from user selections and responses
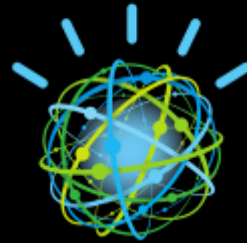
…built on a massively parallel architecture optimized for IBM POWER7

Watson enables three classes of cognitive services

Ask

• Leverage vast amounts of data
• Ask questions for greater insights
• Natural language inquiries
• e.g. - Next generation Chat

Discover

• Find the rationale for given answers
• Prompt for inputs to yield improved responses
• Inspire considerations of new ideas
• e.g. - Next generation Search → Discovery

Decide

• Ingest and analyze domain sources, info models
• Generate evidence based decisions with confidence
• Learn with new outcomes and actions
• e.g. - Next generation Apps → Probabilistic Apps

Imagine if…

… call center agents could find better answers to customer questions 50% faster.

That's exactly what a major provider of financial management software did.

"Contact centers of the future will improve precision and personalization, transforming centers from a cost orientation to a strategic assets."
                    - Leading Telco Supplier

271B calls come in to call centers annually costing $600B

50% of all incoming calls require escalation or go unresolved

61% of all unresolved calls could have been resolved with better access to information

ASK

Imagine if…

. . . new insights from medical research find their way to patient treatment programs in months instead of years?

That's exactly what a global leader in cancer care is doing today.

"Watson will be an invaluable resource for our physicians and will dramatically enhance the quality and effectiveness of medical care."

-Dr Sam Nussbaum,
Chief Medical Officer, WellPoint

Medical information is doubling every 5 years

It can take 10 years+ to convert research to practice

$95B/yr. is spent in medical research, yet only 3 of 5 chronic patients benefit

DISCOVER

Imagine if…

. . . the 1.5M people diagnosed with cancer in the US last year had a better prognosis?

That's exactly what a major health plan provider is working to accomplish.

"Watson can aggregate information and give probabilities that will enable (experts) to zero in on the most likely diagnosis."
-Dr. Steven Nissen, Cleveland Clinic

$263.8B was the overall cost of treating cancer in the US in 2010

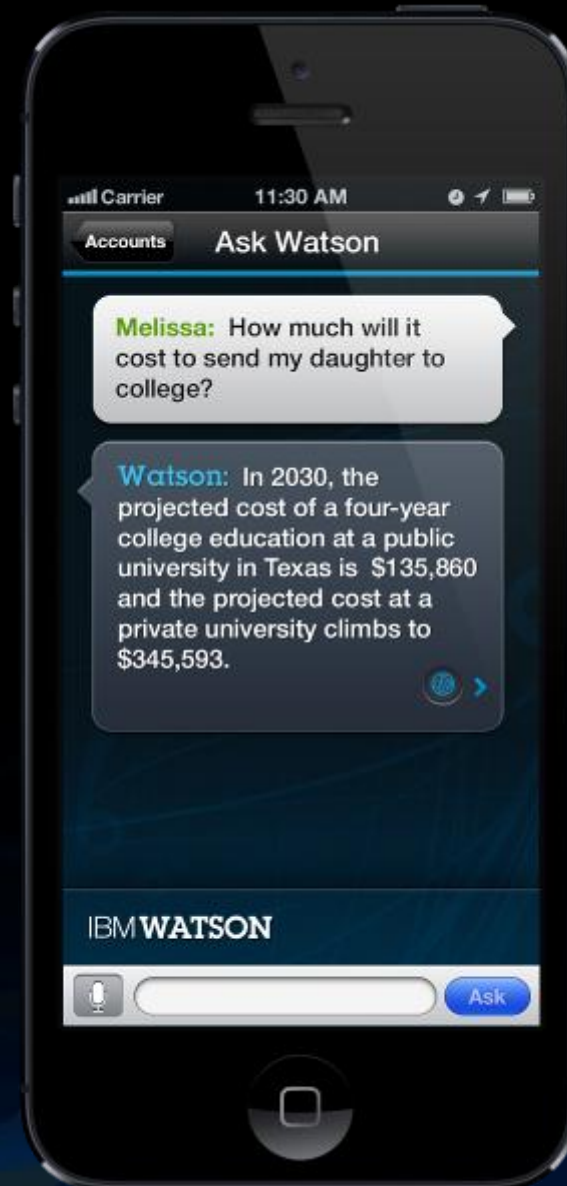3X is the rate cancer costs climb vs. std. health costs, or 15-18% / yr

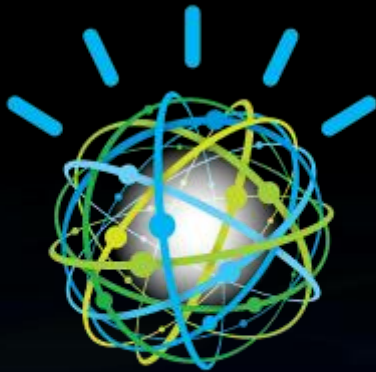20-44% of cancer cases receive the wrong diagnosis initially

DECIDE

The IBM Watson Engagement Advisor
IBM Watson at your service

Top brands tap Watson's ability to crunch big data and provide fast, personalized advice for empowered consumers
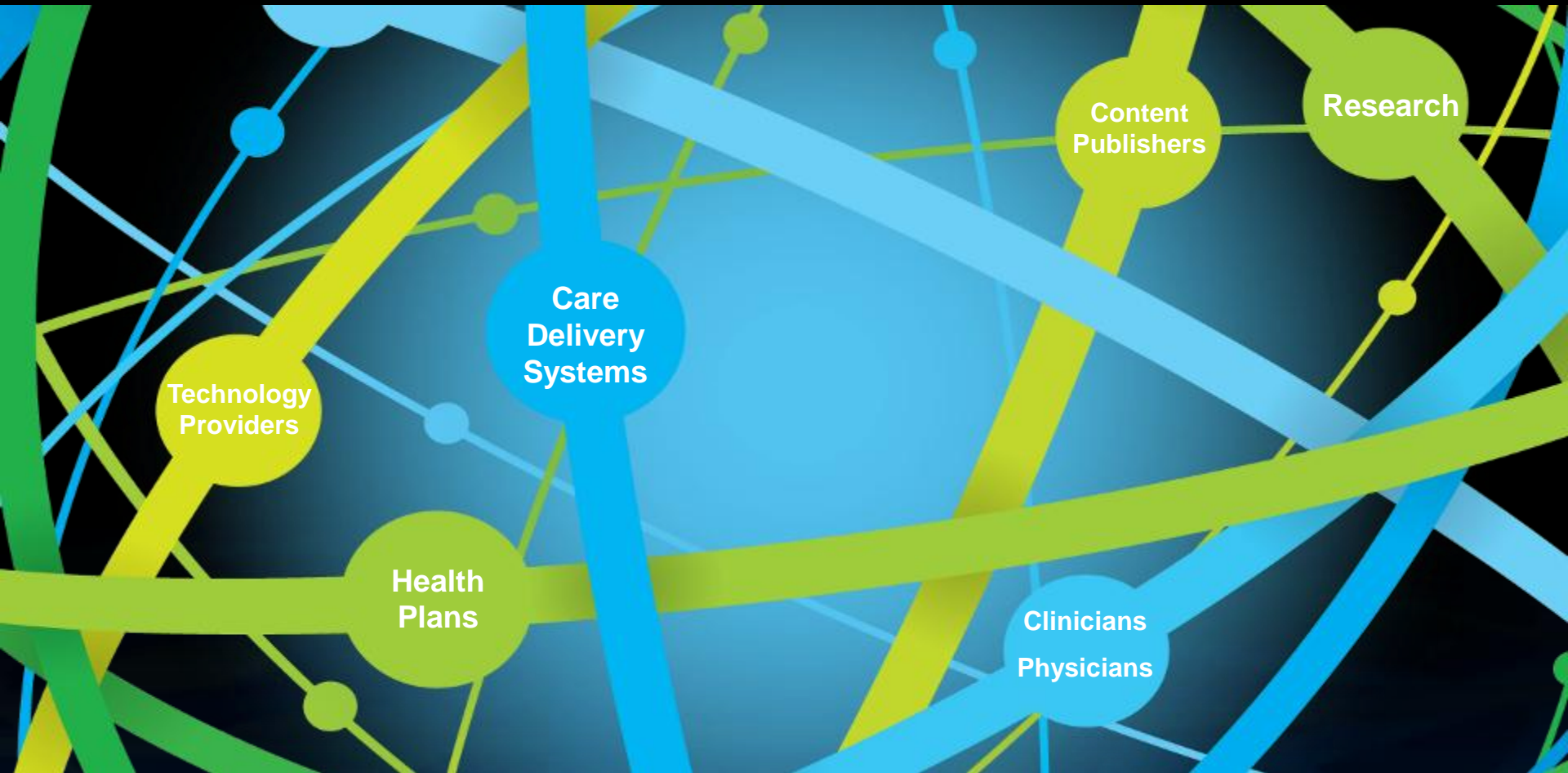
We have only just begun to build a new era of computing powered by cognitive systems

- Transforming how organizations think, act, and operate

- Learning through interactions

- Delivering evidence based responses driving better outcomes

It takes a community to change the world…