Putting IBM Watson to Work In Healthcare

Barry Mason
Vice President, Global Healthcare Payers
On February 14, 2011, IBM Watson changed history introducing a system that rivaled a human’s ability to answer questions posed in natural language with speed, accuracy and confidence.

Watson Wins!
Largest Jeopardy! in 5 years
34.5M Jeopardy! Viewers
1.3B+ Impressions
Over 10,000 Media Stories
11,000 attend watch events
- 2.5M+ Videos Views (top 10 only)
- 12,582 Twitter
- 25,763 Facebook Fans
IBM Watson a look behind the scenes

System Specifications

- 2880 Processing Cores
- 90 IBM P750 Servers
- 16 Terabytes Memory (RAM) – 20TB Disk
- 80 Teraflops (80 trillion operations per second)
- Workload Optimized Systems

IBM Technology Depth

- Content Analytics
- Business Analytics
- Big Data
- Databases / Data Warehouses

In the past 5 years IBM has spent over $14B in analytical acquisitions and $6B in R&D annually
Agenda

What is IBM Watson and why is it important?

How is IBM putting Watson to work?

What can we expect in the future?
The World is Getting Smarter

Instrumented + Interconnected + Intelligent =

An opportunity to think and act in new ways—economically, socially and technically.
Data volume is expanding at an incredible rate...
- data will grow 800% in the next five years
- Unstructured data grows 10-50X faster than structured

Data is getting more social...
- 20M articles on Wikipedia
- 30B pieces of Facebook content are shared monthly
- There are 156M public blogs

There are over 2.3B people on the Web today...
- and a trillion connected objects – cars, appliances, cameras, roadways, pipelines
Businesses on a Smarter Planet 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
- 20% is the amount of available data traditional systems leverages

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

83% of CIO’s cited BI and analytics as part of their visionary plan

54% of companies use analytics for competitive advantage

Source: GigaOM, Software Group, IBM Institute for Business Value®
Medical information is doubling every 5 years, much of which is unstructured.

81% of physicians report spending 5 hours or less per month reading medical journals.

1 in 5
diagnosis that are estimated to be inaccurate or incomplete

1.5 million
errors in the way medications are prescribed, delivered and taken in the U.S. every year

44,000 - 98,000
# of Americans who die each year from preventable medical errors in hospitals alone

“Medicine has become too complex (and only) about 20% of the knowledge clinicians use today is evidence-based”

- Steven Shapiro Chief Medical and Scientific Officer, UPMC
Today’s business challenges are causing organizations to rethink what it will take to get ahead tomorrow.

**Traditional IT**
- Structured data (local)
- Deterministic Applications
- Search Oriented
- Small Data
- Machine Language

**Emerging IT**
- Structured & unstructured (global)
- Probabilistic Applications
- Discovery Oriented
- Small and Big Data
- Natural Language
Brief History of IBM Watson

- IBM Research Project (2006 – )
- Jeopardy! Grand Challenge (Feb 2011)
- Watson for Financial Services (Mar 2012 – )
- Watson Industry Solutions (2012 – )

From inspiration and invention, through innovation and industrialization, ending with industry transformation.
IBM Watson brings together a set of transformational technologies to drive optimized outcomes.

1. Understands natural language and human speech.

2. Generates and evaluates hypothesis for better outcomes.

3. Adapts and learns from user selections and responses.

...built on a massively parallel probabilistic evidence-based architecture optimized for POWER7.
Why is it so hard for computers to understand humans

<table>
<thead>
<tr>
<th>Structured Data</th>
<th>Unstructured Data</th>
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<tbody>
<tr>
<td><strong>Physicist</strong></td>
<td><strong>Birth Place</strong></td>
</tr>
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<td>N. Bohr</td>
<td>Copenhagen</td>
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<tr>
<td>M. Curie</td>
<td>Warsaw</td>
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<table>
<thead>
<tr>
<th>Person</th>
<th>Organization</th>
<th>“If leadership is an art then surely Jack Welch has proved himself a master painter during his tenure at GE”</th>
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</thead>
<tbody>
<tr>
<td>L. Gerstner</td>
<td>IBM</td>
<td>Source: IBM Research</td>
</tr>
<tr>
<td>J. Welch</td>
<td>GE</td>
<td>Source: Jack Welch and the GE Way, Robert Slater</td>
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<tr>
<td>W. Gates</td>
<td>Microsoft</td>
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Source: Excel File, Database, etc.
Informed Decision Making: Search vs. Watson

**Decision Maker**
- Has Question
- Distills to 2-3 Keywords
- Reads Documents, Finds Answers
- Finds & Analyzes Evidence

**Search Engine**
- Finds Documents containing Keywords
- Delivers Documents based on Popularity

**Watson**
- Understands Question
- Produces Possible Answers & Evidence
- Analyzes Evidence, Computes Confidence
- Delivers Response, Evidence & Confidence

**Decision Maker**
- Asks NL Question
- Considers Answer & Evidence
Putting the proper pieces together at the point of impact can be life changing.
Working Together to Beat Cancer

Cancer is an insidious disease and the second highest cause of death

1 in 4 individuals will die from cancer

20% of cancer cases receive the wrong diagnosis initially with some as high as 44%

3X rate cancer cost climbs vs. std. health costs or 15-18% / yr.

263.8B overall costs of cancer in the US in 2010

Source: American Cancer Society, National Health Institute
IBM Watson and WellPoint putting Watson to work

**What if ...**
healthcare could leverage the latest insights improving the quality of patient care while lowering costs?

**WellPoint is doing it!**

- First commercial applications of the IBM Watson technology
- Processing treatment requests faster and more efficiently
- Extended data assessment based on research, clinical, medical, market and patient data
- Applied learning based on action taken and outcome derived
Where to put Watson to work

**Watson Capabilities**

1. Natural language understanding
2. Broad domain of unstructured data
3. Hypothesis generation and confidence scoring
4. Iterative Question/Answering
5. Machine learning

**Best Fit for Watson**

- Problems that require the analysis of unstructured data
- Critical questions that require decision support with prioritized recommendations and evidence
- High value in decision support
- Leverage scale to maximize machine learning and improve outcomes over time
From battling humans on Jeopardy! to changing the way the world thinks, acts, and operates

Healthcare
Diagnostic/treatment assistance, evidenced-based insights, collaborative medicine

Financial Services
Investment and retirement planning, institutional trading and decision support

Contact Center
Call center and tech support services, enterprise knowledge management, consumer insight

Government
Public safety, improved information sharing, security, fraud and abuse prevention

IBM Watson and Smarter Analytics have the capabilities to address grand business and societal challenges
Thank You

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