IBM Market Development & Insights

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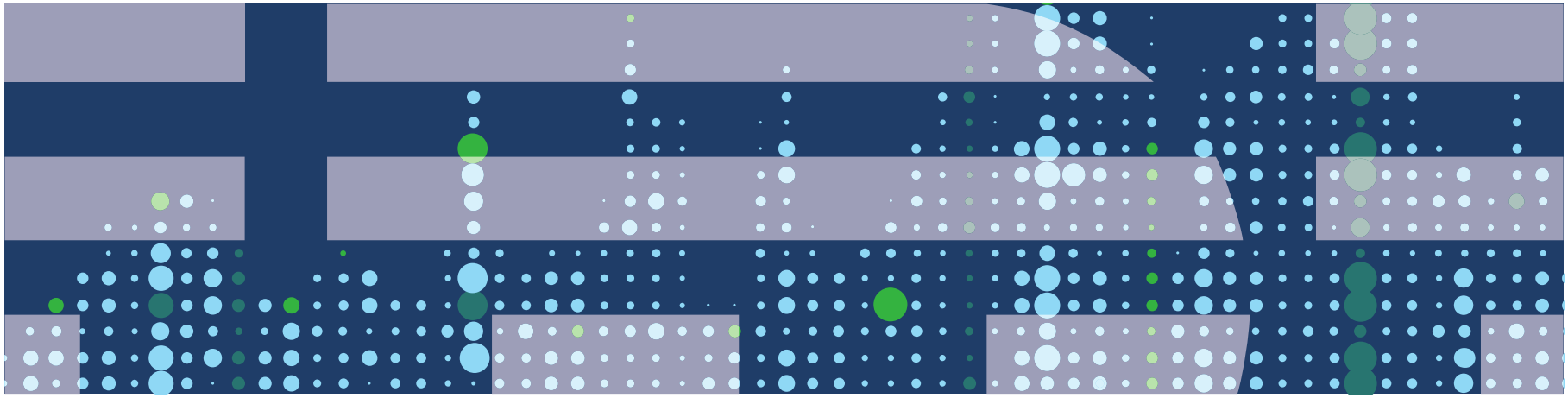
HorizonWatch by bluemine

Cognitive Computing: A 2015 HorizonWatch Trend Report

A bluemine original report – Client Version



Note: This report is based on internal IBM analysis and is not meant to be a statement of direction by IBM nor is IBM committing to any particular technology or solution.

About This Trend Report

- **Purpose:** The slides provide an overview on the Cognitive Computing trend for IBM clients
- **Content:** Summary information about the Cognitive Computing trend is provided along with many links to additional resources.
- **How To Use This Report:** This report is best read/studied and used as a learning document. You may want to view the slides in slideshow mode so you can easily follow the links
- **Available on Slideshare:** This presentation (and other HorizonWatch Trend Reports for 2015) will be available publically on Slideshare at http://www.slideshare.net/horizonwatching
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Cognitive Computing – Trend Overview

We are entering a new era of computing called cognitive computing. It signifies a fundamental shift in how machines interact with us, other machines and the environment. It will provide much value, but it will be highly disruptive.

Drivers

- Advances in enabling technology areas (see box to right)
- Increasingly large complex datasets that can be the source of major insights and hold the answers to critical questions
- Third computing platform – Cloud, Mobile, Big Data, Analytics, Social

Challenges

- Much more work on enabling technologies required
- Impact on business applications and processes not yet fully understood
- Education / Concerns about impact on jobs
- Window of Opportunity: Partnerships / Ecosystems

Implications

- This is a technology that learns. Accuracy will increase over time.
- First movers will have an advantage.
- Cognitive systems and services will be available via cloud delivered services and therefore, cognitive capability will be delivered via any mobile device
- It is technology directed at helping individuals, not departments. Thus expect a mass market to develop around consumers.
- It will be highly disruptive.
  - Business processes and whole industries will be transformed.
  - Changes will be required in employee workforce, corporate culture, and partner ecosystems.
  - New IT architectures, systems design, data management/analytics and workload optimized systems.
  - Scenario planning needed to understand long term implications for mass displacement of white collar knowledgeworkers

"By 2018 half of all consumers will interact with services based on cognitive computing on a regular basis." *IDC*

"The smart machine era will be the most disruptive in the history of IT." *Gartner*

"It has the potential to transform industries and professions everywhere."
Ginni Rometty, IBM CEO

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Cognitive Computing - Trends to Watch in 2015

1. **Computers That Learn:** To truly learn, computers must be able to process sensory as well as transactional input, draw inferences from past experience, understand uncertainty, communicate initial conclusions, interact with people in a natural, human-language like way and then modify conclusions according to feedback. This is a tall order.
2. **Computers That Think:** To solve problems like a human, computers will need advanced artificial intelligence algorithms and applications that mimic the brain's abilities for perception, action and cognition.
3. **Computers That Interact with Humans:** Humans will expect to be able to interact naturally with computers using advanced technologies like voice, gesture, and touch. Thanks to an emerging field, Affective Computing, the computers will detect and understand emotion, tone, and inflection.
4. **Computers That Interact with other Computers:** Leveraging the IoT, enterprises become interested in building sense and respond networks of smart machines and devices that talk to each other, make decisions, and get work done autonomously.
5. **Much More Research Needed:** Cognitive systems will require scientific breakthroughs at every layer of information technology. There is much work to do.

IBM's Jon Iwata on the Intelligence of Watson

"Advances in algorithms, hardware, networks and big data, smart machines are proving ready to disrupt conventional approaches to much of what the IT organization does." *Gartner*

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Cognitive Computing - Trends to Watch in 2015 (cont.)

6. **Pilots / Case Studies:** 2015 is the year to produce thought leadership content that documents the results of early adopters and informs researchers of requirements for future versions. Then more pilots are needed.
7. **Education & Training:** In 2015, all stakeholders need education around Cognitive Computing, including Universities, Students, Developers, Customers, Business Partners, Analysts, Journalists, Investors, and Employees. Vendors should focus on creating and distributing thought leadership content, holding briefings/webinars and social discussions.
8. **Apps:** Eventually, all mobile and desktop apps we use will have capability for users to verbally ask questions and interact to fine tune searches, analysis, and visualizations. Expect a whole new breed of small startups launching apps over the next few years.
9. **IBM's Watson Group:** In 2015, continue to expect a whole new class of software, services and apps from IBM's Watson Group that think, improve by learning, and discover answers and insights to complex questions.
10. **Increased Vendor Activity:** There is a gold rush of sorts going on across the whole ecosystem. Expect more announcements from companies like Google, Apple, Facebook, Baidu, Microsoft, Amazon, etc.

Tapping into the new cognitive computing market (Starts at 6:45 mark)

"People interacting with machines through transparent computing, machines autonomously interacting with other machines, and people and machines interacting with the cloud and mobile infrastructure put intelligent systems at the edge, in the infrastructure, and in between." *IDC*

 Source: HorizonWatch, IBM Market Insights
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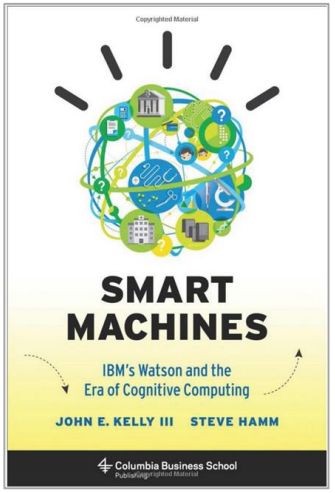
Cognitive Computing - Trends to Watch in 2015 (cont.)

11. **BYOCA (Bring Your Own Cognitive App):** Over the next five years mobile Intelligent Agents designed for consumers will win the mass market play and eventually be adopted by enterprises for their workforce.
12. **Siri, Google Now, and Cortana:** Expect both the accuracy and the capabilities of these services to further improve.
13. **Potential for Workplace Disruption High:** It may take many decades, but machines will eventually be able to handle many blue and white collar job activities. This will have implications across all businesses and governments.
14. **Industries Will Be Transformed:** Not in 2015, but the potential for industry-wide disruption is high. Scenario planning required. First movers may gain a competitive advantage.
15. **Window of Opportunity:** Expect the next few years to be a gold rush of sorts with large vendors building capabilities and buying companies with assets and intellectual property.
16. **Leadership Required:** As with any new technology, the Cognitive Era will require leaders who are able to transform business processes and corporate culture in order to leverage the technology.



IBM

"Voice-controlled intelligent assistants offer a tantalizingly productive vision of end user computing." *Forrester*

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"The smart machine era will be the most disruptive in the history of IT." *Gartner*

Cognitive Computing technologies can assist decision making and help humans solve complex problems

"Cognitive computing makes a new class of problems computable. It addresses complex situations that are characterized by ambiguity and uncertainty; in other words it handles human kinds of problems." *WikiPedia*

So what does cognitive computing do?

Cognitive computing…

- Accelerates, enhances and scales human expertise
- Captures the expertise of top performers – and accelerates the development of expertise in others
- Enhances the cognitive process of professionals to help improve decision making in the moment
- Scales expertise by quickly elevating the quality and consistency of decision making across an organization.

IBM

Enabling Technologies

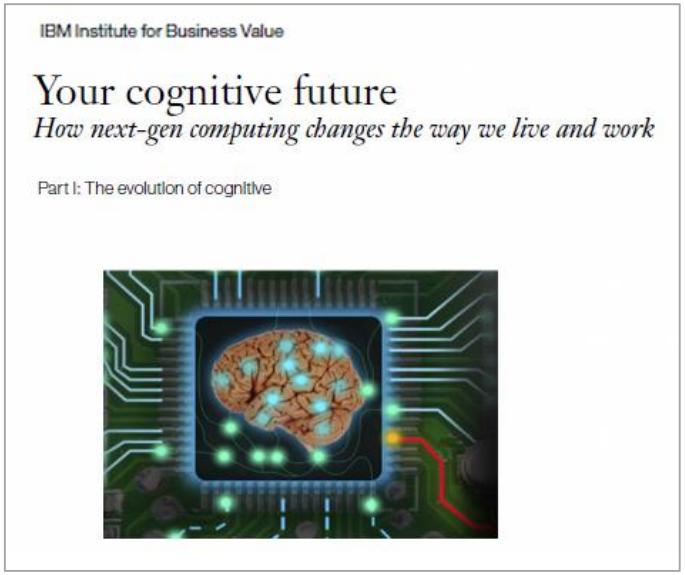
- Natural Language Processing
- Semantic Analysis
- Information Retrieval
- Automated Reasoning
- Machine Learning
- Artificial Intelligence

"Cognitive-based systems extend the capabilities of humans. They achieve this by learning and building knowledge, understanding natural language and interacting more naturally with human beings than traditional programmable systems." *IBM*

Cognitive Computing, built on the new platform of Cloud, Mobile, Big Data Analytics, and Social, will transform the way we work and live.

"Cognitive computing makes a new class of problems computable. It addresses complex situations that are characterized by ambiguity and uncertainty; in other words it handles human kinds of problems." *WikiPedia*

"Information systems are becoming smarter and will increasingly be able to make business decisions with less input." *Gartner*



IBM

"Advances have made possible the beginning of a transition away from traditional programmatic computing to a newer arena of cognitive computing. In essence, it is the transition to enabling computers to 'think' or 'reason' in a way similar to the human mind." *Blue Hill Research*

"Growth in applications incorporating advanced and predictive analytics, including machine learning, will accelerate in 2015. These apps will grow 65% faster than apps without predictive functionality." *IDC*

Some implications of the Cognitive Computing Trend

"By 2018 half of all consumers will interact with services based on cognitive computing on a regular basis." *IDC*

"CIOs, CTOs, enterprise architects, business relationship managers and other IT leaders need to incorporate smart machines into their plans and investment strategies now because these technologies will significantly change how business and government work — and how humans in general work." *Gartner*

Dharmendra Modha on Brain-Inspired Computing

"In 2015, smart machines will revolutionize white-collar work. Smart machines will revolutionize the service sector in three ways: (1) automating manual writing (reports, emails, etc.); (2) enhancing employee expertise by making a company's sales or marketing data "speak" in natural language; and (3) improving your customer-brand relationship through personalized marketing campaigns—all to help businesses finally realize the promise of big data." *AlchemyAPI*

Cognitive Computers will leverage the large volumes of big data available to enterprises to help improve the decision making process

"The machines of tomorrow – cognitive systems -- will forever change the way people interact with computing systems to help people extend their expertise across any domain of knowledge and make complex decisions involving extraordinary volumes of fast moving Big Data." *IBM*

"Cognitive computing systems learn and interact naturally with people to extend what either humans or machine could do on their own. They help human experts make better decisions by penetrating the complexity of Big Data." *IBM*

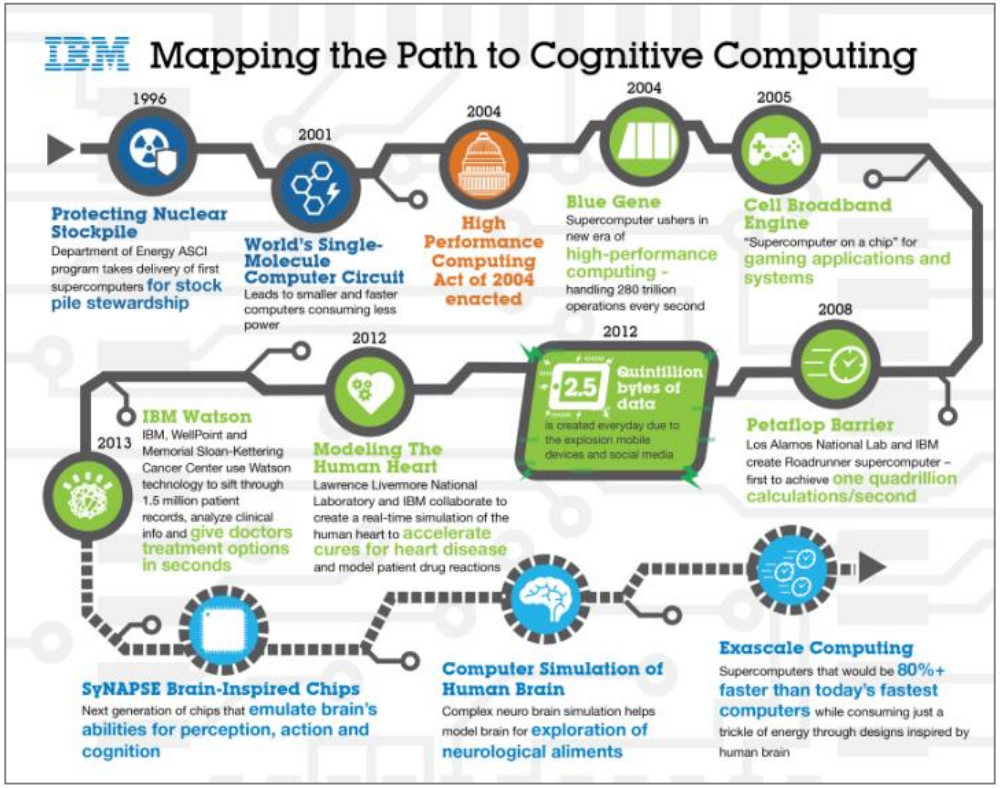


Image *IBM*

Gartner calls this the “Smart Machines” era and says it will be highly disruptive

“Through 2020, the smart machine era will blossom with a proliferation of contextually aware, intelligent personal assistants, smart advisors (such as IBM Watson), advanced global industrial systems and public availability of early examples of autonomous vehicles.” *Gartner*

“Aggressive early-adopter companies can realize competitive advantage by employing smart machines, such as cognitive systems, autonomous vehicles and mobile robots.” *Gartner*

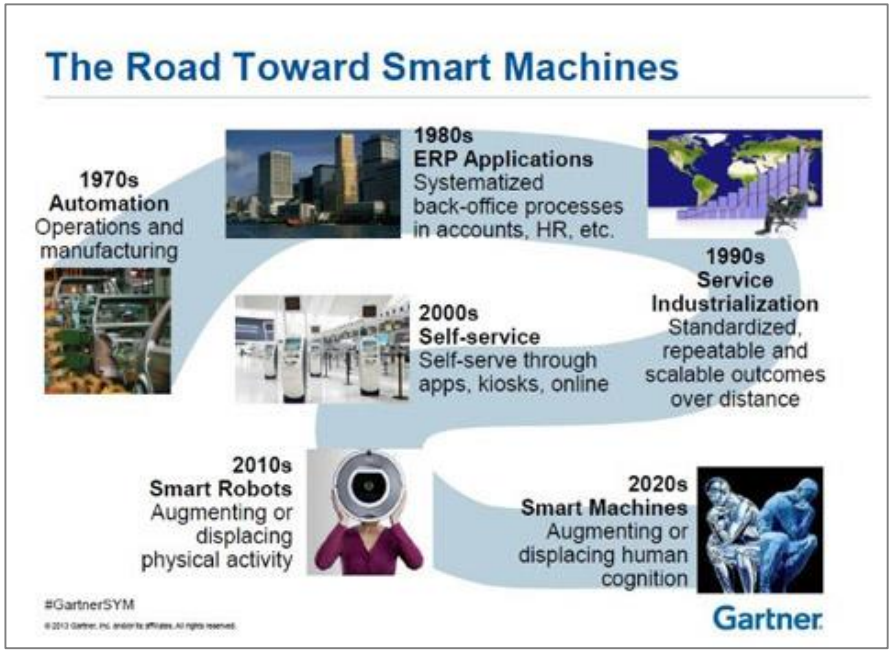


Image: *PC Magazine*

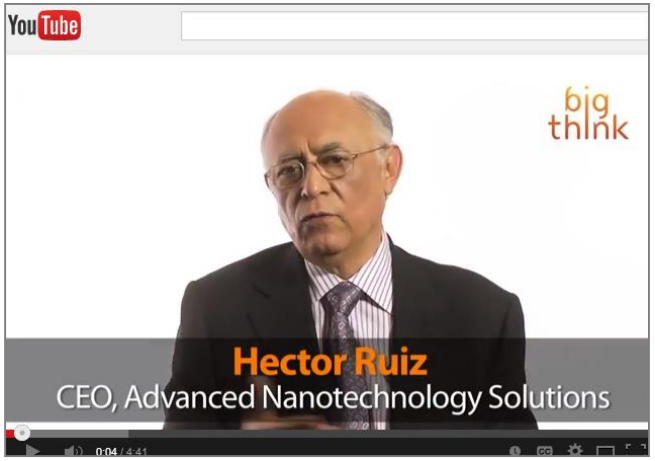
“The smart machine era will be the most disruptive in the history of IT. New systems that begin to fulfill some of the earliest visions for what information technologies might accomplish — doing what we thought only people could do and machines could not —are now finally emerging.” *Gartner*

No matter what it is called, this shift in computing will change not only business processes, but entire industries

"In the history of our industry there have been some real major events that transformed the industry and had a huge impact in our lives. I believe that the next step is gonna be what's called cognitive computing." *Hector Ruiz, CEO of Advanced Nanotechnology Solutions*

"It has the potential to transform industries and professions everywhere." *Ginni Rometty, IBM CEO*

Hector Ruiz on the Evolution of Cognitive Computing



"The automation of knowledge work has the potential to become pervasive, transforming the economics of many industries, but also posing challenges and opportunities for technology providers, virtually all business leaders, individuals, and policy makers." *McKinsey*

"Forrester believes that cognitive computing has the potential to address important problems that are unmet with today's advanced analytics solutions." *Forrester*

Potential Competitive Advantages await first movers who learn how to leverage advanced analytics and cognitive solutions.

"Smart machines deliver substantial first-mover advantage and we recommend early action." *Gartner*

"It is not only access to information, but the ability to analyze and act upon it, that creates competitive advantage." *IDC*

"Cognitive computing can provide competitive differentiation for businesses by empowering their people with fact -and experience- based insights and suggested guidance that results in better informed decisions." *Ventana Research*


Building a Smarter Planet

A Smarter Planet Blog

IBM CEO Ginni Rometty: Gaining Competitive Advantage in the New Era of Computing

IBM CEO Ginni Rometty

In these early days of the 21st century, Big Data, analytics, cloud, mobile and social technologies are transforming our world. This new era of computing provides the instrumentation, interconnection and intelligence that make it possible to build a smarter planet. But, in order to do so, countries, cities, corporations and individuals need to rethink how they go about achieving their goals. Watch this video of IBM CEO Ginni Rometty laying out her vision of the path forward at the Council on Foreign Relations–and her Q&A session with the audience. Join the conversation here and on Twitter at #IBM and #CFRlive. Here's the speech.

IBM

"Significant competitive advantages await early adopters of smart advisors, starting in 2014; contextually aware intelligent personal assistants, starting in 2015; and, by 2020, advanced global industrial networks and early autonomous vehicles. IT leaders should act now as laggards will lose." *Gartner*

"Artificial intelligence isn't mainstream yet, but a wave of applications for AI is coming, and could give early adopters a significant competitive advantage." *WSJ*

McKinsey says incremental productivity value of automating knowledge work could exceed $5.2 trillion economic impact by 2025

"It is possible that this incremental productivity—which does not include any estimate of the value of higher quality output due to better knowledge tools—could have as much as $5.2 trillion to $6.7 trillion in economic impact annually by 2025." *McKinsey*

McKinsey

"Advances in artificial intelligence, machine learning, and natural user interfaces (e.g., voice recognition) are making it possible to automate many knowledge worker tasks that have long been regarded as impossible or impractical for machines to perform." *McKinsey*

"Now is the time to begin planning for an era when the employee base might consist both of low-cost Watsons and of higher-priced workers with the judgment and technical skills to manage the new knowledge "workforce." *McKinsey*

The Cognitive Computing ecosystem is emerging and already there are many players

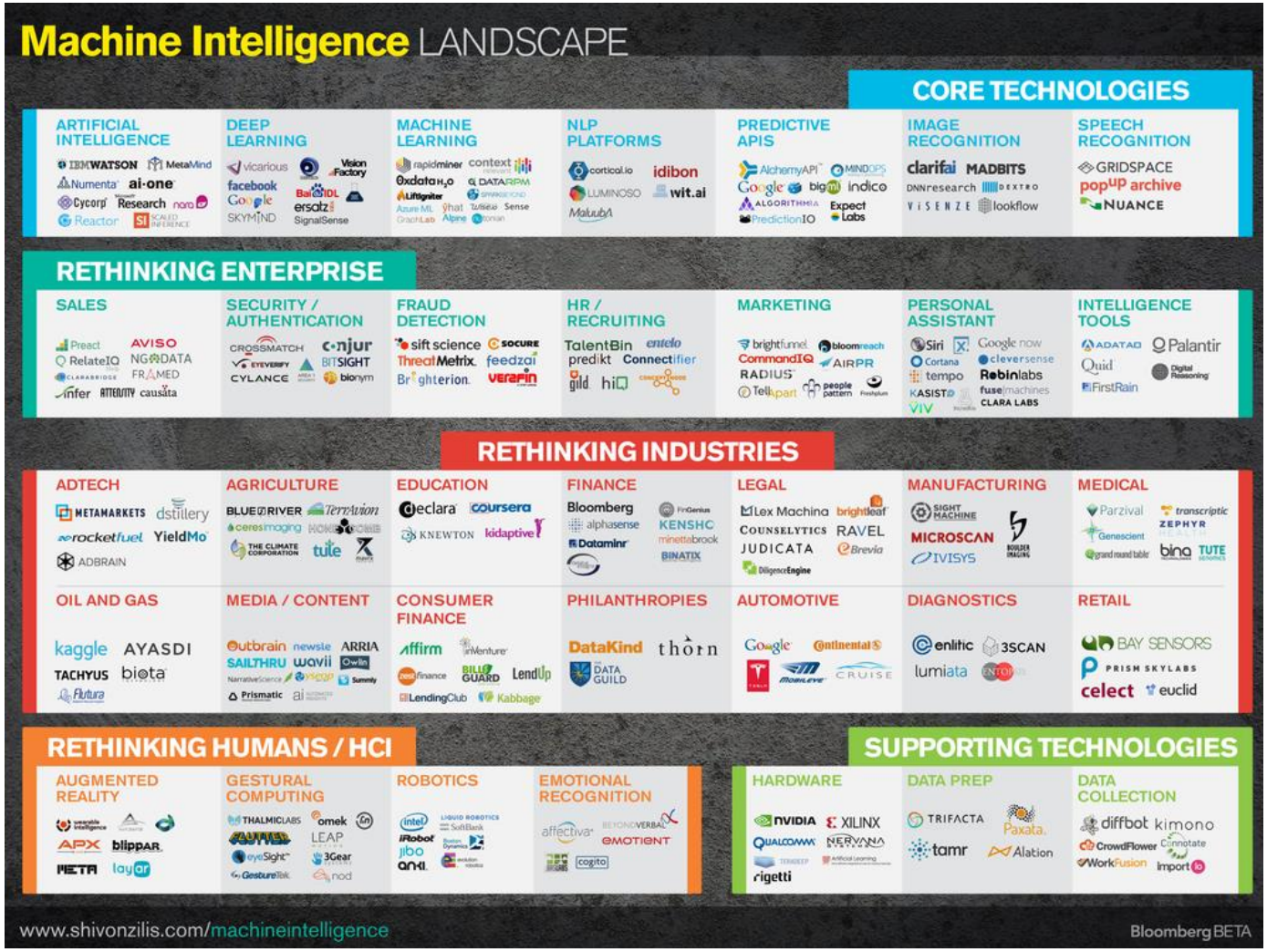


Image Source: [Shivon Zillis]

On January 9, 2014, IBM announced the Watson Group, leading the entire I.T. Industry on the journey to Cognitive Systems

News room > News releases >

IBM Forms New Watson Group to Meet Growing Demand for Cognitive Innovations

Headquartered in NYC's "Silicon Alley," New IBM Watson Group to Include Watson Innovation Hub, Fueling New Products and Start-ups

Watson Group Introduces New Cloud Solutions to Accelerate Research, Visualize Big Data and Enable Analytics Exploration

IBM

"Today is an important moment in our company's history. And It is also an important moment in the history of technology." *Ginni Rometty, IBM CEO*

"IBM has transformed Watson from a quiz-show winner, into a commercial cognitive computing breakthrough that is helping businesses engage customers, healthcare organizations personalize patient care, and entrepreneurs build businesses."
Michael Rhodin, Senior Vice President, IBM Watson Group

Video: IBM Watson Group Launch Event in New York

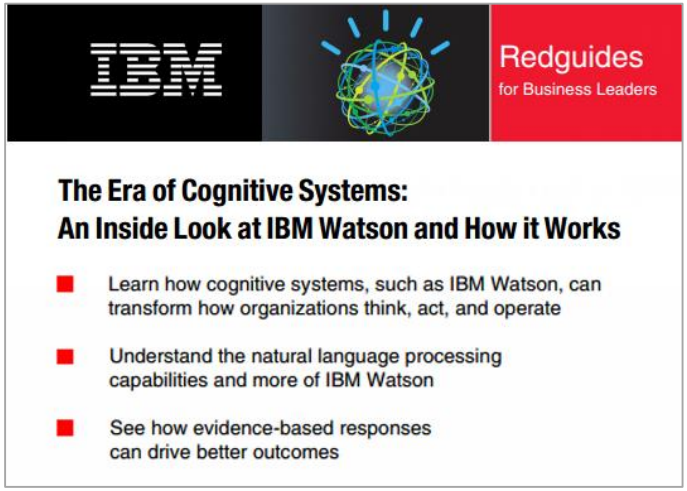
What is Watson? It signals a new era of computing where computers interact with users in order to improve decision making

"Watson is an artificial intelligence computer system capable of answering questions posed in natural language" *WikiPedia*

"The combination of the following capabilities makes Watson unique:

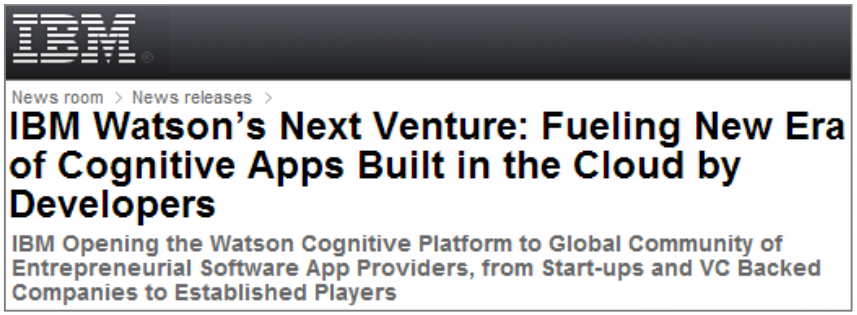
- Natural language processing by helping to understand the complexities of unstructured data, which makes up as much as 80 percent of the data in the world today.
- Hypothesis generation and evaluation by applying advanced analytics to weigh and evaluate a panel of responses based on only relevant evidence
- Dynamic learning by helping to improve learning based on outcomes to get smarter with each iteration and interaction"

IBM Redbooks



IBM

IBM has opened up the Watson platform to developers in a move that will enable a whole new era of cognitive related apps

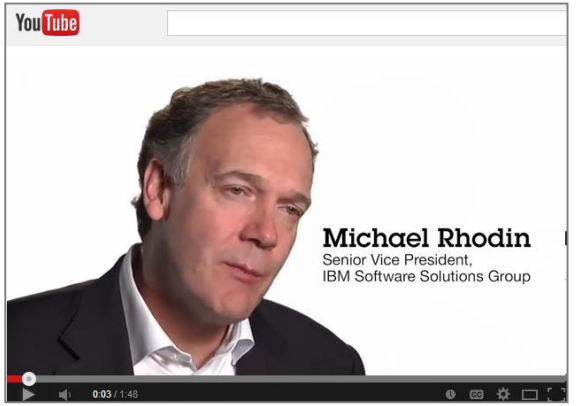


IBM

"With this move, IBM is taking a bold step to advance the new era of cognitive computing. Together with our partners we'll spark a new class of applications that will learn from experience, improve with each interaction and outcome, and assist in solving the most complex questions facing the industry and society." *Michael Rhodin, Senior Vice President, IBM Watson Group*

"The significance here is that IBM will enable other companies, large and small, to embed access to Watson into their products and services, or better yet, to build applications on top of it. This could bring about a paradigm shift not only in how people interact with computers, but in how we live our lives." *Mohamad Makhzoumi, Partner at New Enterprise Associates and board member at Welltok*

Michael Rodin - Cognitive Apps



Learn more about Cognitive Computing and Watson from IBM Leaders

"It is taught, it is not programmed. By design it learns by experience. By design it learns from interaction. And by design it gets smarter over time and has better judgments over time."
Ginni Rometty, IBM CEO

Dr. John Kelly on Cognitive Computing

Mike Rhodin on IBM Watson Group Announcement

Jerome Pesenti at TEDxBermuda

Manoj Saxena, former General Manager of IBM Watson, discusses some of the progress made on Watson since the Jeopardy game

Manoj Saxena discusses IBM Watson

"It is my firm belief that, over time, cognitive computing will transform all types of descriptive, prescriptive, and predictive analytics. By fusing traditional structured data analysis with unstructured information (e.g., tweets, blogs, call center notes), cognitive analytics will deliver insights and advice at a depth and scale that will mimic the human brain. This is not a futuristic statement but something that is already happening across various industries." *Manoj Saxena, founding general partner, The Entrepreneurs' Fund, chairman, Cognitive Scale, and former general manager for IBM Watson software division*

Watson will open up new opportunities for advanced decision support applications, transforming industry business processes

"Deep learning intersects with numerous fields, and it will soon aid in manufacturing, medicine, retail, utilities, and beyond." *HBR*

Putting Watson to Work (link)

Video: IBM Watson in Healthcare

Video: IBM Watson in Finance

Chef Watson: Cognitive Cooking

Watson & Brazil's Ministry of Justice

"Imagine having the ability to take in all the information around a patient's medical care -- symptoms, findings, patient interviews and diagnostic studies. Then, imagine using Watson analytic capabilities to consider all of the prior cases, the state-of-the-art clinical knowledge in the medical literature and clinical best practices to help a physician advance a diagnosis and guide a course of treatment. " *Wellpoint*

Other IT industry players and consultants are positive on the Cognitive Computing Trend

"If companies take full advantage of intelligent automation, the overall impact on business could rival that of the enterprise resource planning wave of the 1990s." *Deloitte*

"Cognitive computing can, and will, bring benefits to many industries, and it will fundamentally change the ways in which many businesses operate." *Accenture*

Churchill Club Video: Machine Learning: Hottest Tech Trend in the Next 3-5 Years?

"Cognitive computing, inspired by how the human brain works, has the potential to revolutionize visually-based information analytics, leading to exciting applications in a wide range of domains, including surveillance, location-based services, healthcare safety, fraud detection, sentiment analysis or big data processing and visualization." *HP*

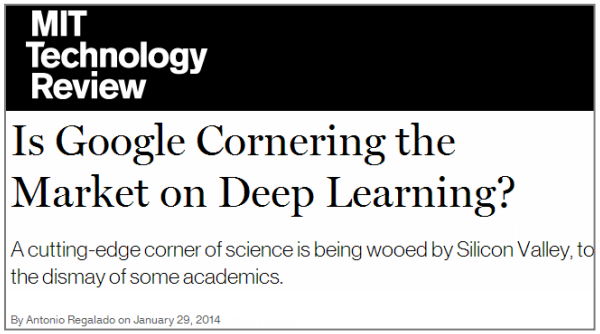
Google is very active in Artificial Intelligence, Robots, and related topics. It will be a strong player in the Cognitive Computing Era

"We believe quantum computing may help solve some of the most challenging computer science problems, particularly in machine learning." *Google*

"Understanding natural language is at the core of Google's work to help people get the information they need as quickly and easily as possible." *Google*

"Google is not really a search company. It's a machine-learning company." *Matthew Zeiler, the CEO of visual search startup Clarifai*

Artificial Intelligence with Peter Norvig, Director of Research at Google


MIT Technology Review

Is Google Cornering the Market on Deep Learning?

A cutting-edge corner of science is being wooed by Silicon Valley, to the dismay of some academics.

By Antonio Regalado on January 29, 2014

MIT Technology Review

Google Brain is an internal codename for work going on at Google around deep learning and artificial intelligence

"When Google used 16,000 machines to build a simulated brain that could correctly identify cats in YouTube videos, it signaled a turning point in the art of artificial intelligence." *Wired*

"We've developed a machine-learning system that can automatically produce captions to accurately describe images the first time it sees them." *Google Research*

"Deep learning will eventually allow robots to recognize objects they haven't seen before and navigate to new locations on their own." *HBR*

"Artificial intelligence is at the core of almost all of Google's current and and future technologies." *Wired*

Wikipedia: Google Brain

MIT Technology Review

Baidu is betting big on Artificial Intelligence and recently hired Andrew Ng to build a Silicon Valley Lab for Artificial Intelligence

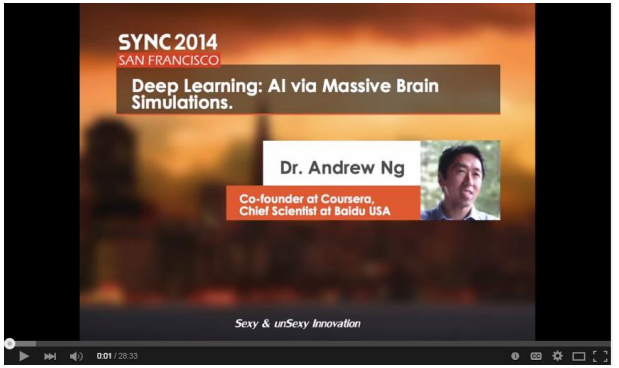
"The mission is to develop hard AI technology that will benefit hundreds of millions of people." *Andrew Ng*

"I hope that this will allow us to make incremental improvements to some of the current deep learning applications within Baidu, to support those teams– search, advertising, language translations, optical character recognition, speech recognition." *Andrew Ng*

"Whoever wins artificial intelligence will win the Internet in China and around the world. Baidu has the best shot to make it work." *Andrew Ng*

MIT Technology Review

Video: Deep Learning with Andrew Ng:

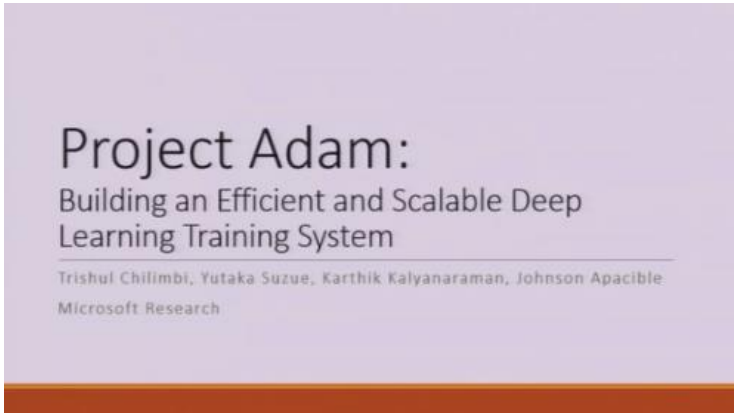


Microsoft is focused on deep learning systems with one example being their project called Adam

"Project Adam is a new deep-learning system modeled after the human brain that has greater image classification accuracy and is 50 times faster than other systems in the industry." *Microsoft*

"Our results provide compelling evidence that a distributed systems-driven approach to deep learning using current training algorithms is worth pursuing." *Microsoft Research*

"I would define artificial intelligence as software that's trying to emulate the human mind. That's often specific to a domain, like computers that can see—that's computer vision—or computers than can listen, which is speech recognition, or computers that can read text, which would be natural language processing or text mining. So that's AI: emulating the human mind." *John Platt, Microsoft*



Microsoft

John Platt on AI, Cortana, and Project Adam

In 2015 expect new versions of personal intelligent agents that incorporate cognitive computing capabilities

"Companies are building virtual personal assistants that will watch users' actions — what they read, what they ignore, whom they listen to, what they say, which meetings they go to and which they skip, and so forth — to learn what they might do to make those users more productive." *Gartner*

"Consumers experiencing services such as Google Now and Apple's Siri, as well as enterprise products such as IBM's Watson, will clamor for such capabilities in their organizations, expecting new models for information-gathering from their IT and business developers that expand on the classic box-and-button search models." *Gartner*

Wired

"The vision is very significant. If this team is successful, we are looking at the future of intelligent agents and a multibillion-dollar industry." *Oren Etzioni*

"Viv founders say you'll access its artificial intelligence as a utility, the way you draw on electricity. Simply by speaking, you will connect to what they are calling "a global brain." And that brain can help power a million different apps and devices." *Wired*

Apple's Siri, launched in 2011, is expected to get smarter

"An exhaustive new patent filing… details a very similar desktop version of the virtual assistant that can perform dictation, high-level system commands and even act as a "third hand" for Mac users." *Apple Insider*

"Just imagine what Siri could do if it applied Watson's logic to your inbox, calendar, and everything you've got in the cloud." *VentureBeat*

"Those in the tight-knit community of artificial intelligence researchers believe… that Apple has formed its own speech recognition team and that a neural-net-boosted Siri is on the way." *Wired*

"Siri is the intelligent personal assistant that helps you get things done just by asking. It allows you to use your voice to send messages, schedule meetings, place phone calls, and more. Siri understands your natural speech, and it asks you questions if it needs more information to complete a task." *Apple*

Website: Apple Siri
Wikipedia: Siri

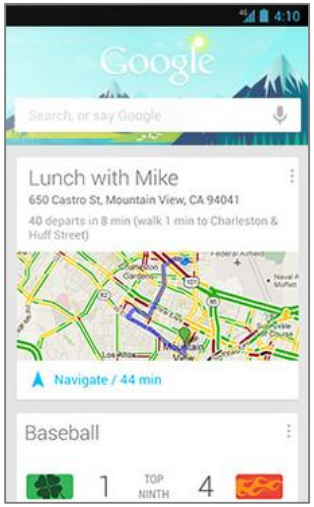
NY Times

Google continues to improve Google Now capabilities and integrate it across it's endless line of services

Website: Google Now
Wikipedia: Google Now

"Google Now differs from Siri in one key way: It provides personalized information served up via 'cards': weather, traffic, flights, appointments, ordered packages, etc. And the information contained on these cards is gleaned from various sources including the user's Gmail account, location and previous search history." *Forbes*

CNET



"Building the next generation of Google Now is the goal, not snooping on our temps, room locations and smoke alarms. The Nest Labs team will help fuel development of the next generation of Google Now as it shifts more toward proactive assistance and advice." *Forrester*


Forbes

ENTREPRENEURS 10/06/2014 @ 11:30AM | 21,028 views

Is 'Google Now' The Future Of Mobile Search?

Forbes

Microsoft's Cortana, launched in 2014, is designed to get smarter as more people use it

"The base technologies for a virtual personal assistant include speech recognition, semantic/natural language processing, dialogue modeling between human and machines, and spoken-language generation." Larry Heck, Distinguished Engineer, Microsoft Research

"The goal is to support all types of human interaction—whether it's speech, text, or gestures—across domains of information and function and make it as easy as a natural conversation." *Larry Heck, Distinguished Engineer, Microsoft Research*

Microsoft Research

"Our UI will be deeply personalized, based on the advanced, almost magical, intelligence in our cloud that learns more and more over time about people and the world. Our shell will natively support all of our essential services, and will be great at responding seamlessly to what people ask for, and even anticipating what they need before they ask for it." *Steve Ballmer, Microsoft CEO*

MIT Technology Review

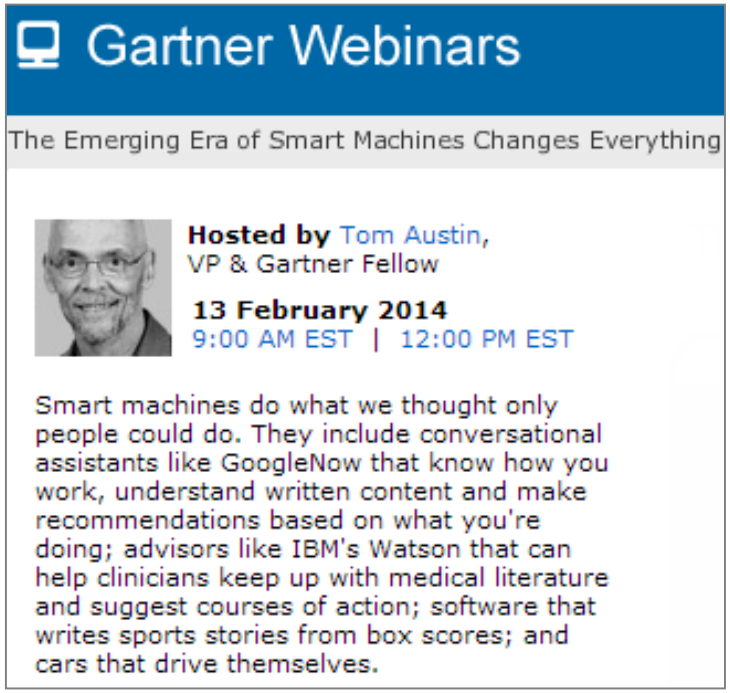
Table of Contents

Some related definitions found on Wikipedia

- "A **cognitive computer** combines artificial intelligence and machine-learning algorithms, in an approach which attempts to reproduce the behavior of the human brain." *Wikipedia*
- "**Artificial intelligence** (AI) is the intelligence exhibited by machines or software. It is an academic field of study which studies the goal of creating intelligence." *Wikipedia*
- "**Machine learning** is a scientific discipline that explores the construction and study of algorithms that can learn from data." *Wikipedia*
- "In artificial intelligence, an **intelligent agent** (IA) is an autonomous entity which observes through sensors and acts upon an environment using actuators (i.e. it is an agent) and directs its activity towards achieving goals (i.e. it is rational)." *Wikipedia*
- "**Human–computer interaction** (HCI) involves the study, planning, and design of the interaction between people (users) and computers." *Wikipedia*
- "**Natural language processing** (NLP) is a field of computer science, artificial intelligence, and linguistics concerned with the interactions between computers and human (natural) languages." Wikipedia
- "**Deep learning** is a set of algorithms in machine learning that attempt to model high-level abstractions in data by using model architectures composed of multiple non-linear transformations." *Wikipedia*

Cognitive Computing – Selected Analyst Websites and Resources

- Forrester: Artificial Intelligence (blogs)
- Frost & Sullivan: Artificial Intelligence (search)
  - Artificial Intelligence -- Emerging Trends and Applications (Technical Insights)
- Gartner: Smart Machines (search) and Machine Learning
- IDC: Intelligent Systems (search) and Machine Learning
- Nucleus Research: IBM Announces Watson Analytics
- Ovum: Cognitive Computing (search) and Artificial Intelligence



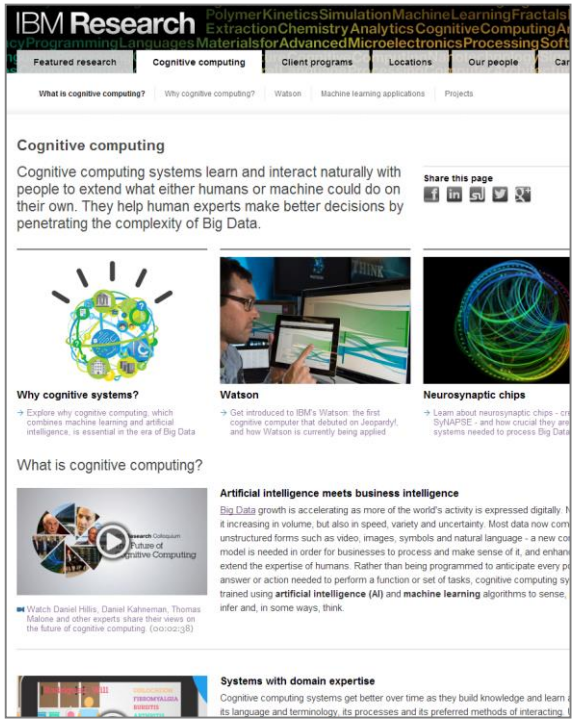
Gartner

"IDC expects to see important new developments in cognitive/machine learning and Internet of Things (IoT) analytics." *IDC*

"Machine learning, already one of the most versatile technologies of the past decade, will gain even more traction in a digital business." *Gartner*

Cognitive Computing – Selected IT Vendor and Consultant Websites and Resources

- Accenture: Analytics and Turning Cognitive Computing into Business Value
- Amazon: Mechanical Turk
- Apple Siri
- Deloitte: Demystifying Artificial Intelligence and Deloitte University Press (search)
- Google: Google Now / Artificial Intelligence and Machine Learning / Launching the Quantum Artificial Intelligence Lab / Natural Language Processing / Human-Computer Interaction and Visualization
- IBM Research: Cognitive Computing
- IBM Watson
- Infosys: Research Machine Learning
- Microsoft: Machine Learning / Intelligent Systems / Top Authors in Artificial Intelligence / Machine Learning Blog
- Oracle: Advanced Analytics
- SAS: Machine Learning



IBM

"Cognitive computing is a disruptive technology with a profound potential impact on businesses and the nature of work." *Accenture*

Cognitive Computing: Selected Media Websites, Resources & Articles

- Businessweek Artificial Intelligence (search) / IBM Watson (search)
- CIO.com Artificial Intelligence (search) / IBM Watson (search)
- ComputerWorld Artificial Intelligence (search) / IBM Watson (search)
- DataVersity Cognitive Computing
- eWeek Cognitive Computing (search) / Artificial Intelligence (search)
- Forbes Cognitive Computing (search) / Artificial Intelligence (search)
- GIGAOM Cognitive Computing (search) / Artificial Intelligence (search
- HBR.org Cognitive Computing (search) / Artificial Intelligence (search)
- InformationWeek Cognitive Computing (search) / Artificial Intelligence (search)
- InfoWorld Cognitive Computing (search) / Artificial Intelligence (search):
- The Atlantic The Dawn of the Age of Artificial Intelligence
- Wired Artificial Intelligence (search) / IBM Watson (search)

GIGAOM

Bloomberg BusinessWeek

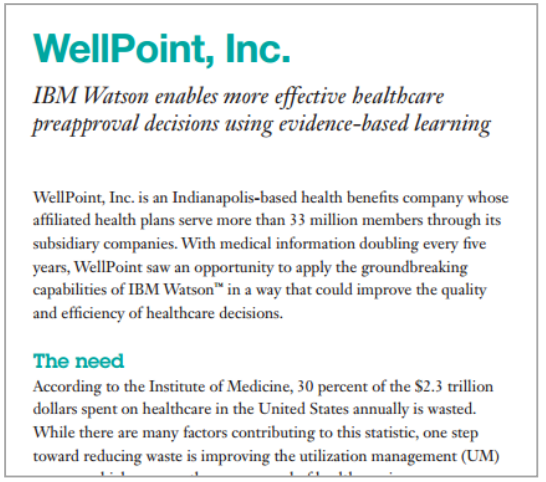
Fast Company

Selected IBM Websites, resources and links

ibm.com links

- IBM Watson
  - News
  - What is Watson?
  - Watson Analytics / Watson Analytics Story Book
  - DeveloperCloud
  - Explorer
  - Discovery Advisor
  - Ecosystem
  - Academic
  - Engagement Advisor
  - Implement Watson
  - Watson in Healthcare
- IBM Research: Cognitive Computing / DeepQA / 5in5 videos – Machine Learning Applications

IBM Watson Analytics



WellPoint, Inc.

IBM Watson enables more effective healthcare preapproval decisions using evidence-based learning

WellPoint, Inc. is an Indianapolis-based health benefits company whose affiliated health plans serve more than 33 million members through its subsidiary companies. With medical information doubling every five years, WellPoint saw an opportunity to apply the groundbreaking capabilities of IBM Watson™ in a way that could improve the quality and efficiency of healthcare decisions.

The need

According to the Institute of Medicine, 30 percent of the $2.3 trillion dollars spent on healthcare in the United States annually is wasted. While there are many factors contributing to this statistic, one step toward reducing waste is improving the utilization management (UM)

IBM

Selected IBM Social Media Websites, resources and links

- Twitter: @ibmwatson (52.7k followers) Hashtags #ibmwatson #WatsonAnalytics
- Linkedin: Watson Advocates
- Facebook: IBM Watson (56k likes)
- YouTube: IBMWatsonSolutions
  - Watson in Healthcare
  - Watson Ecosystem Partners
  - What is the Watson Ecosystem?
  - What Does Watson Do?
  - Memorial Sloan Kettering
- Tumblr: ibmblr
- Pinterest: Watson
- Slideshare.net search for IBM Watson
- Blogs
  - Building a Smarter Planet
  - Dharmendra S Modha's Cognitive Computing Blog

Twitter: @ibmwatson

Selected videos found on the Internet published in 2014

- IBM Big Data & Analytics Go Inside IBM Watson Analytics, 1 hour, Dec 2014
- Accenture Cognitive Computing, 2 min, Dec 2014
- IBM Research Brain-inspired Computing: A Decade-Long Journey, 20 min, Dec 2014
- IBM Research Jeff Hawkins - What The Brain Can Tell Us, 54 min, Dec 2014
- IBM Japan THINK Forum Japan 2014: The Future of Computing: Dr. John E. Kelly III, 20 min, Dec 2014
- The Royal Society Statistical and causal approaches to machine learning, 60 min., Dec 2014
- Imaginarium Noam Chomsky lecture on artificial intelligence at Harvard, 60 min, Dec 2014
- NJNewsFeed Chris Welty - Cognitive Computing, 35 min, Nov 2014
- IBM Watson Analytics Introducing Watson Analytics at Insight 2014, 12 min, Nov 2014
- IBM Watson IBM Watson: How it Works, 8 min, Oct 2014
- IBM Watson IBM Watson – Grand Opening of World HDQ, 2 hours – begins at 6:43, Oct 2014
- Council on Foreign Relations The Future of Artificial Intelligence, 60 min, Oct 2014
- ILA Group The Quest for Artificial Intelligence AI The World's Smartest Machine, 48 min, Oct 2014
- Talks at Google Nick Bostrom: Superintelligence - Authors@Google, 72 min, Sept 2014
- Exponential Finance Will IBM's Watson and Other AI's Overtake Wall Street?, 19 min, Aug 2014
- Big Think IBM's Jon Iwata on the Intelligence of Watson, 7 min, Aug 2014
- Gaurav Tivei Quoc Le's Lectures on Deep Learning, Various times, July 2014

Selected videos from 2014 (continued)

- Piero Scaruffi Peter Norvig, Director of Research at Google, on Artificial Intelligence, 25 min, July 2014
- Software Engineering Institute Cognitive Computing: New Ways of Developing Software for a New Era of Computing (SATURN Keynote) , 40 min, July 2014
- George Gregory Understanding Natural Language Understanding - ACM SIGAI Bay Area Chapter, 95 min, July 2014
- TiE Silicon Valley TiEcon 2014 Grand Keynote: Catching Fire: Tapping into the new cognitive computing market, 30 min, July 2014
- CustomerMatrix Defining Cognitive Computing, 33 min, Jun 2014
- IBM Research The New Era of Cognitive Computing, 66 min, May 2014
- IBM Big Data & Analytics Watson Cognitive Computing Deep Dive, 106 min, May 2014
- PyCon 2014 Melanie Warrick: How to Get Started with Machine Learning - PyCon 2014, 25 min, April 2014
- Google Tech Talks Seth Lloyd: Quantum Machine Learning, 69 min, Mar 2014
- PSW Science Era of Cognitive Computing, 75 min, Feb 2014
- Deloitte US Tech Trends 2014: Cognitive analytics, 2 min., Jan 2014
- IBM Research The Future of Cognitive Computing, 3 min, Jan 2014
- IBM IBM Watson Inspires Millennials to Seek Cognitive Computing Career, 2min, Jan 2014
- Citrisuc Cognitive Computing for Utilities, 50 min, Jan 2014
- IBMSocialMedia Innovation in Cognitive Computing – Grady Booch, 3 min, Jan 2014

Selected videos from 2013

- CCCen Joscha Bach - How to Build a Mind - Artificial Intelligence Reloaded, 56 min, Dec 2013
- Martin Wasserman Future Talk #32, Artificial Intelligence with Peter Norvig, 28 min, by Nov 2013
- IBM Research AoT Big Brains Event: New Ways of Thinking With Cognitive Computing, 10 min., Nov 2013
- Big Think Elementary, Watson: The Rise of the Anthropomorphic Machine, 4 min, Nov 2013
- Google Google and NASA's Quantum Artificial Intelligence Lab, 7 min, Oct 2013
- Calit2ube Artificial Intelligence vs. Intelligence Amplification – Dr. Yoav Freund, 33 min, Oct 2013
- IBM Enterprise Conference Manoj Saxena: The future of IBM Watson, 25 min, Oct 2013
- IBMSoftware IBM InterConnect 2013: Ginni Rometty - A New Era of Smart, 23 min, Oct 2013
- IBMSocialMedia Zachary Lemnios on Cognitive Computing, 2 min, Sept 2013
- IBM Research IBM Research's John Kelly: The Three Eras of Computing, 4 min, Sept 2013
- IBM Research A new software ecosystem for cognitive systems, 3 min, Aug 2013
- GIGAOM Dharmendra Modha – Cognitive Computing, 33 min, Aug 2013
- IBM TED: Cognitive Computing (Eric Brown), 2 min, Aug 2013
- Churchill Club The Future of Human-Computer Interaction: How Will We Connect?, 85 min, Aug 2013
- Churchill Club Machine Learning: Hottest Tech Trend in the Next 3-5 Years?, 60 min, Aug 2013

Selected Videos from 2013 (continued)

- PBSoftbook The Rise of Artificial Intelligence, 9 min, Jul 2013
- EnthoughtMedia A Gentle Introduction To Machine Learning, 18 min, Jul 2013
- Fourth-Floor South Manoj Saxena - Cognitive Computing The Next Big Thing, 8 min, Jul 2013
- Big Think Hector Ruiz: The Evolution of Cognitive Computing, 5 min, Jul 2013
- Adam Ford Michael Anissimov - Artificial Intelligence - Progress Towards Safe AI, 60 min, Jun 2013
- TEDxTalks The Age of Artificial Intelligence: George John, 20 min, May 2013
- CalCogSci California Cognitive Science Conference 2013: David Ferrucci, 64 min, May 2013
- StandfordBusiness The Future of Healthcare: Artificial Intelligence & Clinical Support Systems (panel), 60 min, Apr2013
- NC State Mark Woodwell - Building a Business on Artificial Intelligence, 42 min, Mar 2013
- TEDxTalks How To Create A Mind: Ray Kurzweil (22min), Mar 2013
- GoogleTechTalks Jeff Hawkins: Building Brains to Understand the World's Data, 62 min, Mar 2013
- TEDxTalks Making Friends With Artificial Intelligence: Eric Horvitz, 24 min, Feb 2013
- University of California Television Intelligence and Machines: Creating Intelligent Machines(Modeling the Brain, 88 min, Dec 2012
- ComputerHistory, The Challenge and Promise of Artificial Intelligence, 53 min, Jul 2012
- Google Tech Talks, Alan M. Turing Centennial Conference – Israel (playlist), April 2012

Selected IBM press releases - 2014

- U.S. Department of Veterans Affairs Taps IBM Watson to Help Accelerate and Enhance Care Delivery, Dec 2014
- IBM Watson Group Invests in Pathway Genomics to Help Personalize Consumer Health, Nov 2014
- IBM Unveils New Start Ups and Ecosystem Partners Delivering Watson-Powered Apps in the Cloud, Oct 2014
- IBM and Cleveland Clinic Use Watson to Advance Genomic Research for Cancer Care Pilot, Oct 2014
- IBM Watson Accelerates Global Expansion, Oct 2014
- Digital Travel Pioneer Terry Jones Launches WayBlazer, Powered IBM Watson, Oct 2014
- IBM Introduces Powerful Analytics for Everyone, Sept 2014
- Mayo Clinic and IBM Task Watson to Improve Clinical Trial Research, Sept 2014
- IBM Watson Ushers in a New Era of Data-Driven Discoveries, Aug 2014
- IBM Watson and Bon Appétit Team on New App That Transforms How We Cook, Jun 2014
- IBM Announces Watson Mobile Developer Challenge Winners, Jun 2014
- Seven Leading Technology Institutions Unveil Cognitive Computing Courses Leveraging IBM Watson, May 2014
- IBM Watson Group Invests in Fluid to Transform the Consumer Shopping Experience, Apr 2014
- IBM Reveals New Companies Developing Watson-Powered Apps, May 2014
- DBS Bank Engages IBM's Watson to Achieve Next Generation Client Experience, Jan 2014

Selected IBM publications and press releases from 2013

- IBM Watson Ecosystem Program, Nov 2013
- IBM Watson Group: Technology to Transform Business and Society, Jan 2014
- IBM Forms New Watson Group to Meet Growing Demand for Cognitive Innovations, Jan 2014
- IBM Watson Group Unveils Cloud-Delivered Watson Services to Transform Industrial R&D, Visualize Big Data Insights and Fuel Analytics Exploration, Jan 2014
- An Ecosystem of Innovation: Creating Cognitive Applications Powered Watson, Nov 2013
- IBM Watson's Next Venture: Fueling New Era of Cognitive Apps Built in the Cloud Developers, Nov 2013
- Smarter Analytics: Taking the Journey to IBM Cognitive Systems, Oct 2013
- A DevOps approach speeds IBM Watson solutions to market, Oct 2013
- How Watson helps answer big questions with Big Data, June 2013
- The Era of Cognitive Systems: An Inside Look at IBM Watson and How it Works, Dec 2012
- Watson's Next Conquest: Business Analytics, 2012

Selected articles, reports, and blog posts retrieved from the Internet

- Information Age: The intelligent enterprise: how businesses will use cognitive computing in 2015 Jan 2015
- Deloitte Demystifying artificial intelligence, **Nov 2014**
- Jeff Dean, Google Large Scale Deep Learning, Nov. 2014
- WSJ Smart Machines and the Decisions They Support, Dec 2014
- Microsoft Project Adam: Building an Efficient and Scalable Deep Learning Training System, Oct 2014
- University of Gothenburg Artificial intelligence that imitates children's learning, Sept 2014
- HBR How Watson Changed IBM, Aug 2014
- Blue Hill Resaearch How Cognitive Computing Will Rethink Analytics, Aug 2014
- Forrester Cognitive Computing Forum: 7 Things You Need To Know, Aug 2014
- Wired Artificial Intelligence Systems Will Prove Useful Long Before They Become Self-Aware, Aug 2014
- Cognitive Computing Forum, Speakers and Agenda, Aug 2014
- Wired Microsoft Challenges Google's Artificial Brain With 'Project Adam', July 2014
- Dataversity Understanding the New World of Cognitive Computing, July 2014
- Forrester Can You Afford To Ignore The Artificial Intelligence Wave?, June 2014
- IBM Cloud Cognitive Computing & Big Data Analytics – A New Wave of Smart Mobile Applications, May 2014
- Manjula Ambur, NASA Big Data Analytics and Machine Intelligence Strategy, April 2014
- Nicola Jones, Nature The Learning Machines, Jan 2014
- Manning Publications Real-World Machine Learning. 2014
- Microsoft Research Deep Learning for Natural Language Processing and Related Applications, May 2014

Additional Information on Technology Trends

HorizonWatch by bluemine

Other slide decks in this 2015 Trend Report series have been posted to Slideshare

You are also invited to check out the following IBM websites and resources

- IBM Academy of Technology
- IBM Center for Applied Insights
- IBM Institute for Business Value
- IBM Research and 5 in 5
- IBM's Smarter Planet Blog