

IBM Watson

Welkom in het cognitieve computer tijdperk

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From Jeopardy! in 2011 to today

The world's hardest problems are labeled Grand Challenges

Chess – Deep Blue (1997)

- A finite, mathematically well-defined search space
- Limited number of moves and states
- Grounded in **explicit, unambiguous** mathematical rules



Human Language – Watson (2011)

- Ambiguous, contextual and implicit
- Grounded only in **human cognition**
- Seemingly infinite number of ways to express the same meaning



Watson demonstrated cognitive technology first in 2011 by winning a Q&A gameshow called Jeopardy

Watson proved it can understand the nuances of language and contextual references



MILORAD CAVIC
ALMOST UPSET
THIS MAN'S PERFECT
2008 OLYMPICS,
LOSING TO HIM BY
ONE HUNDREDTH
OF A SECOND

Who is Michael Phelps?

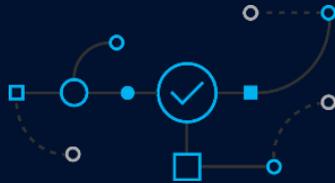
<https://www.youtube.com/watch?v=yJptrICVDHI>

There are three capabilities that differentiate cognitive systems from traditional programmed computing systems.



Understanding

Cognitive systems understand like humans do, whether that's through natural language or the written word; vocal or visual.



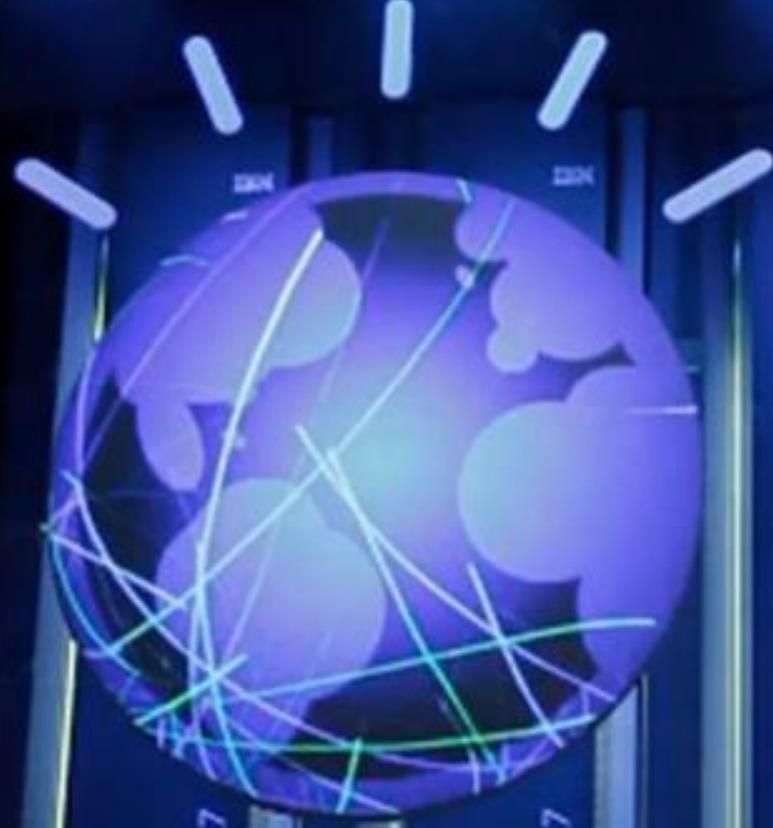
Reasoning

They reason. They can understand information but also the underlying ideas and concepts. This reasoning ability can become more advanced over time. It's the difference between the reasoning strategies we used as children to solve mathematical problems, and then the strategies we developed when we got into advanced math like geometry, algebra and calculus.



Learning

They never stop learning. As a technology, this means the system actually gets more valuable with time. They develop "expertise". Think about what it means to be an expert - it's not about executing a mathematical model. We don't consider our doctors to be experts in their fields because they answer every question correctly. We expect them to be able to reason and be transparent about their reasoning, and expose the rationale for why they came to a conclusion.



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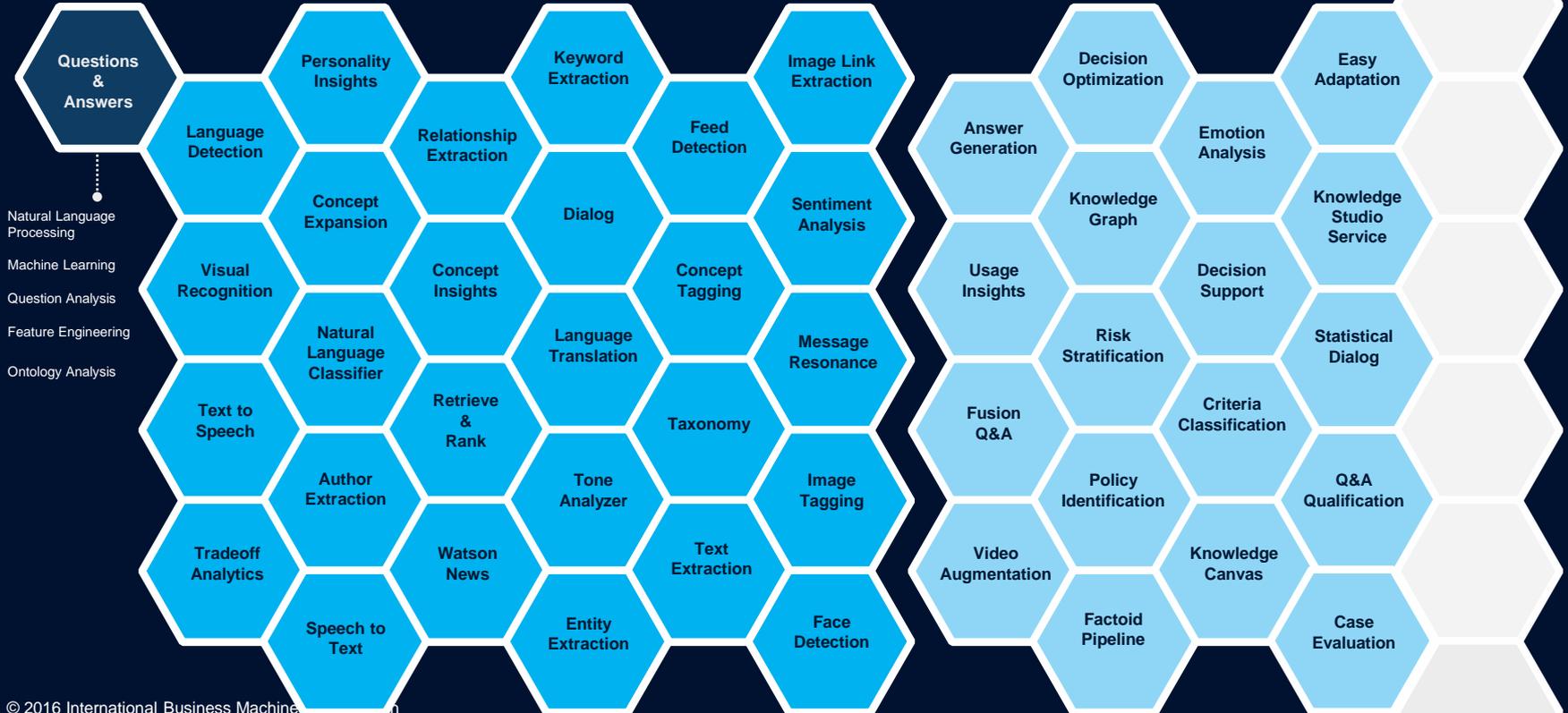
IBM

WATSON

The Watson that competed on *Jeopardy!* in **2011** comprised what is now a single API—**Q&A**—built on **five underlying technologies**.

Since then, Watson has grown to a family of **28 cognitive services (APIs)**

By the end of 2016, there will be nearly **50 Watson APIs**—with more added every year

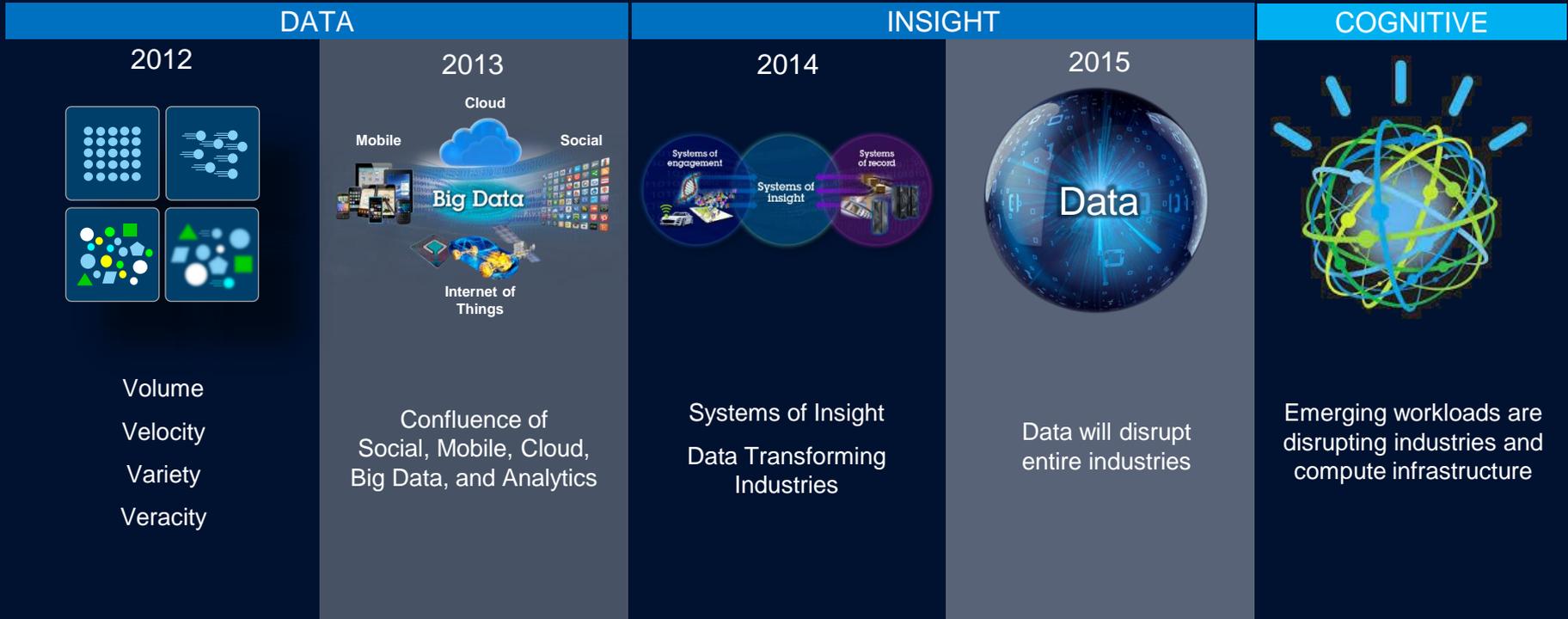


IBM Global Technology Outlook

IBM Research around the world



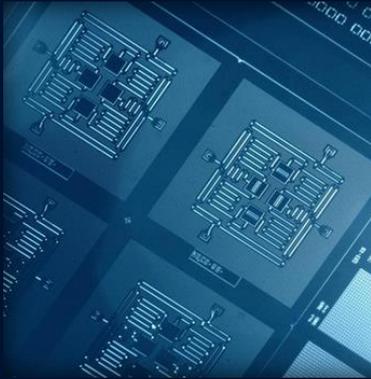
IBM Global Technology Outlook 2012-2016: data, insight, cognitive



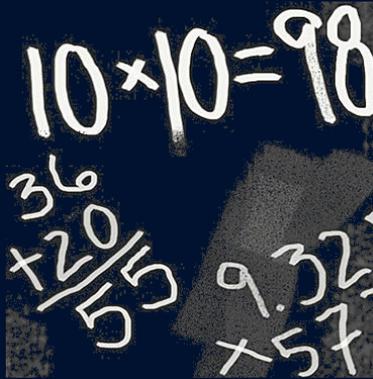
Disrupting compute infrastructure

Traditional computing is challenged

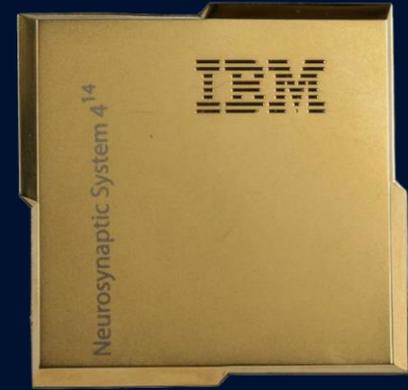
New options offer a way forward



Quantum Computing



Approximate Computing



Neuromorphic Computing

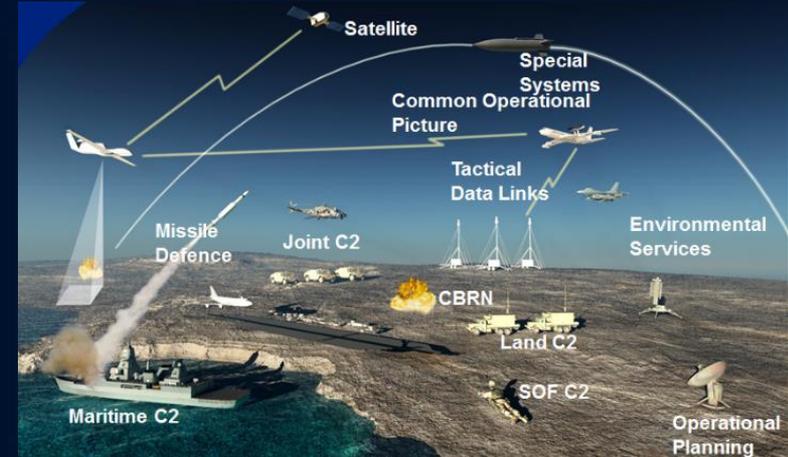
IBM TrueNorth – DARPA project on brain inspired computing

Market forces

- Military sensors are creating lots of data at the edge of the network Need to process data close to the sensor in real time with low power consumption
- Traditional computing is challenged, stream computing better, brain-inspired computing best.

What

- Brain inspired computing mimics how the human brain is constructed, resulting in a massively parallel yet very low power consumption processor chip.
- Breaks path with 70 years old von-Neumann architecture underlying today's computers
- TrueNorth is the first single, self-contained chip to achieve one million individually programmable neurons and 256 million individually programmable synapses.
- These chips are great at spotting patterns in data hence ideally suited to recognizing sensor data in real time.



Sensor data needs to be processed at the edge of the mission network

Disrupting industries

Enhance, scale and accelerate human expertise to empower all people

Teach your system to learn and uncover patterns and insights from **all kinds of information** such as research data, images and notes



Collate decades of knowledge and data to create an evidence-based, **virtual advisor** and elevate entire teams to the level of your best experts

Go beyond analysis to **hypothesis, conclusion and action—in weeks** instead of months or years

Build workflows that can be **coached by humans** to grow ever more effective with each interaction

Enhance, scale and accelerate human expertise to empower all people

Robotics

IBM's Automated Radiologist Can Read Images and Medical Records



WATSON TAKES THE STAND



Cognitive computing is already helping doctors, scientists, economists and investors—and now it's going to law school.



ASK *Jasmine*
your Virtual Assistant
for answers to your individual income tax.

Hilton and IBM Pilot "Connie," The World's First Watson-Enabled Hote...

What will you do with Watson?



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