

**IBM Watson**

# **IBM WATSON**

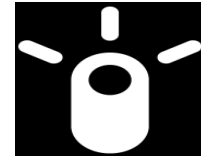
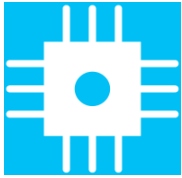
**Presented to:**

**Second Workshop of Mission  
Critical Big Data Analytics –  
MCBDA 2017**

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**On a Smarter Planet, Everyone is connected to everything.**



**Instrumented**

+

**Interconnected**

+

**Intelligent**

*Event capture and filtering for timely response*

*Any to any linkage of people, process, and systems*

*Deep discovery, analysis and forecasting*

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“...AN OCEAN OF DATA...”

IBM Software



# Big Data is creating new possibilities and insights fueled by analytics

## Volume

**12** terabytes  
of Tweets create daily

Analyze product sentiment

## Velocity

**5** million  
trade events per second

Identify potential fraud

## Variety

**100's** video feeds  
from surveillance cameras

Monitor events of interest

**350** billion  
meter readings per annum

Predict power consumption

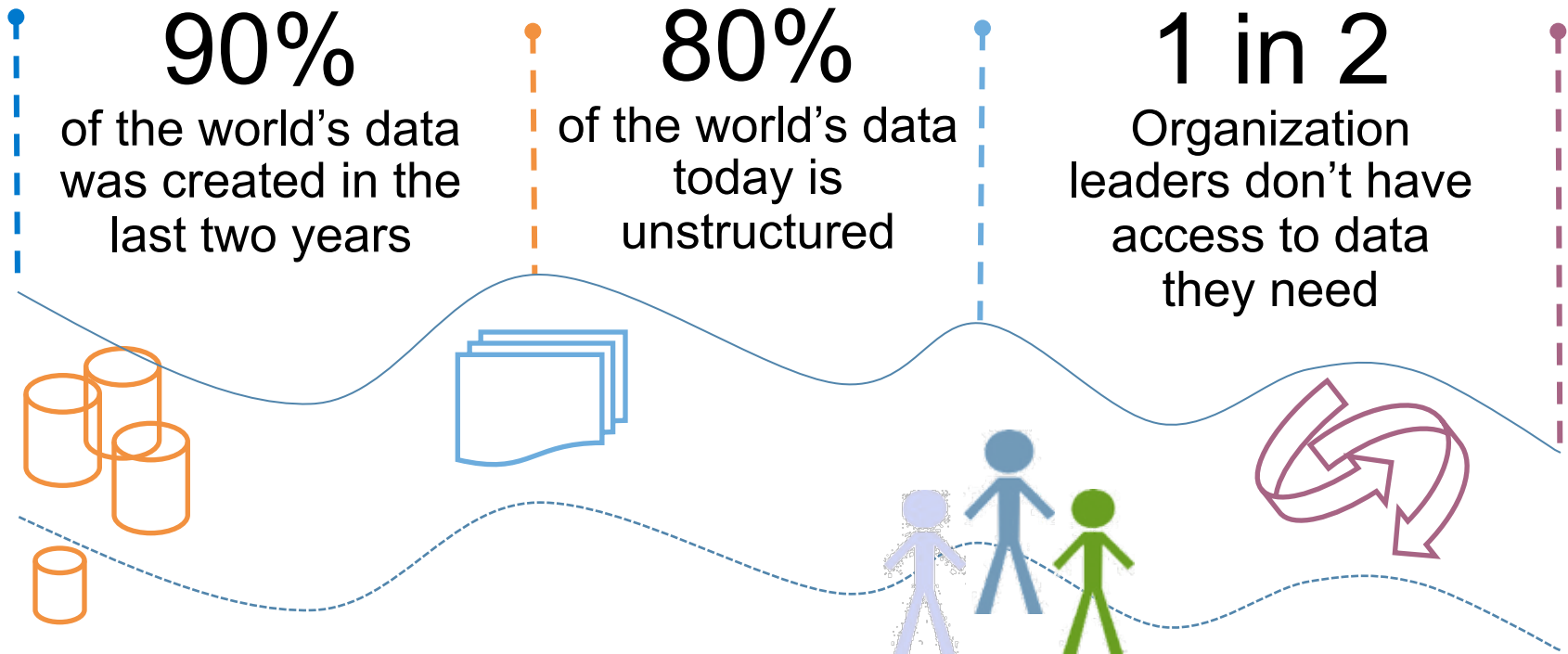
**500** million  
call detail records per day

Prevent customer churn

**80%** data growth  
are images, video, documents...

Improve customer satisfaction

# Organizations are “dying of thirst in an ocean of data”



# Watson is ushering in a new era of computing . . .

Tabulating  
Systems Era



1900

Programmable  
Systems Era



1950

Cognitive  
Systems Era



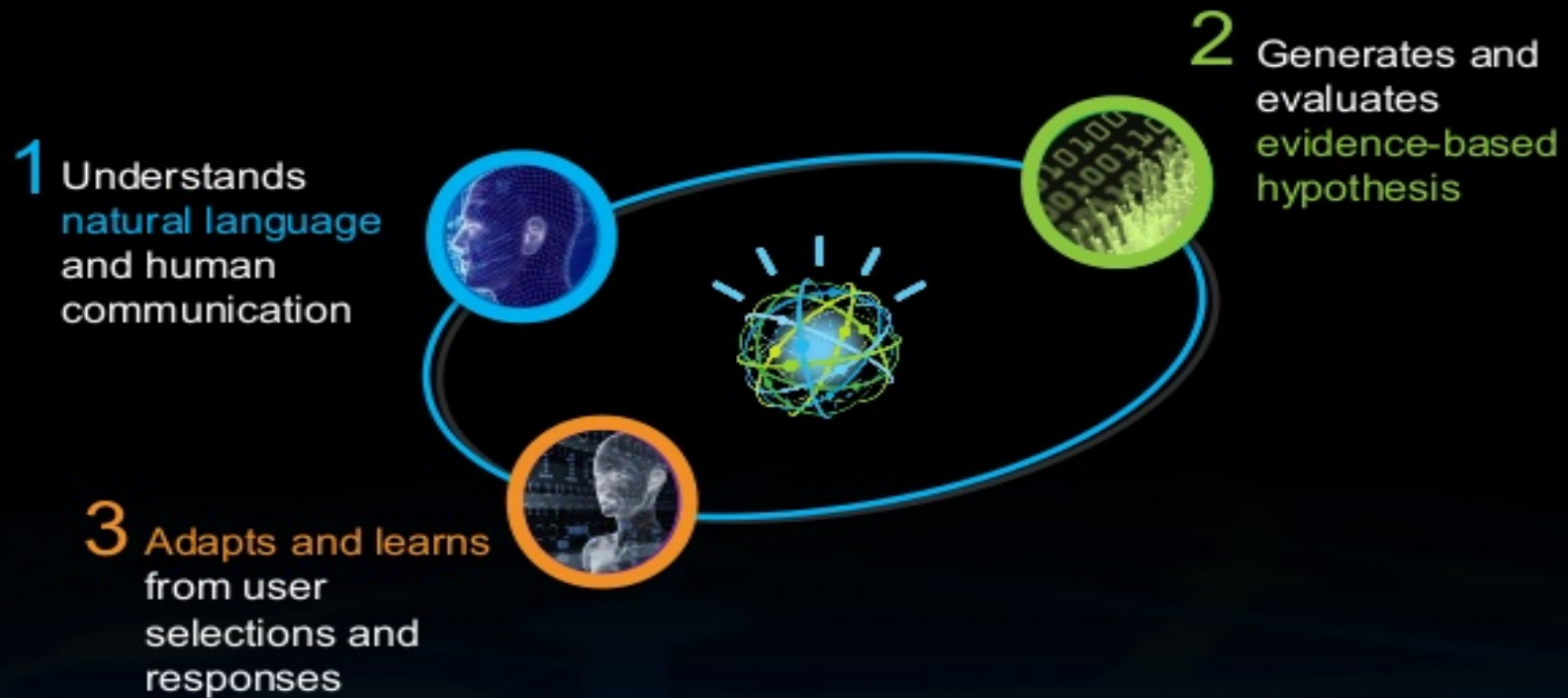
cog·ni·tive: of or pertaining to the mental processes of perception, memory, judgment, learning, and reasoning.

2011

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**“Cognitive Computing” enables a  
new partnership between  
people and computers that enhances  
and scales human expertise**

## IBM Watson combines **transformational technologies**



*...built on a massively parallel architecture optimized for IBM POWER7*

**IBM WATSON**



# “GRAND CHALLENGE”

## 'Automatic Open-Domain Question Answering'

Long-Standing Challenge in Artificial Intelligence to emulate human expertise

- System is Given
  - Rich **Natural Language Questions**
  - Over a **Broad Domain of Knowledge** (science, technology, literature, popular culture)
  
- Must Deliver
  - **Precise Answers:** Determine what is being asked & give precise response
  - **Accurate Confidences:** Determine likelihood answer is correct
  - **Consumable Justifications:** Explain why the answer is right
  - **Fast Response Time:** Precision & Confidence in **<3 seconds**

# Watson answers a grand challenge

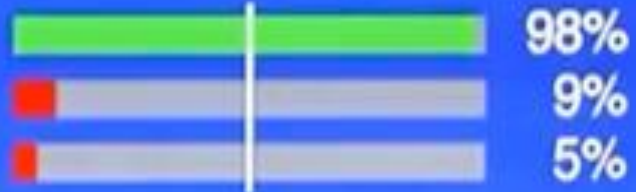
....Can we design a computing system that rivals a human's ability to answer questions posed in natural language, interpreting the meaning and context and retrieving, analyzing and understanding vast amounts of information in real-time?



THIS 2-WORD PHRASE  
MEANS THE POWER TO  
TAKE PRIVATE  
PROPERTY FOR PUBLIC  
USE; IT'S OK AS LONG  
AS THERE IS JUST  
COMPENSATION



Eminent domain  
the electric company  
capitalist economy



- **Spoiler Alert:** Watson won and received the first place prize of \$1 million (which 100% was given to charity)



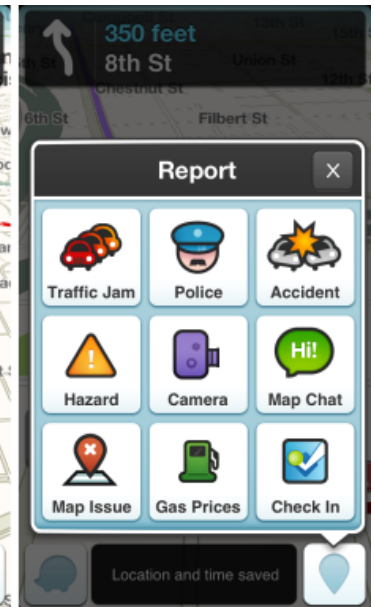
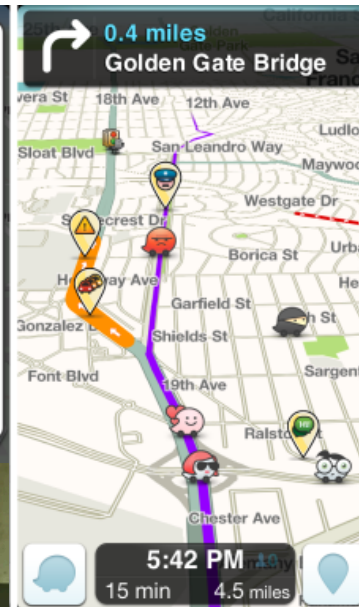
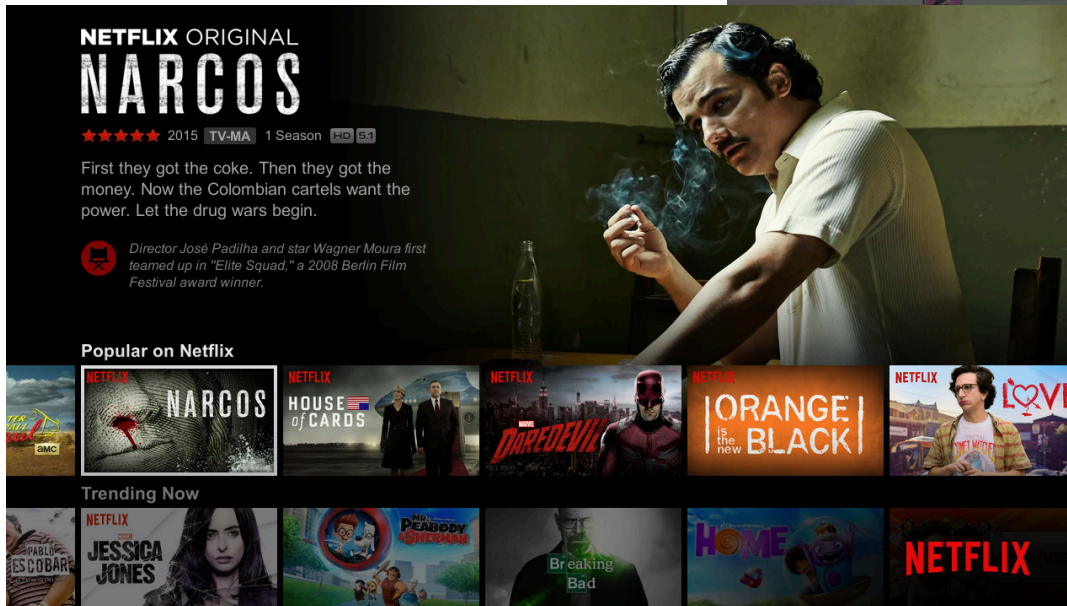
# Cognitive Systems are everywhere – influencing nearly everything we do...



Driverless Delivery for Domino's



Netflix provides personalized movie recommendations



Waze provides a personalized driving experience for its users

# Informed Decision Making: Search vs. Expert Q&A

## 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

## Expert

Understands Question

Produces Possible Answers & Evidence

Analyzes Evidence, Computes Confidence

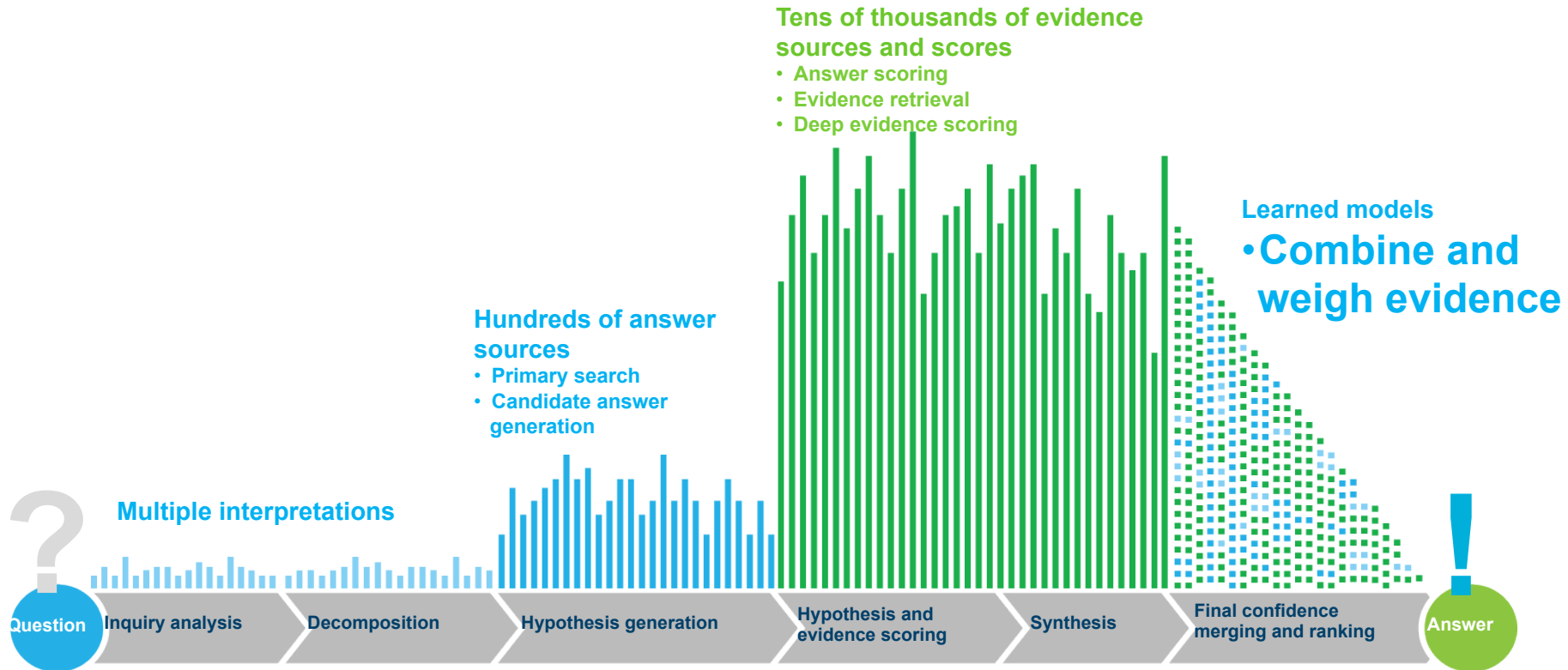
Delivers Response, Evidence & Confidence

## Decision Maker

Asks NL Question

Considers Answer & Evidence

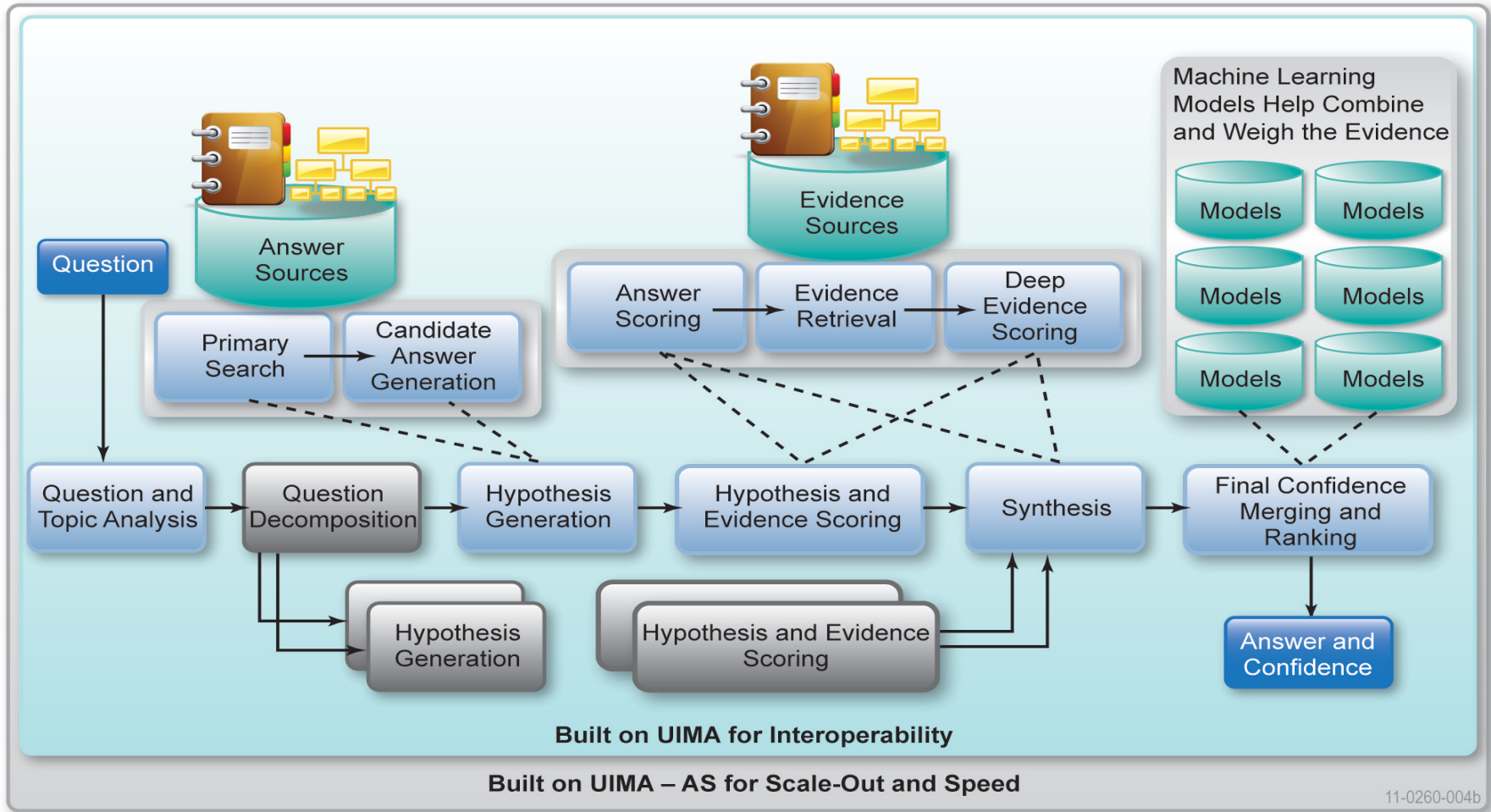
# Watson understands a question and derives evidence-supported response





# Inside Watson

## *Massively Parallel Probabilistic Evidence-Based Architecture*



UIMA = Unstructured Information Management Architecture

# Cognitive systems rely on collections of data and information:



Data, information, and expertise create the foundation.

**Examples include:**

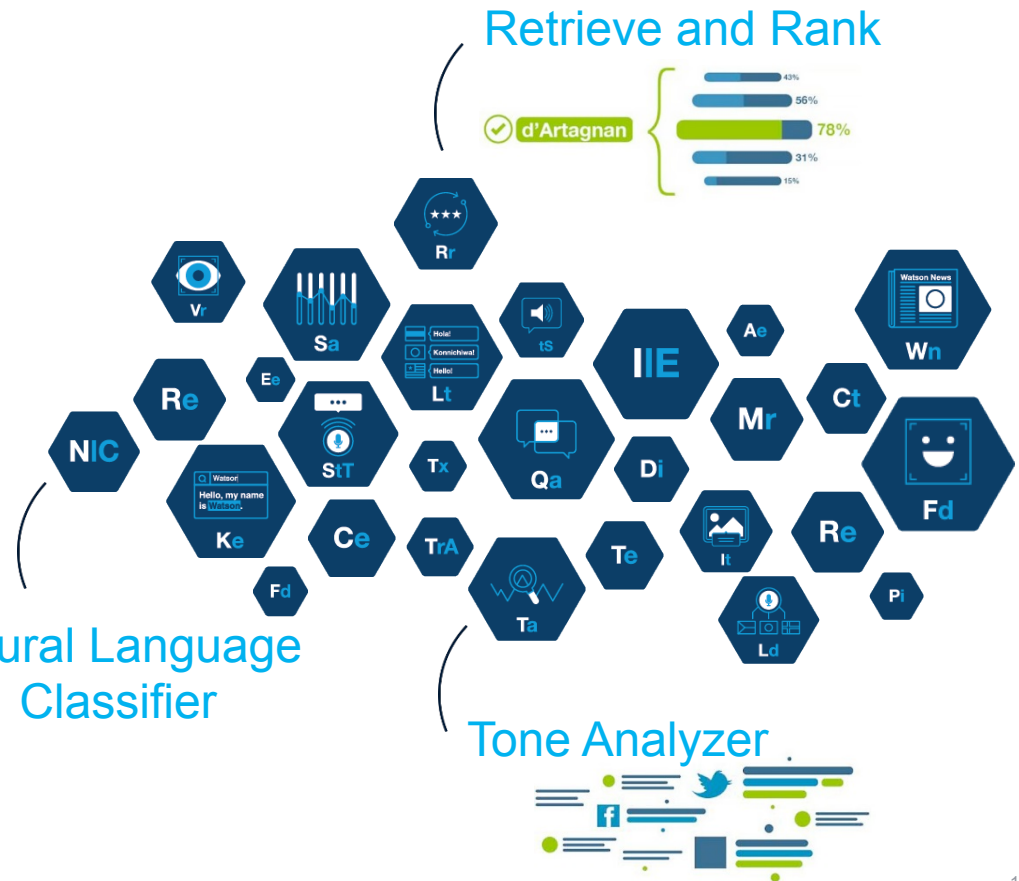
Analyst reports  
tweets  
Wire tap  
transcripts  
Battlefield docs  
E-mails

Texts  
Forensic reports  
Newspapers  
Blogs  
Wiki  
Court rulings  
International  
crime database  
Stolen vehicle  
data  
Missing persons  
data

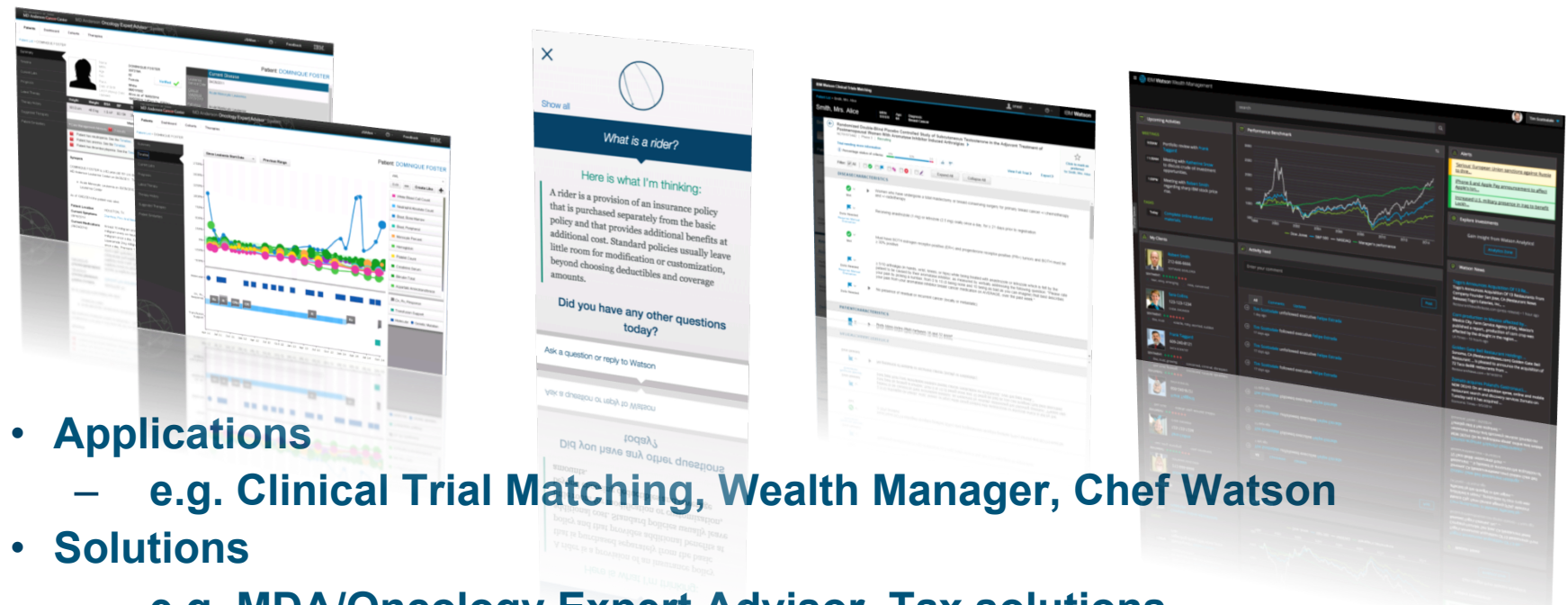
# ...and then leverage Watson APIs to apply cognitive capabilities.

## 50 underlying technologies

- Entity Extraction
- Sentiment Analysis
- Emotion Analysis (Beta)
- Keyword Extraction
- Concept Tagging
- Taxonomy Classification
- Author Extraction
- Language Detection
- Text Extraction
- Microformats Parsing
- Feed Detection
- Linked Data Support
- Concept Expansion
- Concept Insights
- Dialog
- Document Conversion
- Language Translation
- Natural Language Classifier
- Personality insights
- Relationship Extraction
- Retrieve and Rank
- Tone Analyzer
- Emotive Speech to Text
- Text to Speech
- Face Detection
- Image Link Extraction
- Image Tagging
- Text Detection
- Visual Insights
- Visual Recognition



# Applications and Solutions

- 
- **Applications**
    - e.g. **Clinical Trial Matching, Wealth Manager, Chef Watson**
  - **Solutions**
    - e.g. **MDA/Oncology Expert Advisor, Tax solutions**
  - **Industry platform services**
    - e.g. **Healthcare Platform**

## 3<sup>rd</sup> Offset Strategy



“Let me tell you what the big idea really is about.

It's about human-machine collaboration ... allowing a machine to help humans make better decisions.”

– Deputy Defense Secretary  
Bob Work, Nov. 2015

# Watson Oncology Cognitive Assistant: Helping oncologists treat cancer patients



## IBM Watson Oncology

Built with Memorial Sloan Kettering



### Business problem:

Need better individualized cancer treatment plans

### Solution:

- Suggestions to help inform oncologists' decisions based on 600K+ pieces of evidence and 2M pages of text from 42 publications
- Analyzes patient data against thousands of historical cases and trained through 5000+ Memorial Sloan-Kettering MD and analyst hours
- Evolves with the fast-changing field

# Watson at work in the world.

"[Thomson Reuters](#) to deploy IBM Watson technology"  
- InfoTechLead

"IBM's Watson Lands A Job With [KPMG](#)." -InformationWeek

"How Can I Help You? IBM's Watson Powers [Hilton's](#) Robotic Concierge" - Fast Company

"[Woodside](#) to tap into IBM's Watson" - CIO

"[SoftBank's](#) Pepper robot is getting an intelligence boost from IBM's Watson"- The Verge

"IBM's Watson Helped Pick [Kia's](#) Super Bowl 'Influencers'"  
- Wall Street Journal

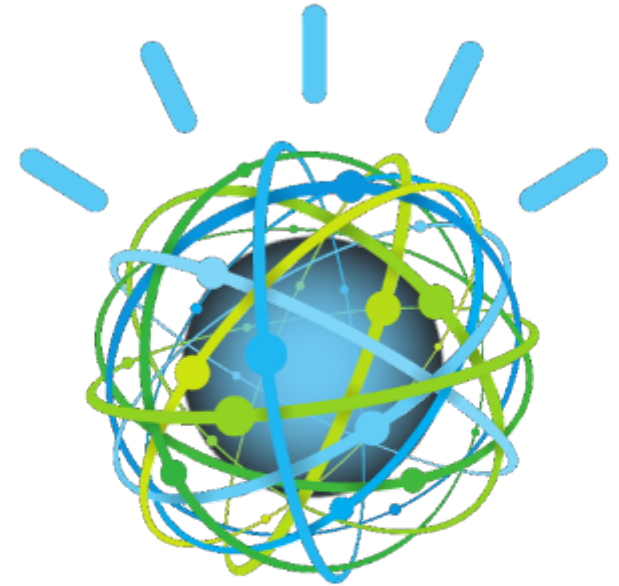
"IBM's Watson Now Powers AI For [Under Armour](#)"  
- TechCrunch

"IBM and [Apple](#) can put Watson's A.I. insights inside Apple Watch"- ComputerWorld

"[The North Face](#) Uses IBM's Watson to Make Online Shopping Smarter" -The Street

"[Medtronic](#), IBM team up on diabetes app to predict possibly dangerous events hours earlier."- The Washington Post

Thank  
YOU







# IBM Academic Initiative

<http://onthehub.com/ibm/>



<https://ibm.biz/BdiirM>

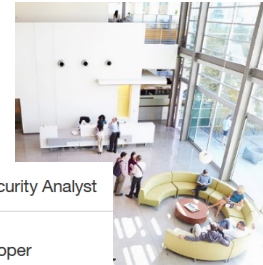
## Program Overview

The IBM Academic Initiative is the main vehicle for providing academic access to IBM resources to faculty and students for teaching and no-commercial research at no-charge. Access to the IBM cloud, software, courseware and remote hardware are examples of some of the industry resources made available.

## Program Overview

The IBM Skills Academy Program is IBM's premier fee-based training and certification initiative for academia. The program provides unique academic roadmaps for faculty members and students, preparing them to succeed in demanding positions unique to the market. The program provides a world class training experience, leveraging IBM official courses, IBM official instructors and hands-on laboratories in multiple languages.

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- Cognitive Computing Analyst
- Data Warehouse Developer
- Marketing Campaign Coordinator
- Mobile Application Administrator
- Mobile Application Developer
- Omni-channel Supply Chain Coordinator
- Predictive Analytics Analyst
- Security Intelligence Analyst
- Application Security Analyst
- Big Data Developer
- Business Intelligence Analyst
- Business Process Analyst
- Business Process Developer
- Cloud Application Developer
- Cloud Enterprise Developer
- Cloud Solution Administrator