



# Extracting Evidence from Unstructured Data:

Potential applications of IBM Watson for  
Risk Assessment

*EFSA Conference, October 16, 2015*



## Cognitive Computing and Analytics hold tremendous potential for many industries and professions



Researchers at the University of Oxford predict that there is a 94 percent probability that cognitive analytics will lead to a **disruption** within the **information-intensive** industries

“For Gartner clients, the risk of investing too late in smart machines is likely greater than the risk of investing too soon.”

Gartner Inc., January 14, 2014

# Risk Assessment is facing important challenges

*How to communicate complex RA in understandable language?*

*The RA process is not necessarily sequential, logical and easy-to-understand.*

## OPENNESS & TRANSPARENCY

*Show me the process*

## INDEPENDENCE

*Show me the evidence*

*Humans per definition do not take "cold" decisions. There is always an element of subjectivity.*

*Any RA decision is per definition based upon a limited amount of info*

*What does "scientific excellence" mean in a world of big data, open data, ... and cognitive?*

## SCIENTIFIC EXCELLENCE

*Show me the logic, the rules and the methods*

## RESPONSIVENESS

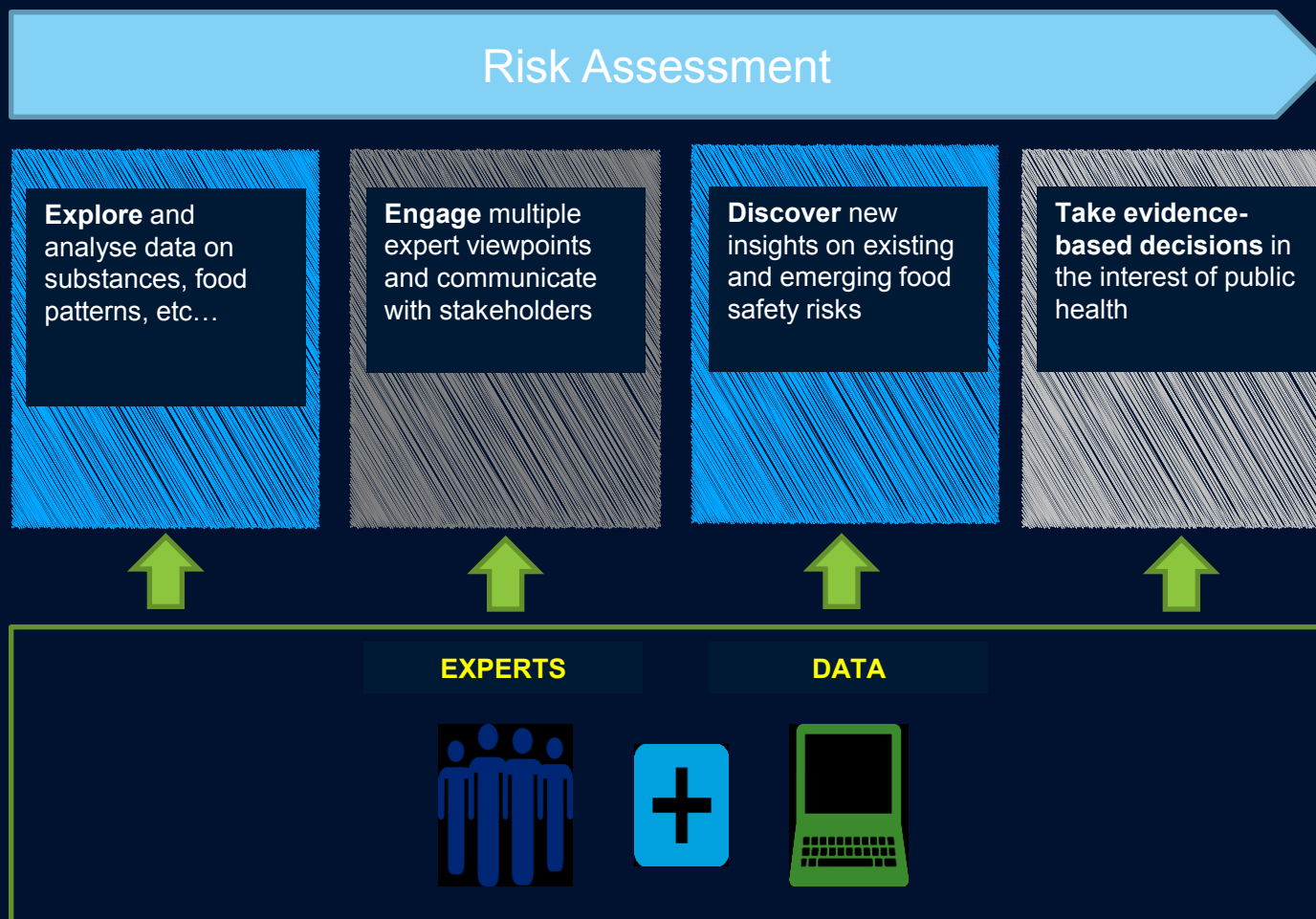
*... and give me speed and proactivity*

*RA is ex post. How to move to ex ante?*

*How to reasonably deal with zillions of data? When is good good enough?*

*How systematic is systematic literature review?*

## Data and expertise are at the heart of the Risk Assessment process





# Welcome to Watson

- Watson scales expertise to expand what's possible.





Watson can read

200 million  
pages  
or a

14 km stack  
of paper

& respond to a  
question in

3 seconds



**And LEARN!**

# IBM Watson combines transformational technologies

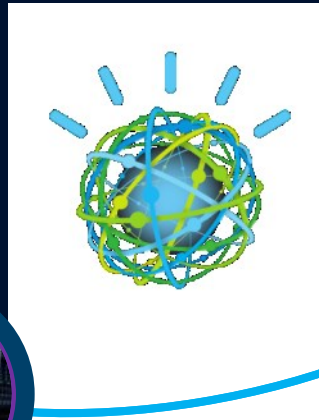
1 Understands  
natural language  
and human  
communication



2 Generates and  
evaluates  
evidence-based  
hypothesis



3 Adapts and learns  
from training,  
interaction, and  
outcomes



Watson understands me.

Watson engages me.

Watson learns and improves over time.

Watson helps me discover.

Watson establishes trust.

Watson has endless capacity for insight.

Watson operates in a timely fashion.

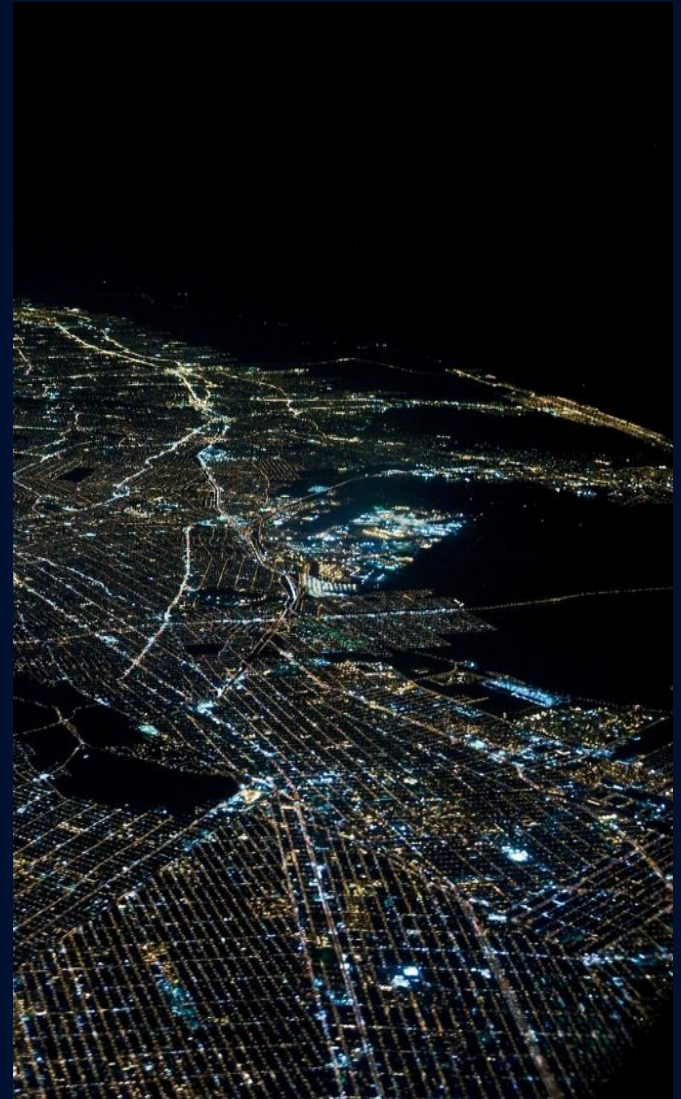


The **volume**, **variety** and **velocity** of data is creating an unprecedented opportunity.

# 2.5B

gigabytes of new data are generated every day

4/5ths of which is unstructured.



# Watson unlocks unstructured data and aids breakthrough insights

Witness reports



Analyst reports



Forensic reports



**Watson  
Corpus**

## Watson Reads

**Witness:** On December 9, 2000, Witness reported affiliate of a drug cartel, **John Doe** was seen at **49 Willows Lane**. He was seen entering the building with a suitcase.

**Analyst Report:** October 10, 2012, A transcript of a wire tap of the cell phone detailed calls to **Joe Bloggs**, **John Smith** and **John Q. Public**

**Forensic report** January 3, 2013, Weapons recovered at a **49 Willows Lane** included a **38 caliber firearm** and **two shot guns**

## Evaluates

Weighs and Scores Evidence

- Quantity
- Proximity
- Relationship
- Domain Truths

## Links



# How might cognitive systems deliver better results

## Search Engine\*

Who discovered black holes?

Looks for terms

In 1915, **Einstein's** theory of general relativity predicted the existence of black holes  
Hubblesite.org

Q&A about the history of scientist theories

*Are black holes real?*  
Skyandtelescope.com

Story about whether black Holes exist

*Black Holes History – Amazing Space*  
amazing-space.stsci.edu

Story about All the steps To discovering black holes

*Black Hole – Wikipedia, the free encyclopedia*  
Wikipedia.org

Encyclopedic Definition of black holes

\*Search on 1/28/2015

## Cognitive System

Who discovered black holes?

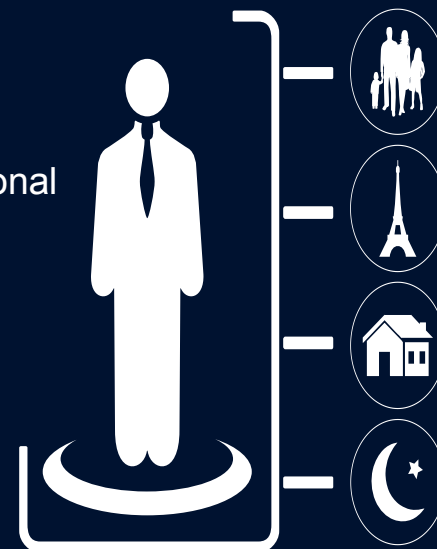
Reads 100,000 newspapers

Reads all of Wikipedia

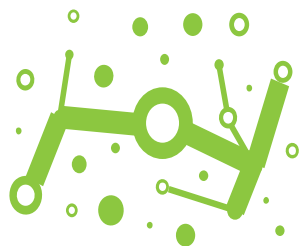
Reads 10,000 pages analyst notes

Reads 1,000 pages of Witness Interviews

Understands “who” as multi-dimensional trait



# IBM can put Watson to work for you



## Explore

Visually depict and  
analyze data for clear  
advice



## Engage

Help organizations build  
stronger relationships  
with constituents



## Discover

Help people create new  
insights by synthesizing  
information



## Decide

Help users make more  
informed evidence-  
based decisions

# Potential Applications for Open Risk Assessment

1. Reading and understanding scientific evidence in a more comprehensive and efficient manner
  - Technology Example: Watson Advisor for Ted Talks, Watson Discovery
2. Guidance / recommendations on safety criteria
  - Technology Example: Watson Oncology Advisor
3. Watching trends in the industry and social reactions
  - Technology Example: Watson News Explorer



5 Videos with possible answers to your question:

SHARE



# what is the impact of poverty on education?

We found some interesting concepts in this playlist you might like to explore:



Recommended by  
IBM Watson™

Video  
concepts

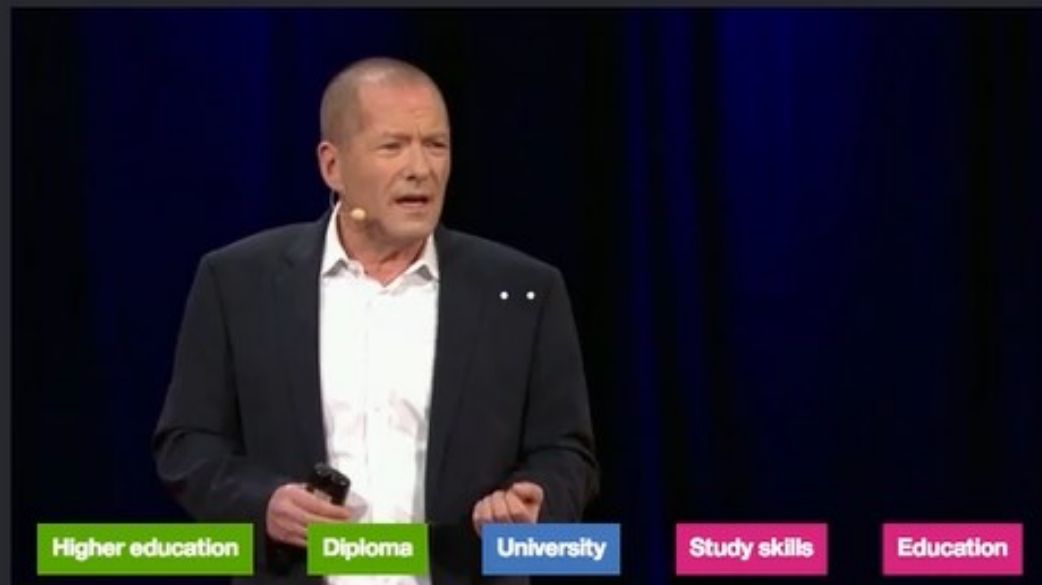
High school

Homework help service

Peer review

AI Gore

Influenza



Higher education

Diploma

University

Study skills

Education

Playing Watson Recommended clips



Pause



Skip



Mute



Video Concepts



Richard Baraniuk

**The birth of the open-source learning revolution**

Peer review

Publishing

Creative Commons



Shail Reeshel

**An ultra-low-cost college degree**

Homework help service

High school

Higher education



Geoffrey Canada

**Our failing schools. Enough is enough!**

High school

Bank

Education



Sugata Mitra

**The child-driven education**

Internet

Emergence

Leonardo da Vinci



Bill Joy

**What I'm worried about, what I'm excited about**

AI Gore

Influenza

Apple Inc.



# Watson App: Discovery Advisor

## Business challenge:

- Researchers can't innovate fast enough to create truly breakthrough therapies
- They struggle to anticipate the safety profile of new treatments and design trials that demonstrate efficacy and safety



## Watson solution:

Making linkages that unlock insights  
Which **accelerate breakthroughs** in

- Disease understanding
- Drug discovery
- Toxicity assessment (early safety)
- Trial design
- Comparative effectiveness
- Pharmacovigilance (drug safety)

### Watson Corpus

Over 1TB of data

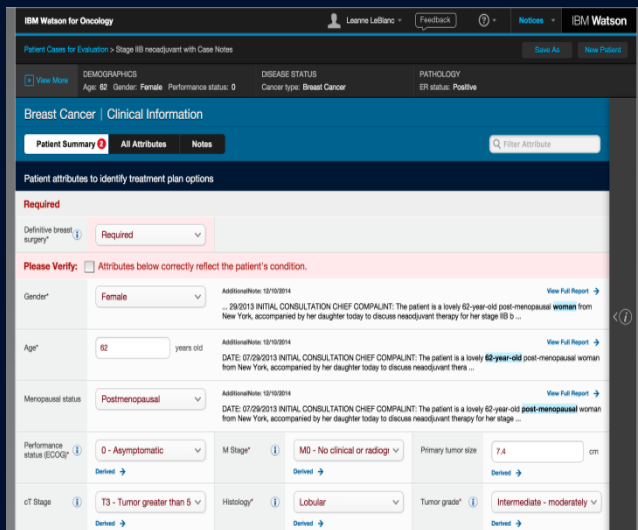
Over 40m  
documents

Over 100m entities  
and relationships

### Available External Data

Chemical database	12M+ chemical structures
Public genomics	20,000+ genes
Medical textbooks	50+ books
Medline	23M+ abstracts
Other journals	100+ journals
FDA drugs/labels	11,000+ drugs
Patents	16M+ patents

# Watson App: Oncology Advisor Trained by Memorial Sloan Kettering



**IBM Watson for Oncology**

Learnie LeBlanc - Feedback - Notices - IBM Watson

Patient Cases for Evaluation > Stage III neoadjuvant with Case Notes

View More DEMOGRAPHICS Age: 62 Gender: Female Performance status: 0 DISEASE STATUS Cancer type: Breast Cancer Cancer stage: III PATHOLOGY ER status: Positive

**Breast Cancer | Clinical Information**

Patient Summary All Attributes Notes

Patient attributes to identify treatment plan options

**Required**

Definitive breast surgery\* Required

**Please Verify:** Attributes below correctly reflect the patient's condition.

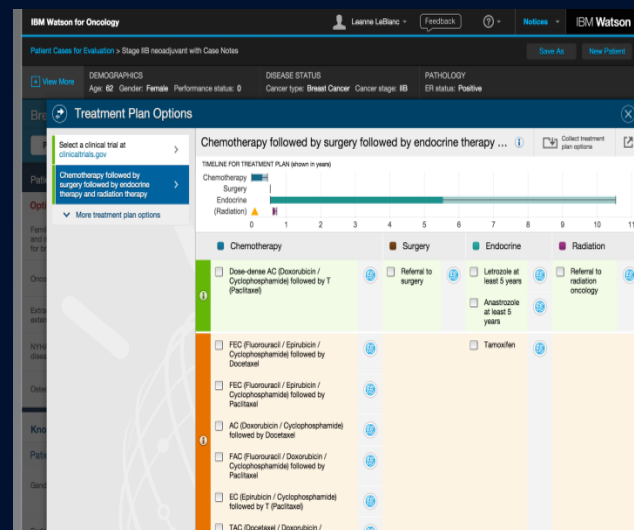
Gender\* Female Additional history: 12/15/2014 View Full Report

Age\* 62 years old DATE: 07/26/2013 INITIAL CONSULTATION CHIEF COMPLAINT: The patient is a lovely 62-year-old post-menopausal woman from New York, accompanied by her daughter today to discuss neoadjuvant therapy for her stage III b ... View Full Report

Menopausal status Postmenopausal Additional history: 12/15/2014 View Full Report

Performance status (ECOG) 0 - Asymptomatic M Stage\* M0 - No clinical or radiog Primary tumor size 7.4 cm

cT Stage T3 - Tumor greater than 5 cm Histology\* Lobular Tumor grade\* Intermediate - moderately



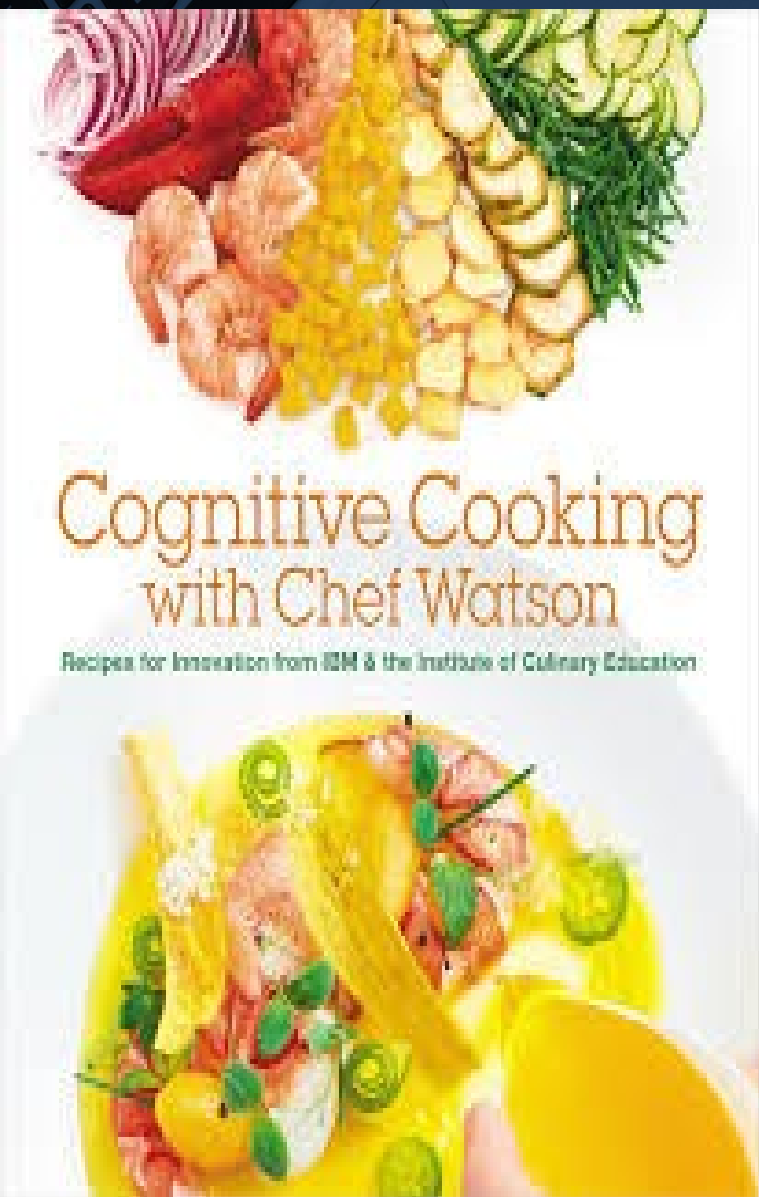
## Business challenge:

- Ability to assess quickly the best treatments for an individual patient based on latest evidence and clinical guidelines

## Watson solution:

- A tool to assist physicians make personalized treatment decisions
  - Analyzes patient data against thousands of historical cases and trained through thousands of Memorial Sloan Kettering MD and analyst hours
  - Suggestions to help inform oncologists' decisions based on over 290 medical journals, over 200 textbooks, and 12M pages of text
  - Evolves with the fast-changing field





# What will you do with Watson?



[facebook.com/ibmwatson](https://facebook.com/ibmwatson)



[ibmwatson.com](http://ibmwatson.com)



[@ibmwatson](https://twitter.com/ibmwatson)