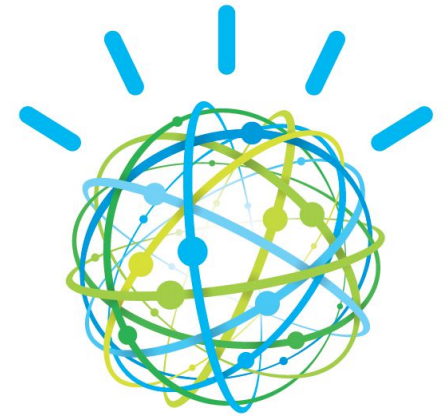


# IBM Watson



Justin Fessler – Artificial Intelligence Leader, IBM Federal



3 top trends/challenges in AI and what's coming/available today...

(AI: Artificial Intelligence or Augmented Intelligence....?)

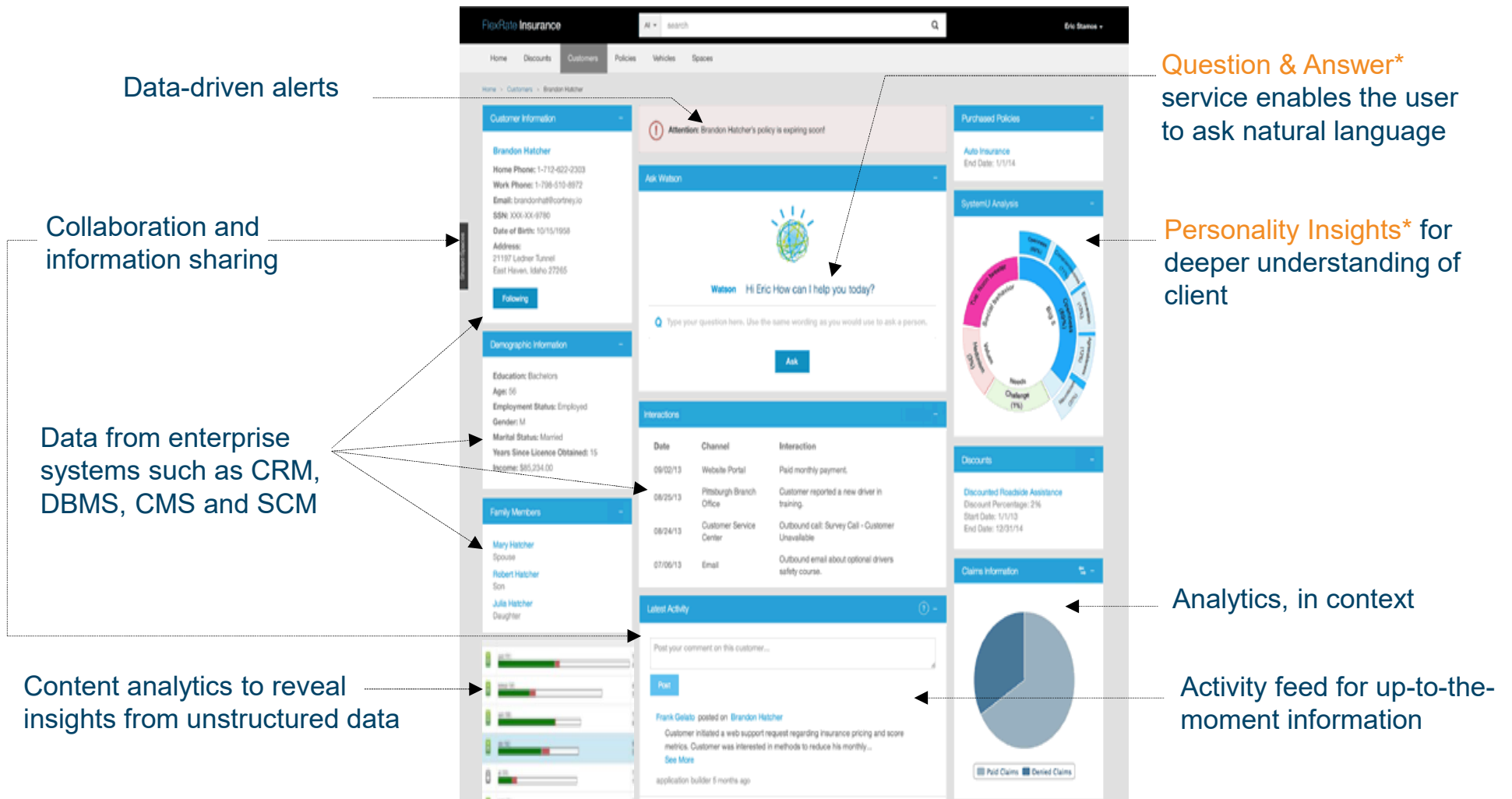
## Challenge #1

### Information Access

Employees struggle to get a complete, secure view of all relevant data and information (structured/unstructured) whether internal, external, OSINT, etc.

# 360-degree information application

Information, analytics and cognitive insights presented in context

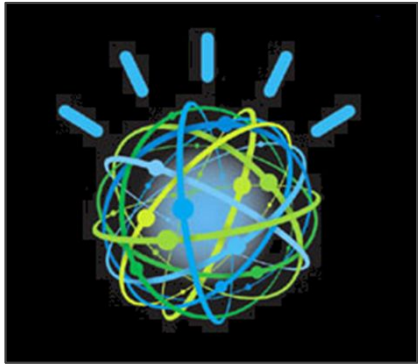


## Challenge #2

### Unstructured Content

80% of data is unstructured but only a small percentage leveraged for insights in uncovering patterns within investigations, inspections, condition-based maintenance, etc.

# Smart is: **breakthrough** content analysis



## IBM Watson (Jeopardy)

### Business Challenge

Advance the state of the art in broad domain Question Answer (QA) systems to enable breakthrough applications in many different industries.

### What's Smart?

Uses **IBM Content Analytics (LanguageWare)** in conjunction with other technologies to read, analyze and understand vast sources of unstructured content. Runs many algorithms in parallel to create, compare and determine confidence in candidate answers. Presents answers with a confidence level attached.

### Smarter Business Outcomes

Coming to your industry soon! Will deliver value in limitless applications starting with clinical healthcare, customer care, government intelligence and beyond.

*“... an information seeking tool that's capable of understanding your question to make sure you get what you want and then deliver's that content through a naturally flowing dialog”*

*Dr. David Ferrucci  
Principal Investigator  
Watson project*

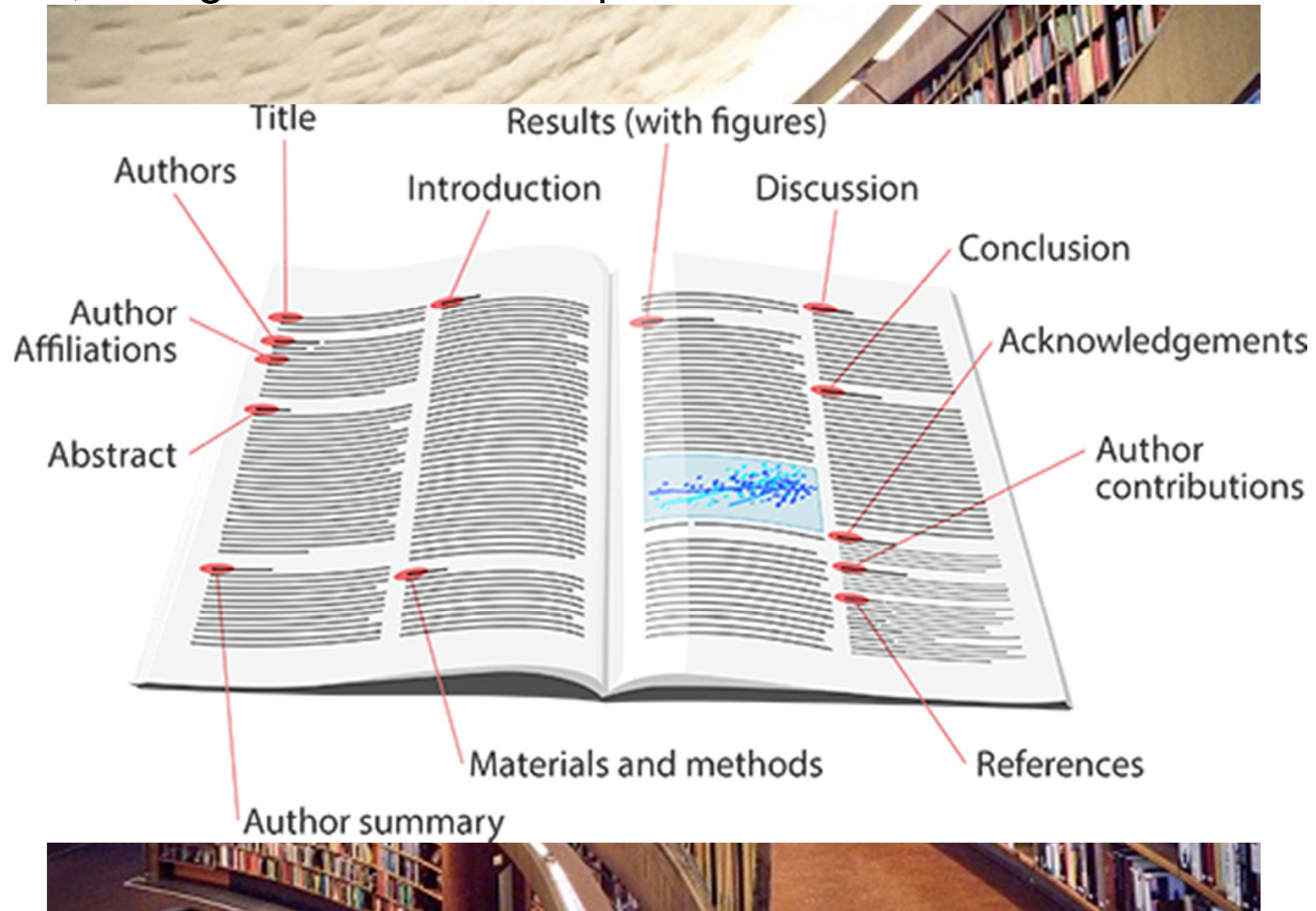
*Industry context: broad industry value  
Value driver: improve business decisions  
Solution onramp: content analytics*





# What Computers Find Hard

Computer programs are natively **explicit**, **fast** and **exacting** in their calculation over numbers and symbols....But **Natural Language** is implicit, highly contextual, ambiguous and often imprecise.



IBM Watson Explorer Content Analytics

Collection: ORNL-Pubs-May - Not logged in - ?

Specify search terms

530/530 results matched

Show advanced

Facet Navigation

Filter

- Part of Speech
- Phrase Constituent
- Sentiment Expression
  - Phrase
  - Expression
  - Target
- My Keywords

Documents

Facets

Time Series

Deviations

Trends

Facet Pairs

Connections

Dashboard

Sentiment

Show: Values

Operator: OR

Filter:

Values	Frequency	Correlation
SrTiO3	138	1.0
Si	120	1.0
DyScO3	43	1.0
MgO	26	1.0

IBM Watson Explorer Content Analytics

Collection: ORNL-Pubs-May - Not logged in - ?

Specify search terms

530/530 results matched

Show advanced

Facet Navigation

Filter

- Part of Speech
- Phrase Constituent
- Sentiment Expression
  - Phrase
  - Expression
  - Target
- My Keywords
  - Formulas
  - Common Experiments
  - Substrates
  - Scientific Journals
  - Dispositions
  - Document Cluster
- Terms of Interest

Documents

Facets

Time Series

Deviations

Trends

Facet Pairs

Connections

Dashboard

Sentiment

Results 1-10 of 530

Sort by: [Relevance]

Results per page: 10 25 50 100

Contextual Views

Actions

zimanyi hysteretic memory in disordered magnets arxiv 2006.pdf

May 17, 2018, 11:11:46 AM

arXiv:cond-mat/0509515v2 [cond-mat.dis-nn] 28 Jul 2006 Hysteretic memory effects in disordered magnets Helmut G. Katzgraber 1 and Gergely T. Zimanyi 2 1Theoretische Physik, ETH Zürich, CH-8093 Zürich, Switzerland 2Physics Department, University of California, Davis, California 95616, USA (Dated: February 2, 2008) We study the return point as well as the complementary point memory effect numerically with paradigmatic models for random magnets and show that already simple systems with Ising spin symmetry can reproduce the experimental results of Pierce et al. where both memory effects become more pronounced for increasing disorder and return point memory is always better than complementary point memory. PACS numbers: 75.50.Lk, 05.50.+q, 75.40.Mg, 75.60.Nt Hysteresis is ubiquitous in na ...

zhou in plane switching mixed bfo jap 2012.pdf

May 17, 2018, 11:12:21 AM

Directed assembly of nano-scale phase variants in highly strained BiFeO3 thin films Jian Zhou, Morgan Trassin, Qing He, Nobumichi Tamura, Martin Kunz et al. Citation: J. Appl. Phys. 112, 064102 (2012); doi: 10.1063/1.4752395 View online: http://dx.doi.org/10.1063/1.4752395 View Table of Contents: http://jap.aip.org/resource/1/JAPIAU/v112/i6 Published by the American Institute of Physics. Related Articles Study of ferromagnetic transition in Pd nanometer-scale constrictions using a mechanically controllable break junction technique Appl. Phys. Lett. 101, 123114 (2012) The magnetic phase diagram and large reversible room-temperature magnetocaloric effect in antiperovskite compounds Zn1-xSnxCFe3 (0<x<1) J. Appl. Phys. 112, 063904 (2012) Magnetic transition in α-NaCuPO4 with Cu-O chains AIP A ...

zhang effect of substrate-induced strains on bfo jap 2007.pdf

May 17, 2018, 11:12:00 AM

Effect of substrate-induced strains on the spontaneous polarization of epitaxial BiFeO3 thin films J. X. Zhang, aff Y. L. Li, Y. Wang, Z. K. Liu, and L. Q. Chen Department of Materials Science and Engineering, The Pennsylvania State University, University Park, Pennsylvania 16802 Y. H. Chu, F. Zavaliche, and R. Ramesh Department of Materials Science and Engineering and Department of Physics, University of California, Berkeley, California 94720 ffReceived 12 November 2006; accepted 15 April 2007; published online 13 June 2007ff A single-domain thermodynamic theory is employed to predict the spontaneous polarizations of ff001ff, ff101ff, and ff111ff oriented epitaxial BiFeO3 thin films grown on dissimilar substrates. The effects of



## Challenge #3

### Scaling expertise through training and Predictive Analytics

Continuous pressure to increase performance and innovation—while doing more with less

## Unstructured data is messy but filled with key facts

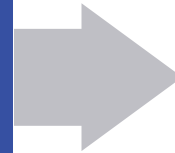
**PC 143** (Hunter)

**15 June 2006 23:47**

**Suspect** identified himself as **John Setsuko**. Matched description given by night club doorman (IC1, Male, Ag 22-24 yrs, blue Everton shirt). Stopped whilst driving **White Ford Mondeo, W563 WDL**.

**Address** given as **22 East Dene Ridge, Copdock, Ipswich**.

Searched at scene and found in possession of **1oz Cannabis Resin** and **lockable pocket knife**.



Arresting_Officer	PC 143
Arrest_Date_Time	15/06/2006 : 23:47
Suspect_Forename	John
Suspect_Surname	Setsuko
Suspect_VRN	W563WDL
Suspect_Vehicle_Colour	White
Suspect_Vehicle_Make	Ford Mondeo
Suspect_Addr_Street	22 East Dene Ridge
Suspect_Addr_Town	Ipswich
Evidence_1_Description	1 oz Cannabis Resin
Evidence_2_Description	Lockable pocket knife

$$\mathbb{P}(S_n - \mathbb{E}[S_n] \geq t) = \mathbb{P}(e^{s(S_n - \mathbb{E}[S_n])} \geq e^{st})$$

$$\leq e^{-st} \mathbb{E}[e^{s(S_n - \mathbb{E}[S_n])}]$$

$$= e^{-st} \prod_{i=1}^n \mathbb{E}[e^{s(X_i - \mathbb{E}[X_i])}]$$

$$\leq e^{-st} \prod_{i=1}^n e^{\frac{s^2(b_i - a_i)^2}{8}}$$

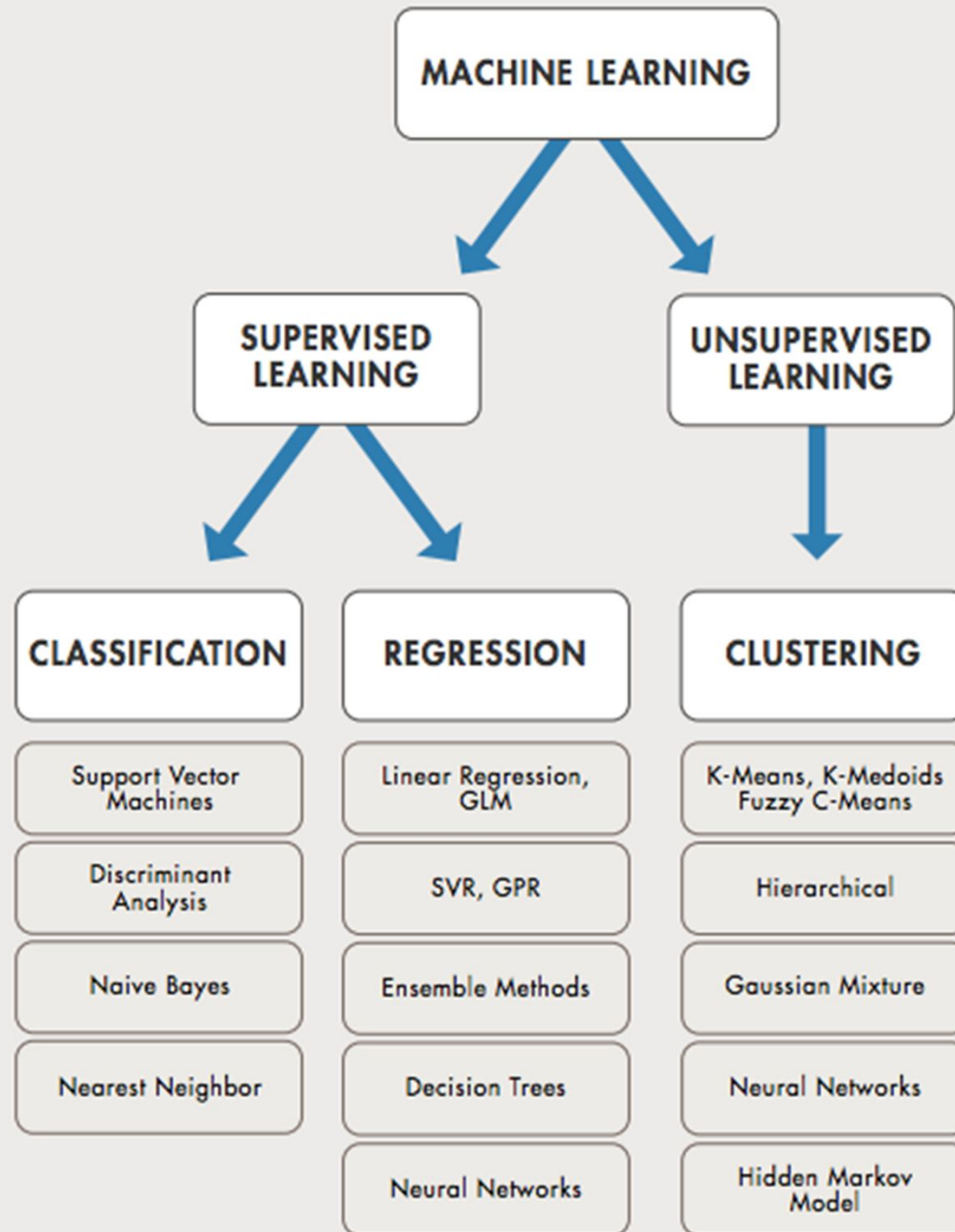
$$= \exp\left(-st + \frac{1}{8}s^2 \sum_{i=1}^n (b_i - a_i)^2\right)$$

Historic  
Data

fictions

Machine Learning Tech

MACHINE



TERING

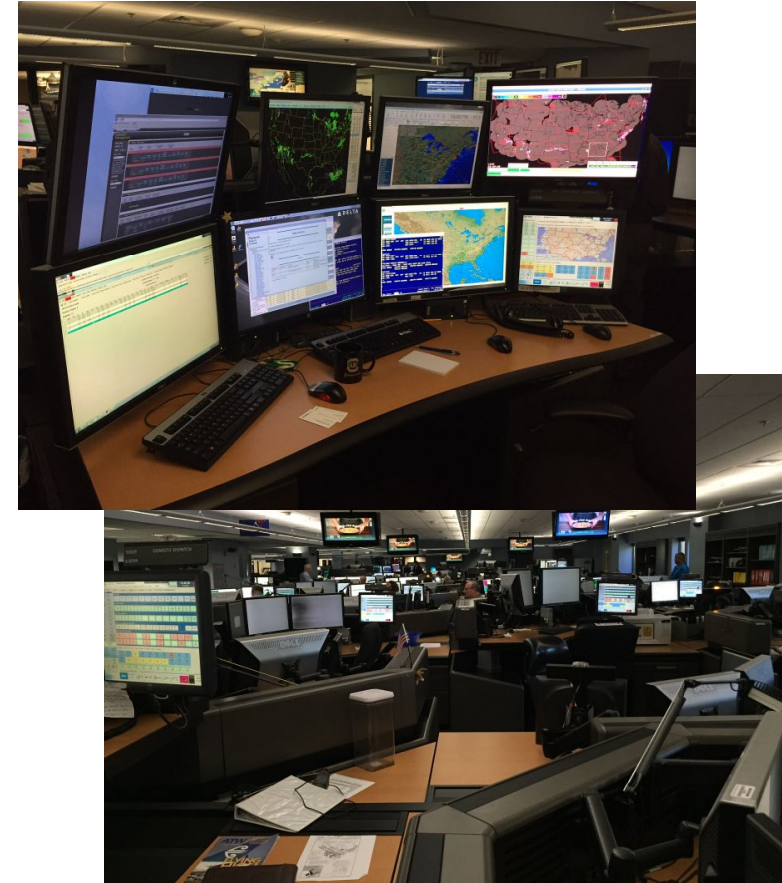
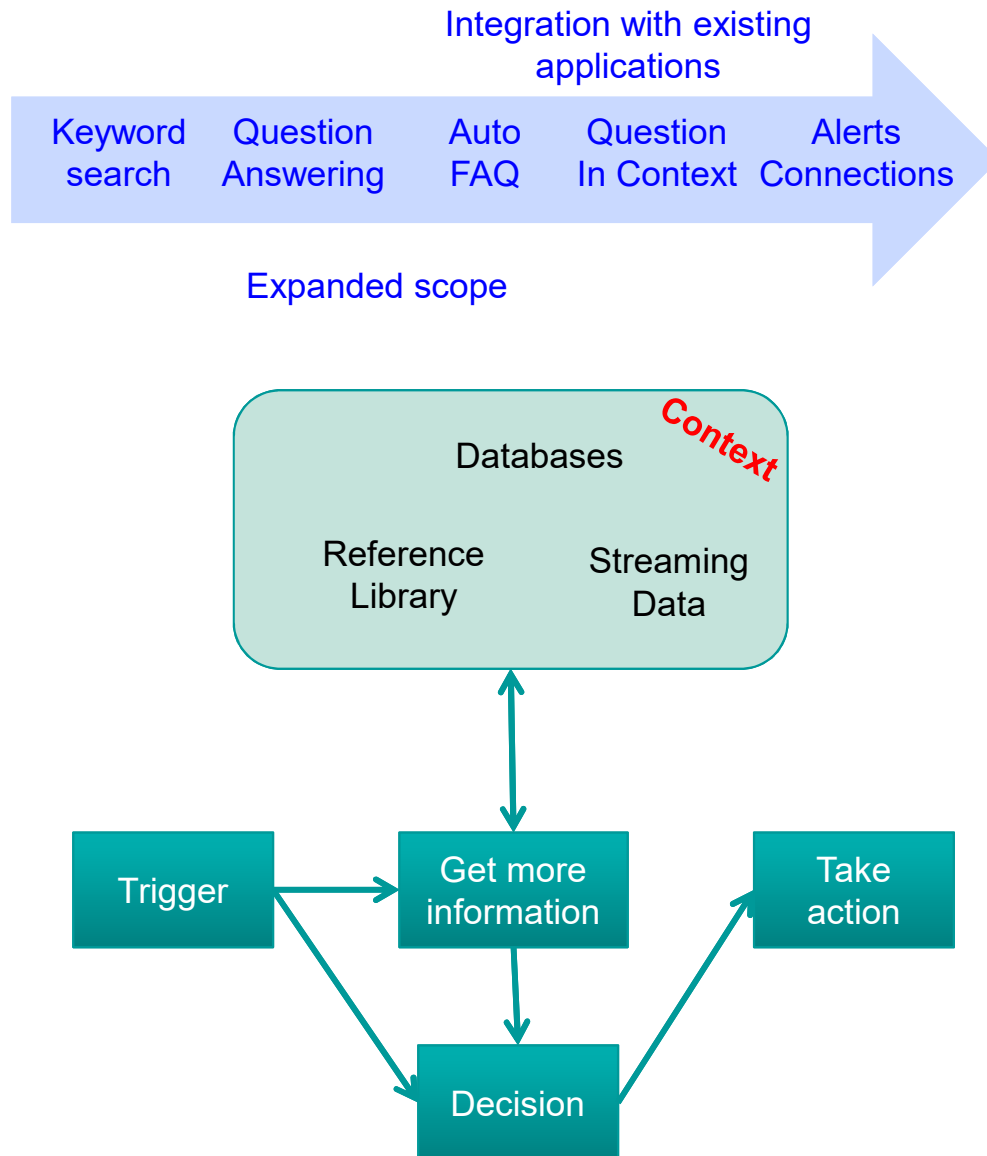
FICATION

SSION

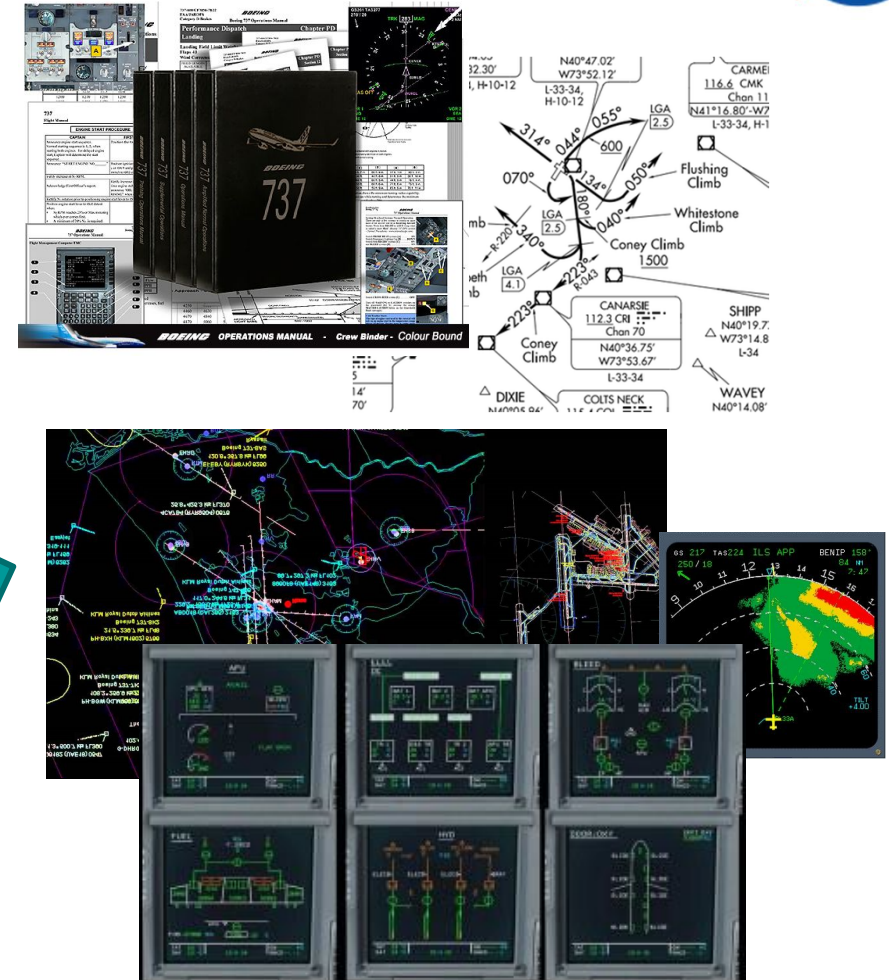
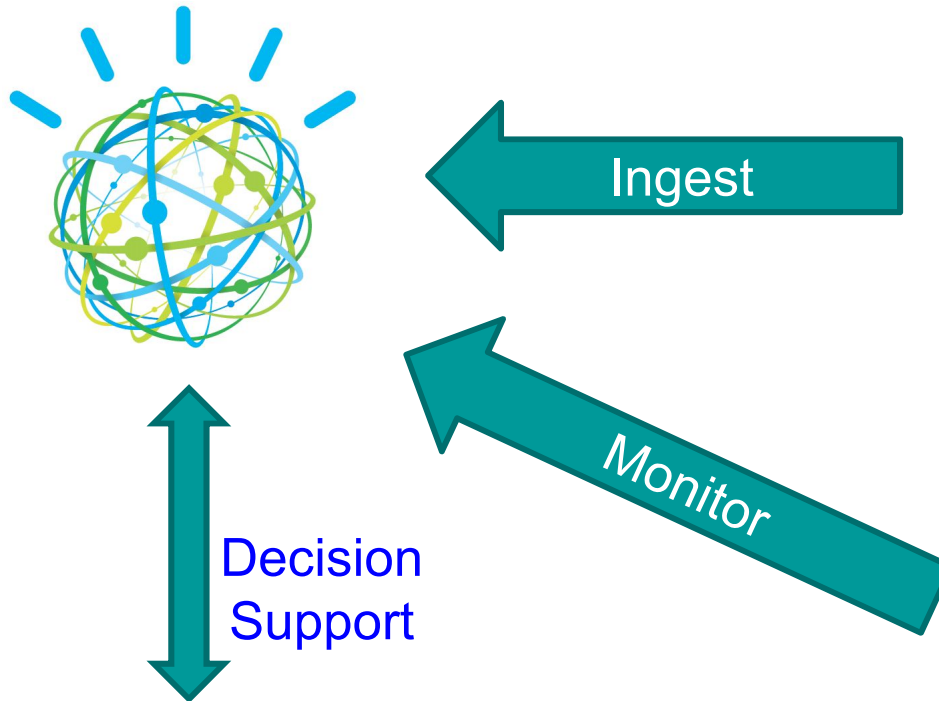
## Use cases



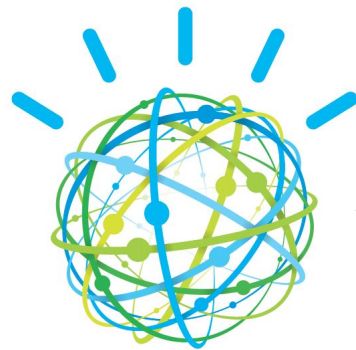
# Watson Flight Operations Advisor – NASA Ames, Armstrong



# Watson Pilot Advisor – NASA Langley, Armstrong



# Watson Aerospace Innovation Advisor – NASA Langley

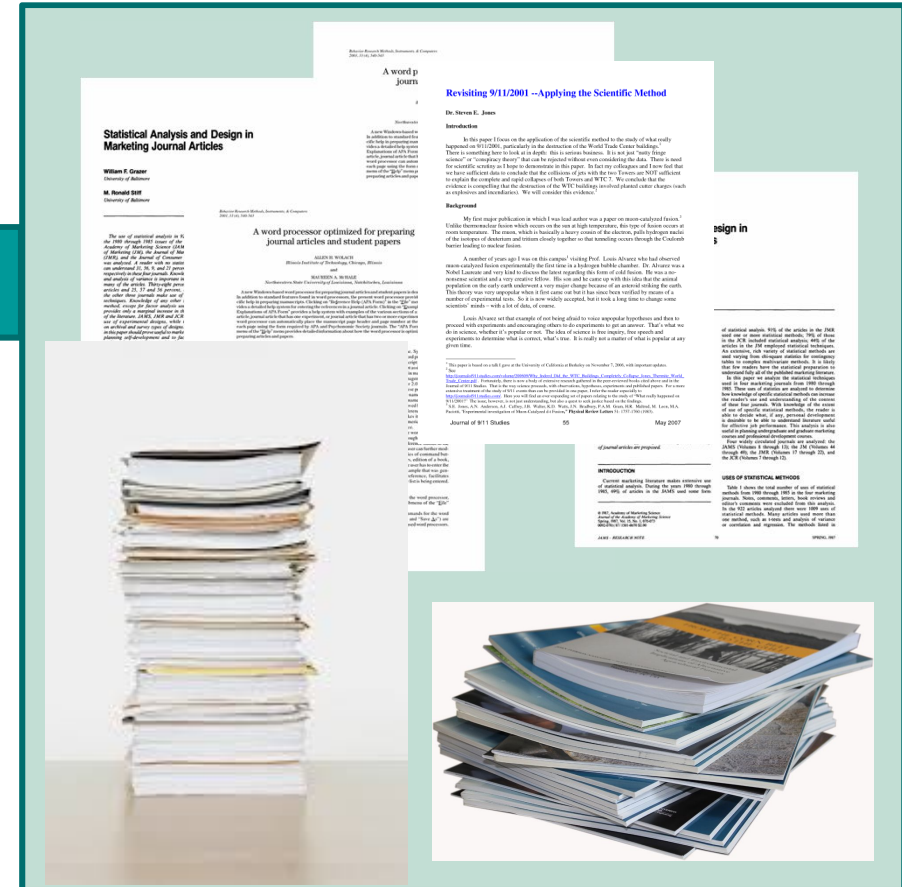


Ingest

Consult



Scientists, Engineers, Planners,  
Project Management





## US Department of Energy, Office of Science and Technical Information (DOE OSTI)

## Audio Indexing

• **What is Audio Indexing?**

- Processing of audiovisual data that extracts text from speech and makes it searchable

• **IBM Cloud:** Watson Bluemix

- WAV, WMA, MP3, AAC, WMV, MP4
- In the process of converting audio and video formats to MP3 and MP4

• **Features**

- Search for specific words or phrases
- System returns audio snippets
- Viewer can go to the proper place in the video
- Captions are provided throughout each video

• **Future Goals:**

- Increased speed and accuracy of processing
- Custom Vocabulary creation to further increase accuracy
- Natural Language Processing features using Watson tech.
- Language options– French, Spanish, etc.

**Confidence: 97%****Duration: 37 ms****Silence: 5ms****SCIENCECINEMA**

4,000+ scientific  
videos featuring  
leading-edge  
research from DOE



## Recap.....

AI (Augmented/Artificial/etc.) is NOT scary. It is here to make us more productive to:

1. Find better, more relevant information quicker
2. Consume the variety and veracity of information that the human ability can not
3. Allow for the interpretation (through training) of large data sets to help the humans come to the best conclusion

4. .... it's not the AI that's run amok, it's the DATA!



Chef Watson: <https://www.bonappetit.com/tag/chef-watson>

Watson News Explorer: <http://news-explorer.mybluemix.net/>

Your Celebrity Match: <https://your-celebrity-match.ng.bluemix.net/>

# THANK YOU

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