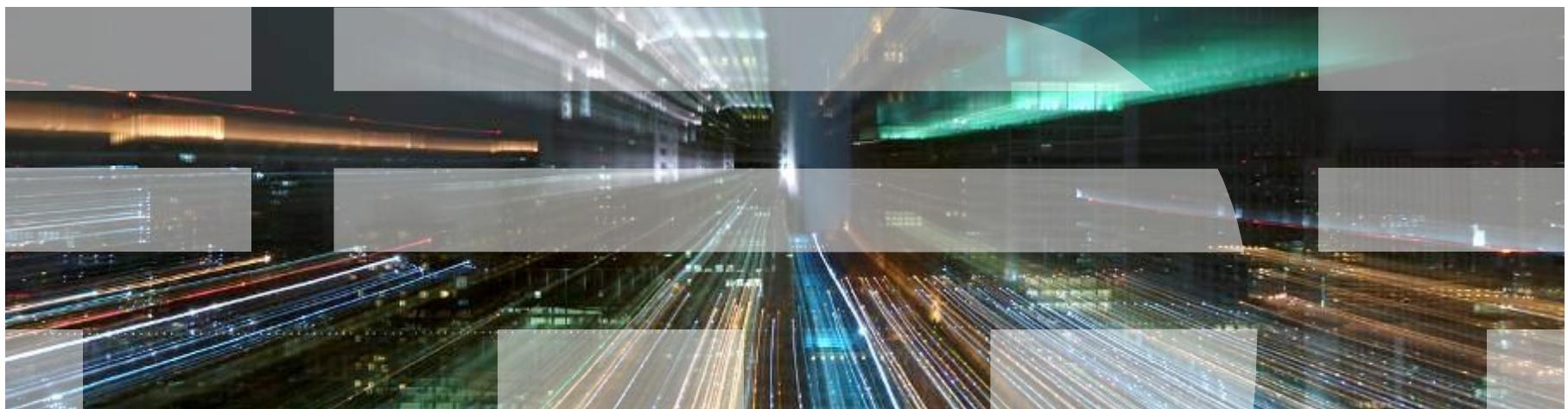
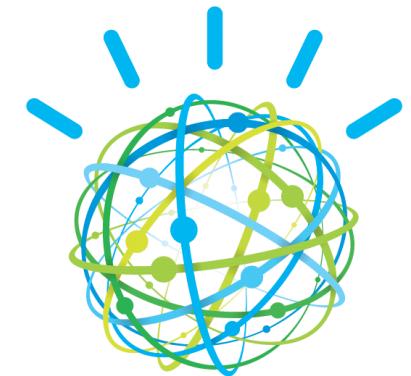
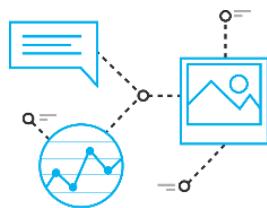


IBM Watson



Three capabilities differentiate cognitive systems from traditional programmed computing systems...



Understanding

Cognitive systems understand like humans do.



Reasoning

They reason. They understand underlying ideas and concepts. They form hypothesis. They infer and extract concepts.

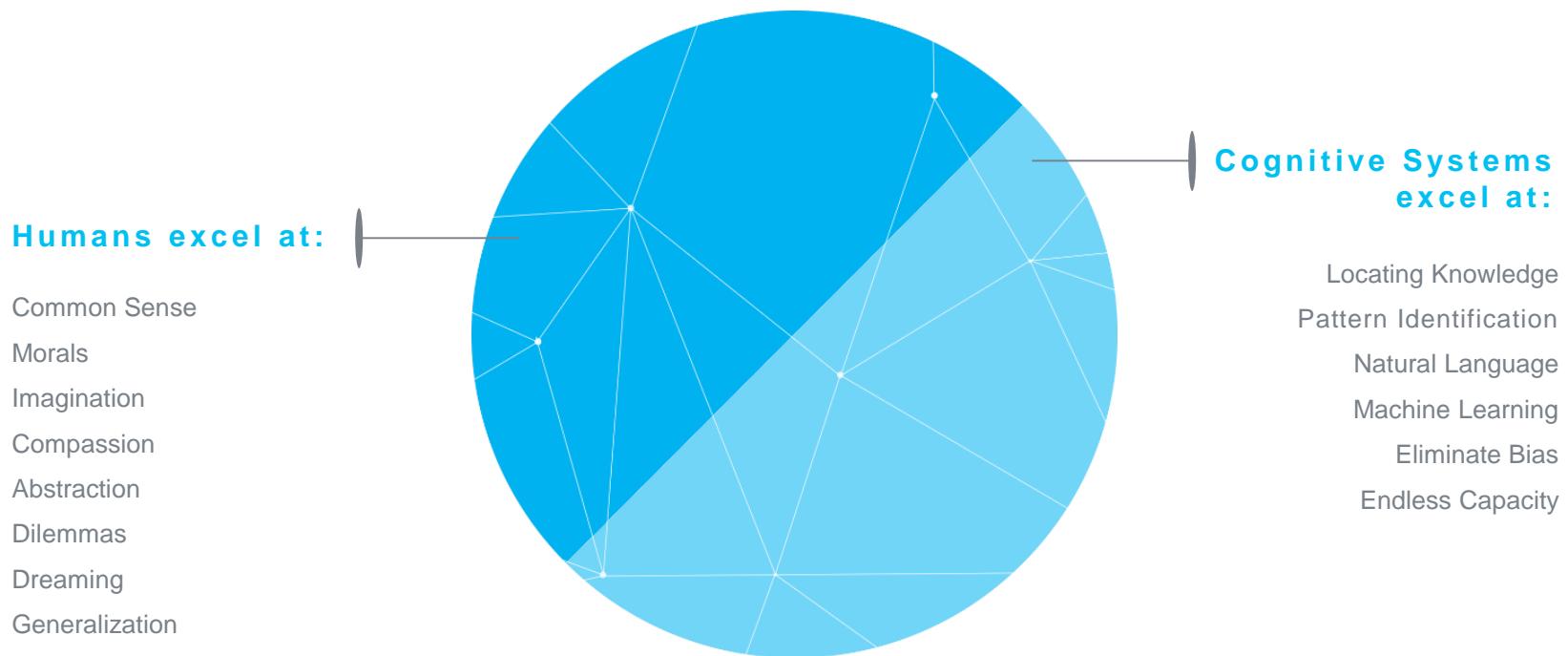


Learning

They never stop learning getting more valuable with time. Advancing with each new piece of information, interaction, and outcome. They develop “expertise”.

.... allowing them to interact with humans.

Cognitive systems forge a new partnership between man and machine.



■ Chess

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



■ Human Language

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



What Computers Find Easy (and Hard)

$$(\ln(12,546,798 * \pi))^2 / 34,567.46 = 0.00885$$

Select *Payment* where *Owner*=“David Jones” and *Type(Product)*=“Laptop”,

Owner	Serial Number	
David Jones	45322190-AK	
Serial Number	Type	Invoice #
45322190-AK	LapTop	INV10895

Invoice #	Vendor	Payment
INV10895	MyBuy	\$104.56

David Jones
 ↓↓↓↓↓
 David Jones

=

Dave Jones
 ↓↓↓↓
 David Jones

≠

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.

Person	Birth Place
A. Einstein	ULM

Structured

- Where was X born?

One day, from among his city views of Ulm, Otto chose a water color to send to Albert Einstein as a remembrance of Einstein's birthplace.

Person	Organization
J. Welch	GE

- X ran this?

If leadership is an art then surely Jack Welch has proved himself a master painter during his tenure at GE.

Automatic Open-Domain Question Answering

A Long-Standing Challenge in Artificial Intelligence to emulate human expertise

- Given
 - Rich **Natural Language Questions**
 - Over a **Broad Domain of Knowledge**
- 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

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

Decision Maker

Asks NL Question

Considers Answer & Evidence

Expert

Understands Question

Produces Possible Answers & Evidence

Analyzes Evidence, Computes Confidence

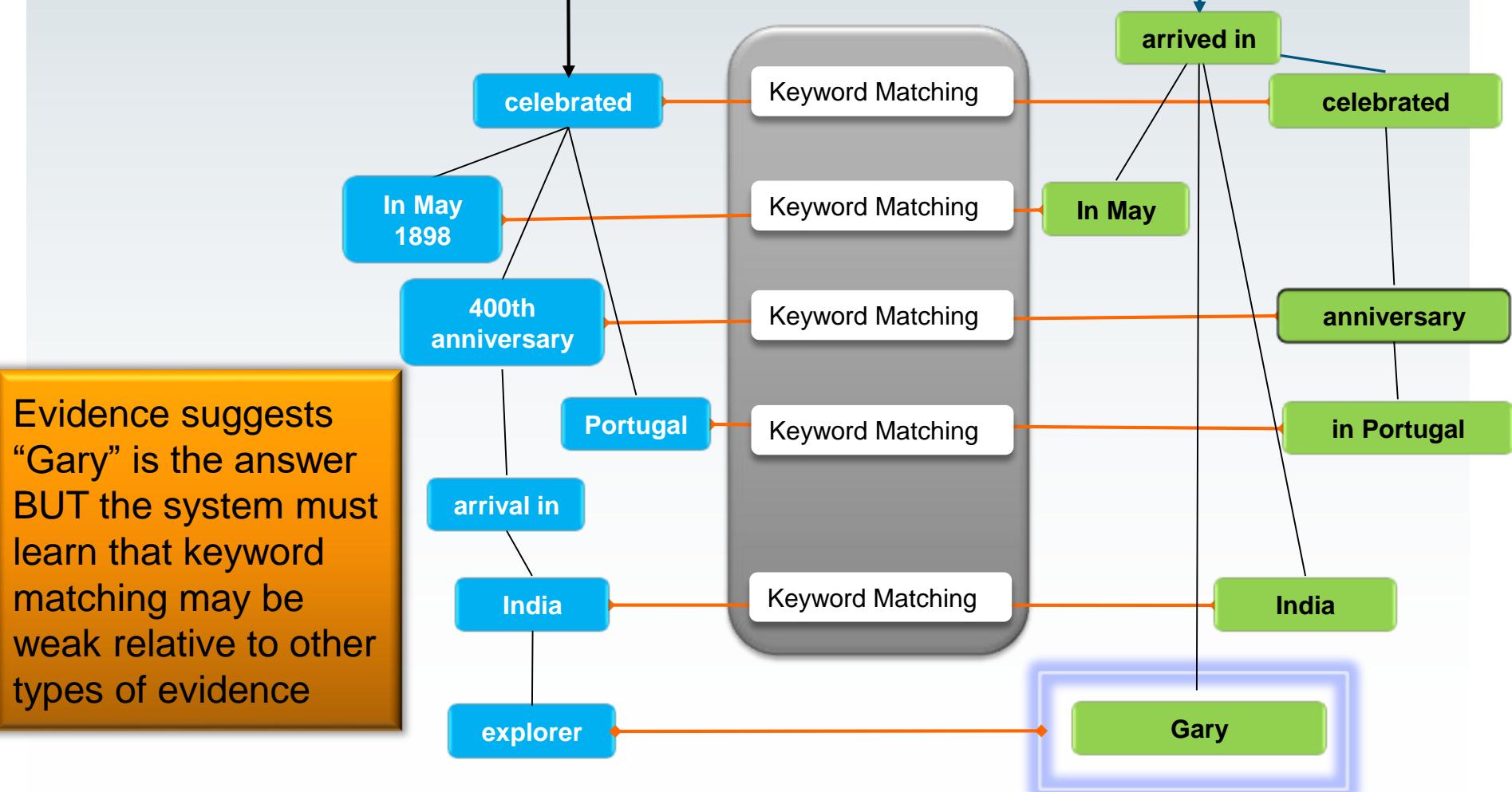
Delivers Response, Evidence & Confidence

Different Types Of Evidence: Keyword Evidence

IBM WATSON™

In May 1898 Portugal celebrated the 400th anniversary of this explorer's arrival in India.

In May, Gary arrived in India after he celebrated his anniversary in Portugal.



Evidence suggests “Gary” is the answer BUT the system must learn that keyword matching may be weak relative to other types of evidence

In May 1898 Portugal celebrated the 400th anniversary of this explorer's arrival in India.

celebrated

Portugal

May 1898

400th anniversary

arrival in

India

explorer

- Search Far and Wide
- Explore many hypotheses
- Find Judge Evidence
- Many inference algorithms

Temporal Reasoning

Statistical Paraphrasing

Geospatial Reasoning

On the 27th of May 1498, Vasco da Gama landed in Kappad Beach

landed in

27th May 1498

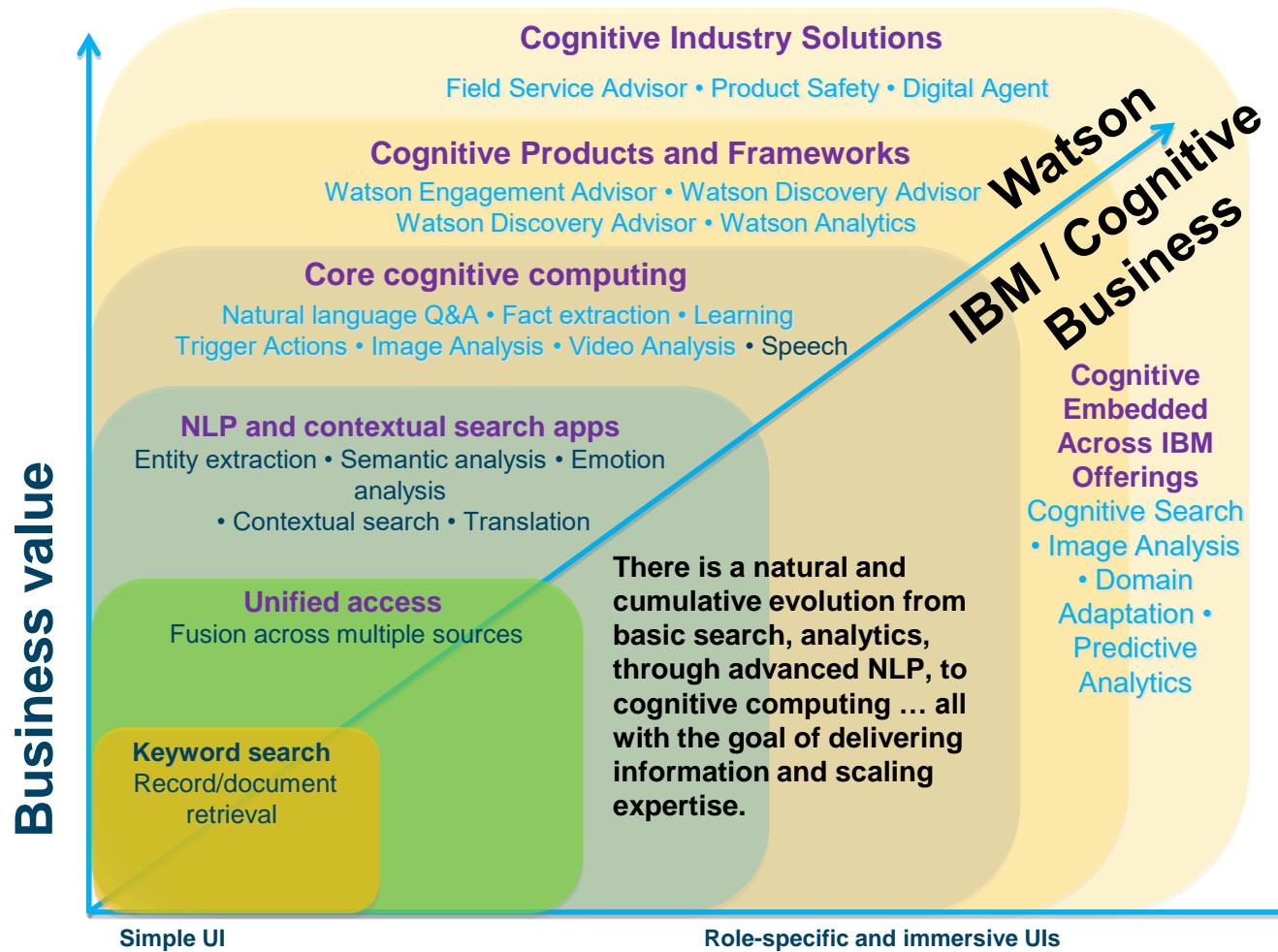
Kappad Beach

Vasco da Gama

Stronger evidence can be much harder to find and score.

The evidence is still not 100% certain.

The Evolution Toward Cognitive Computing



Cognitive is about...

Understanding	Reasoning	Learning
<p>Cognitive systems...</p> <ul style="list-style-type: none">▪ Ingest news, policies, information▪ Interact with language▪ Analyze structured and unstructured data▪ Leverage encyclopedic volumes of domain data in conversational interactions	<p>Cognitive systems...</p> <ul style="list-style-type: none">▪ Improve with experience and feedback▪ Present answers based on supporting evidence and quality of information▪ Train with experts and practice▪ Provide justification behind answers and solutions	<p>Cognitive systems...</p> <ul style="list-style-type: none">▪ Increase trust and confidence▪ Evaluate all possible meanings to determine what is being asked▪ Create new insights and value seemingly unfathomable on a traditional computing scale

Use Case Categories

Exploration

Collect the information that you need to explore your problem area better

Engagement

Dialog with end users to answer the questions needed around products and services

Discovery

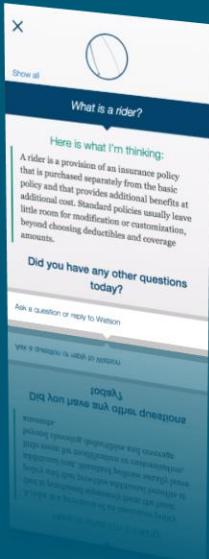
Help find the questions you're not thinking to ask and connect the dots that you're missing that will lead to new inspiration

Decision

Assess the choices that enable you to make better decisions

Policy

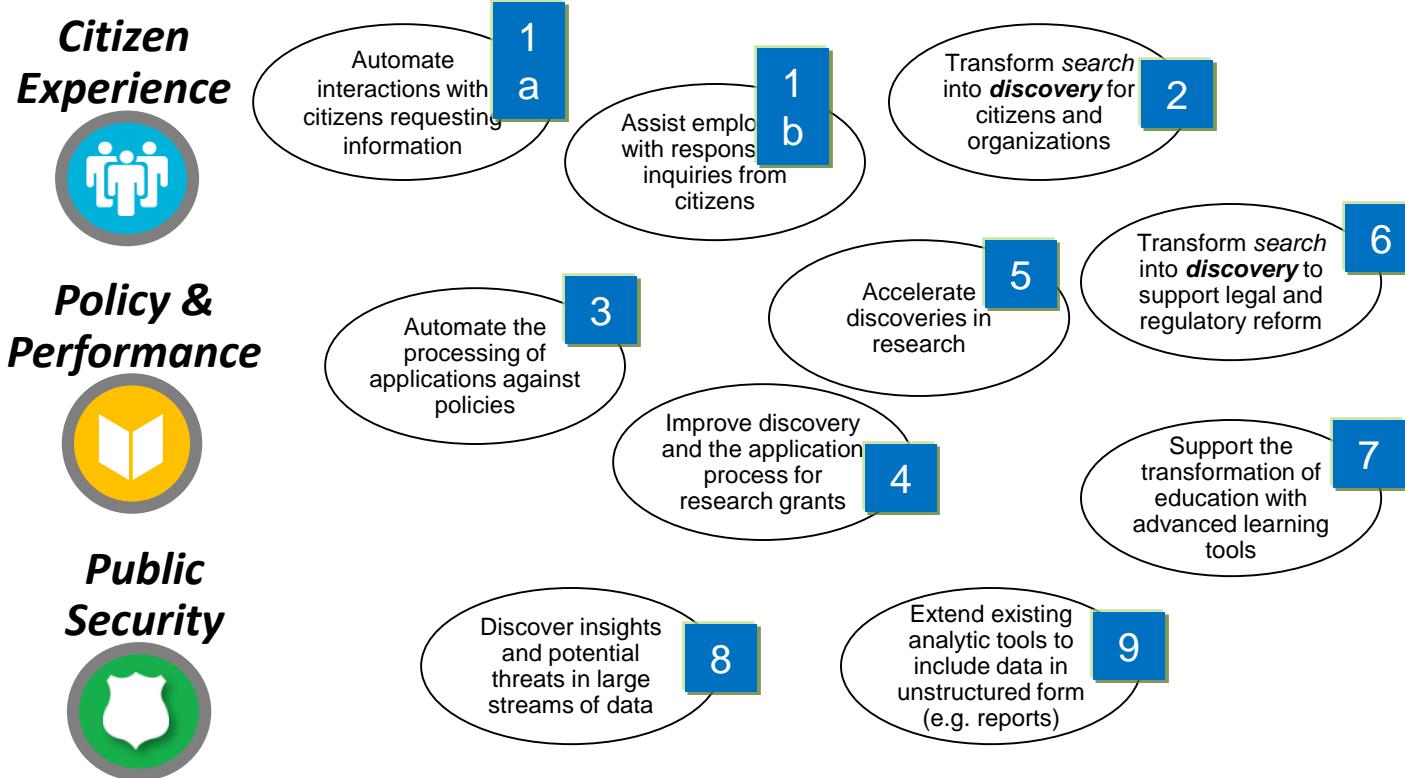
Test conformance to a set of written policy conditions



A screenshot of the IBM Watson Discovery Advisor web interface. A user has asked "What breed of cat is orange?". The results page displays various hypotheses and supporting passages, including a detailed explanation of the Persian breed being the most common orange cat breed.



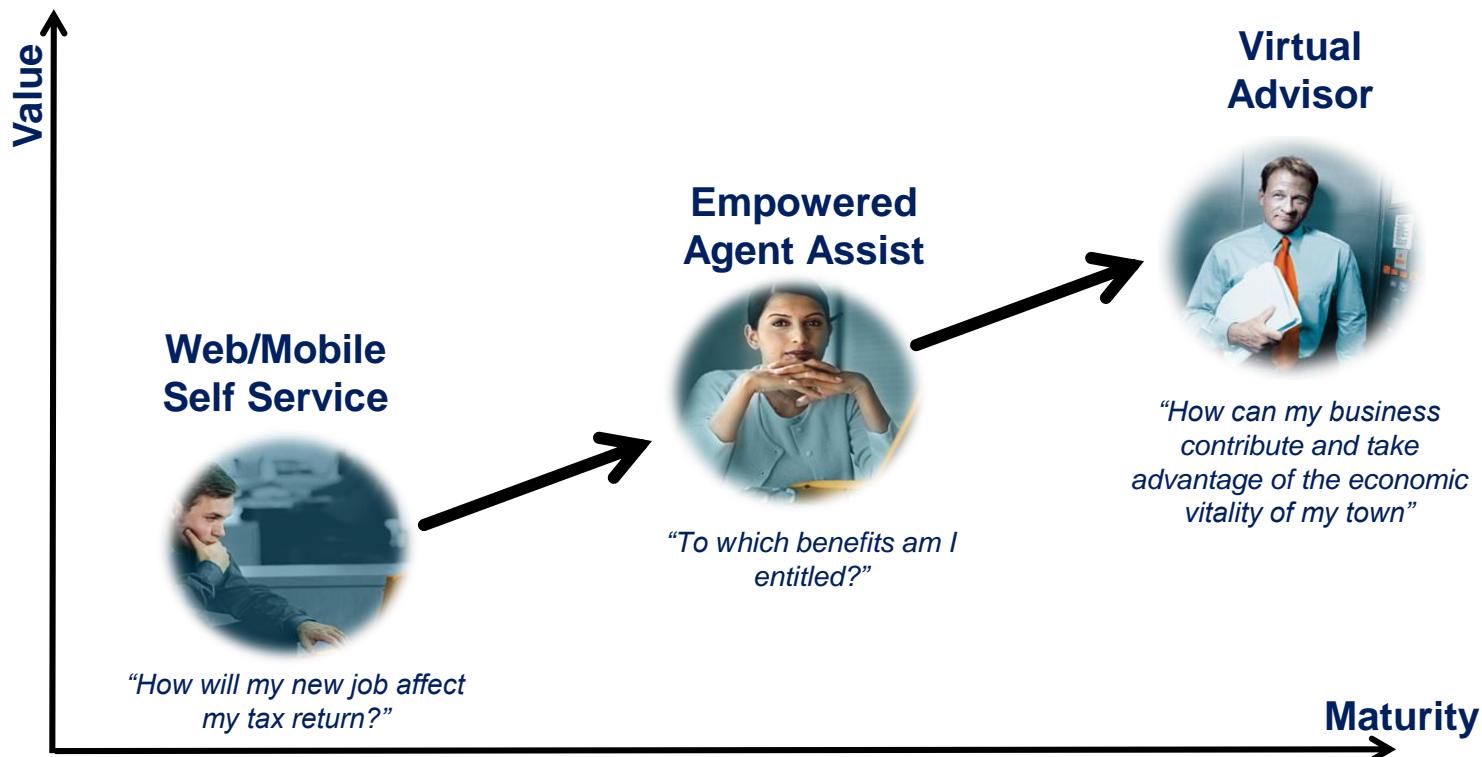
Some Focused use cases for Watson Cognitive Computing in Government



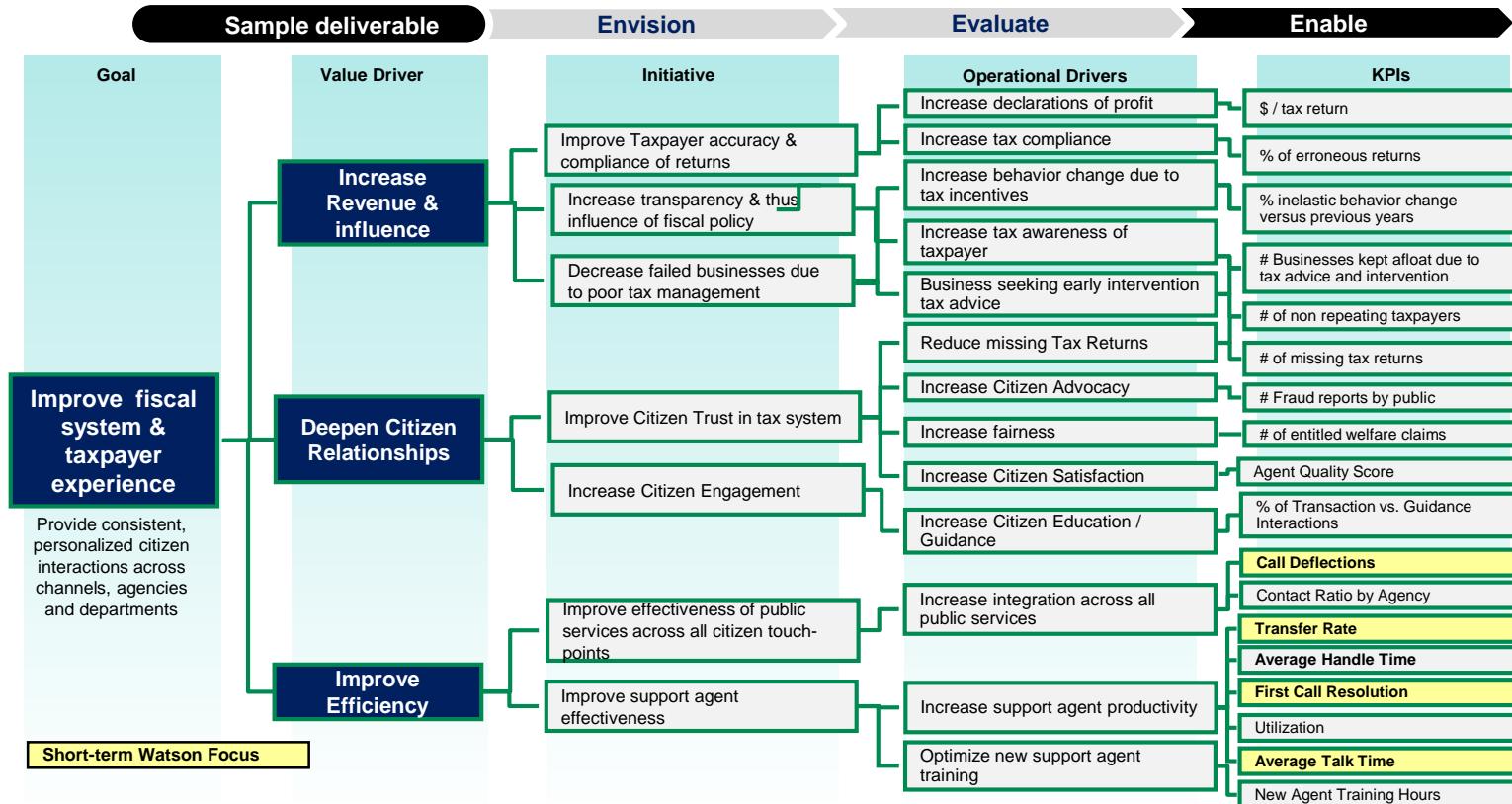
Citizen Engagement

Including a Value case for Watson driving Citizen Engagement

The transformation of public services through Citizen Engagement begins with a foundation of knowledge



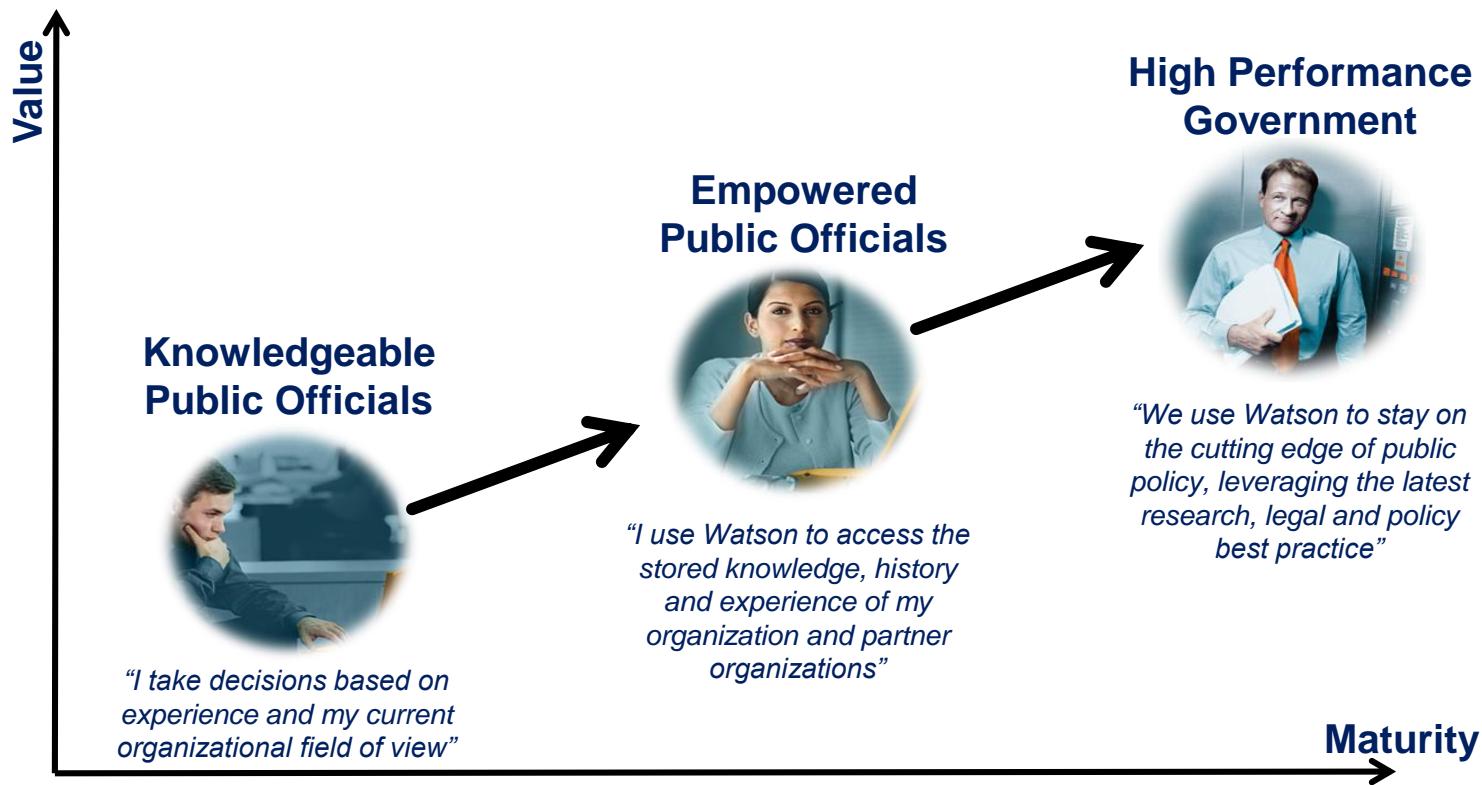
In a specific example, Watson enables these KPI's for Citizen Services



Policy & Performance

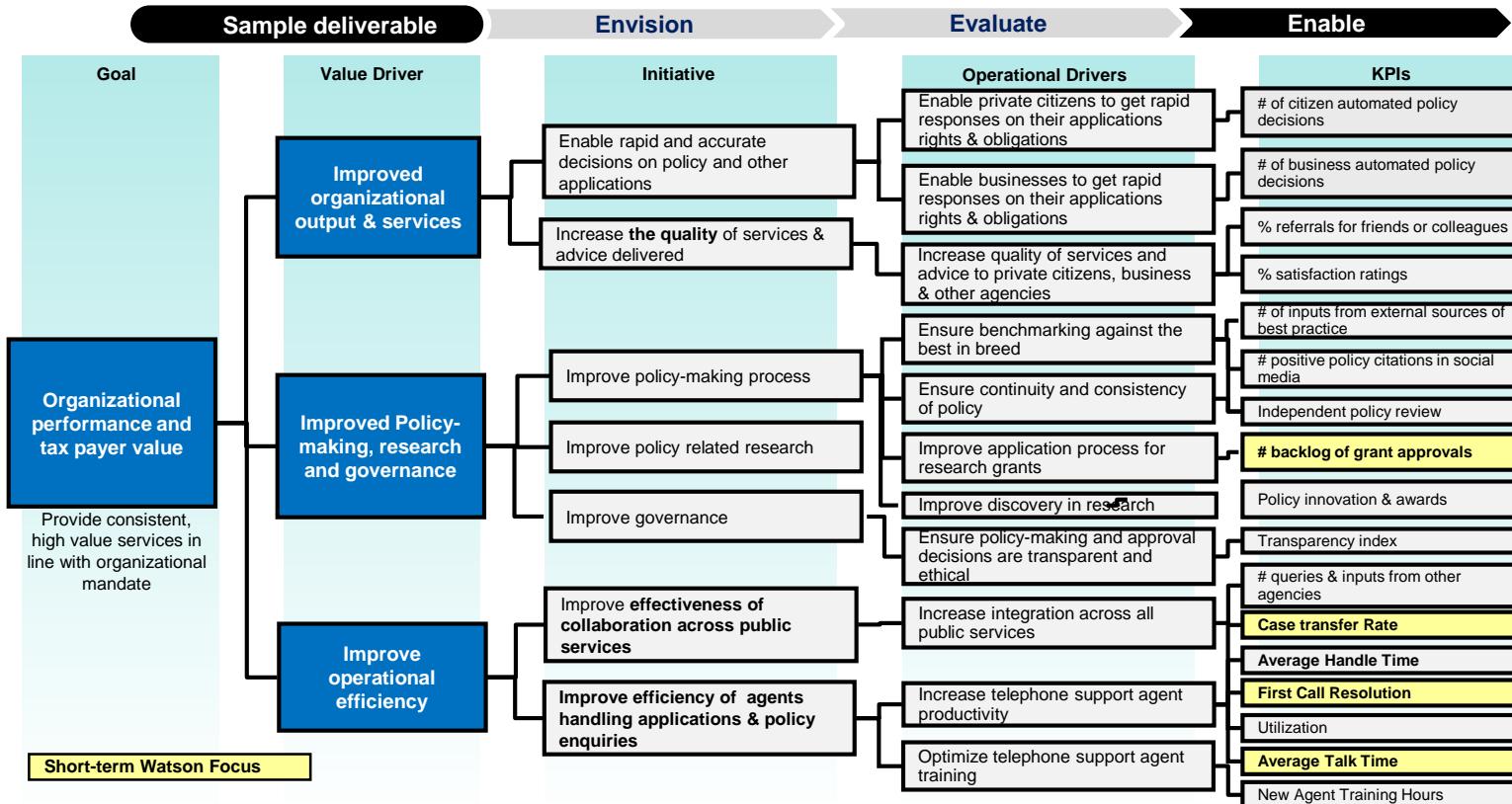
Value case for Watson driving Policy & Performance in Government

Transforming government organizations is driven by enhanced Policy and Performance of its employees and processes



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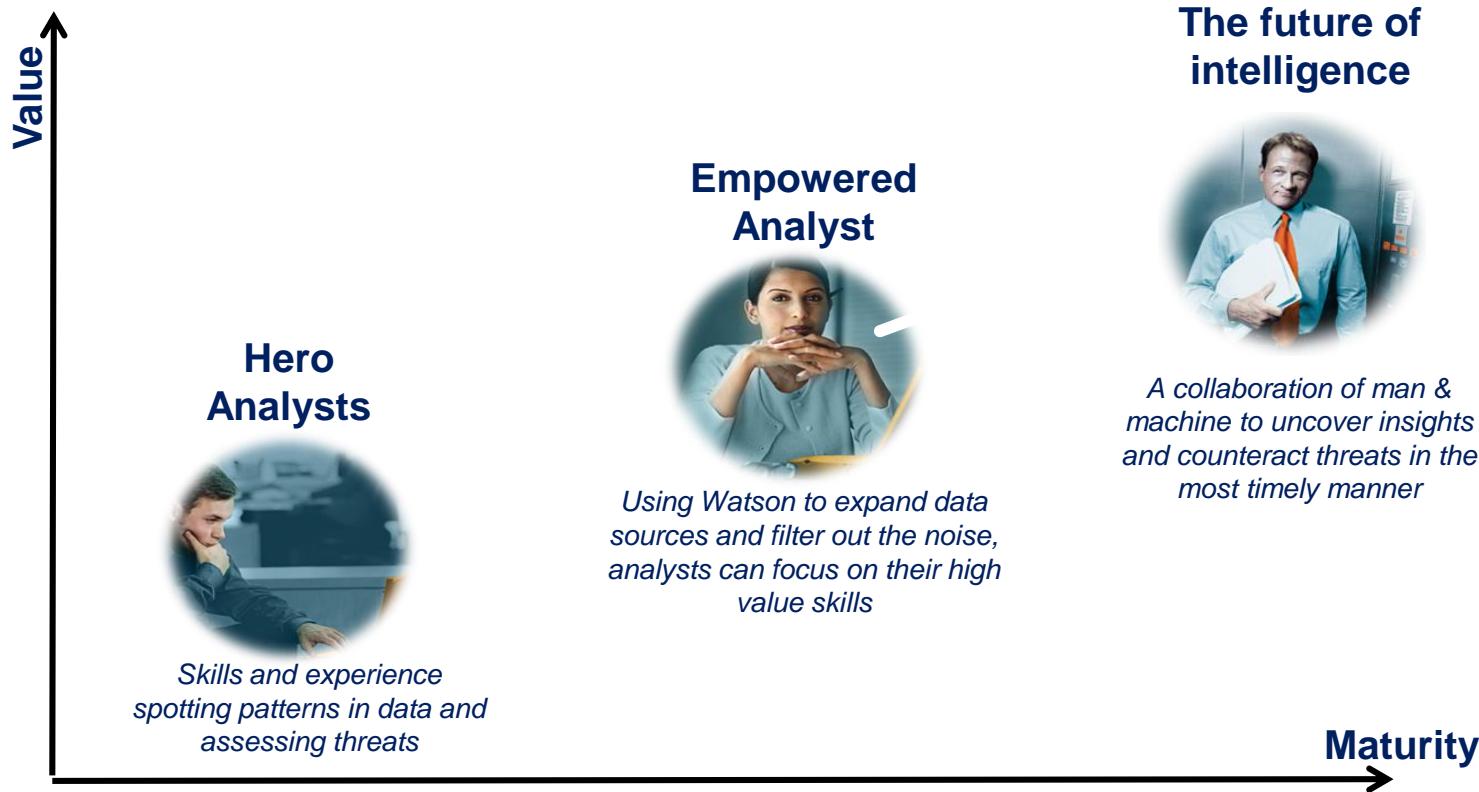
Watson enables multiple KPI's for Policy & Performance



Public Security

Value case for Watson driving Policy & Performance in Government

The transformation of a Security Agency is about maximizing the performance of the analyst



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Transforming Security Agency Performance

Analyst discovery – Watson increases the amount of unstructured text data (documents) that can be examined by analysts, amplifying their inherent experience and insight, making their analysis task more thorough, efficient, and effective.

Timeliness – Watson accelerates the pace of discovery in analyzing relevant evidence to support mission-critical, time-sensitive decisions and policy making

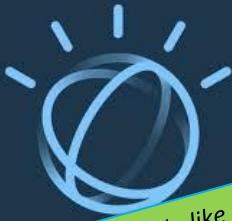
Efficiency – Watson makes the whole security agency perform better in terms of resource efficiency, coverage, consistency & training. Watson provides traceability of information (evidence) supporting conclusions linked to original source documentation and lines of reasoning, and enabling subsequent audit, training and process improvement

Discover more threats



User quote: "Watson has saved me time on several occasions when other tools were not working or didn't come up with the needed report..."

Timeliness of response



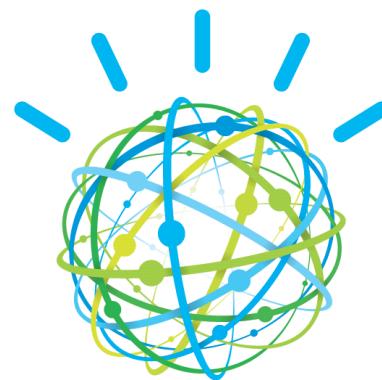
User quote: "I do like using Watson... information has been quickly insightful..."

Efficiency of operations

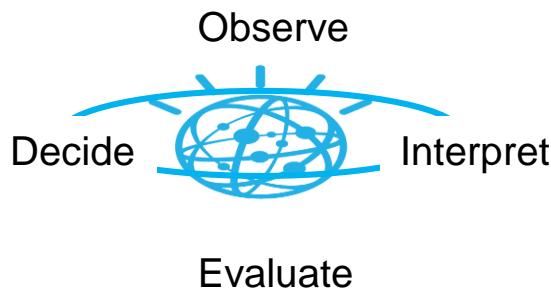


User quote: "I was impressed with Watson and its user friendly interface. With no training, I was able to enter a question and receive accurate, reliable and precise results from multiple sources..."

THANK YOU



Cognitive Object Detection Assistant (CODA)



CODA is using Visual Recognition technology to observe and interpret X-ray data, offering a path to reducing the TSO's cognitive load.

In the future integrating additional cognitive capabilities into the solution can create new insights, based on TSA's needs and the evolving threats.

Unstructured Information

Structured insight

Observe
(Visual Recognition, Text to Speech)



Interpret
(Dialog/NLC)

Speech to Text

The IBM Watson Speech to Text service uses speech recognition capabilities to convert Arabic, English, Spanish, French, Brazilian Portuguese, Japanese, and Mandarin speech into text.

Resources:

Evaluate
(Discovery Advisor)

The screenshot shows a network graph with nodes representing political figures and their connections. A sidebar allows filtering by relationship type (Close to add item, Filter by evidence, Least, Most, Isolated connections) and evidence (Include, Exclude). Below the graph is a search bar and a results table.

Decide
(tradeoff analytics)

The screenshot displays a tradeoff analysis plot with several points representing different options. The axes are labeled with metrics like "difference de classement" and "match offshoot". A legend on the right identifies the points. A sidebar on the left lists various decision criteria.

25

CODA Application

Home



The main image shows a suitcase's X-ray content. A blue handgun is highlighted with a red rectangular box. To the left, there is a vertical stack of six smaller thumbnail images of suitcases.

IBM Watson
CODA

Gun Detected

<http://localhost:8888/CODA/TestImages/bag5 copy.png>



Filters

Sharpen Edge Detection Contrast Unsharp Mask

Undo All

Miami – Dade County Water Service Use Case – Web / Mobile Web

The screenshot shows the official website of the Miami-Dade Water Services (miamidade.gov/water). The top navigation bar includes links for 'Make Payments', 'iWASD Projects GIS Viewer', 'News & Events', 'Get Involved', 'Community Services', and 'Contact Us'. A sidebar on the left lists various water-related services and links. The main content area features a prominent 'IMPORTANT MESSAGE' box with a Watson icon and the text: 'I am your on line water assistant, how can I help you?'. Below this is a 'Type your question here' input field. The page also includes sections for 'WATER CONSERVATION', 'ACCOUNT SERVICES', and 'CAPITAL IMPROVEMENT PROGRAM'. A purple arrow points from the 'Watson Assistant' section towards the 'Future Vision' section below.

Web / Mobile Web

1. Customer enters the Miami Dade web site.
2. Interacts using Text
3. Answer is provided



Current Situation

- Too much information buried on website
- Web is “busy”; peck and hunt approach
- There is no on line chat / answer capability
- Online bill payment barely used pressure to reduce contact center costs

Future Vision

- Introducing a Watson capability on the web will drive down the contact center traffic
- Watson would include answers for general water questions and enable “action”

Case Study: BlueTAS

- A large number of government agencies are facing tremendous challenges with increasing amounts of news sources, social, geospatial, and imagery data that are collected and need to be analyzed.
- Analysts are required to identify, track, and understand patterns, trends, networks and linkage between people, places, and activities.
- While humans are good at these activities - analyzing data, formulating hypotheses, and synthesizing the results - our abilities scale poorly.
- As a result, the exploding volume, variety, and velocity of available information require ever-greater numbers of analysts and accompanying support.

BlueTAS

To address some of these pressing needs, IBM developed BlueTAS, an innovative application that automatically extracts key information and relationships expressed in Twitter text data, and tested its potential to deliver near real-time intelligence in the form of high-confidence alerts to military customers at the operational or tactical level.

The screenshot displays the BlueTAS application interface. At the top, there's a navigation bar with links: Home, Collect, Search, People, Timeline, Alerts, and Connections. Below the navigation is a search bar with the handle "nigelcameron". To the right of the search bar are buttons for "Search" and "User Friends". Further right are "Live" and "Database" options.

The main content area shows a Twitter profile for "Nigel Cameron" (@nigelcameron). The profile includes a video thumbnail, follower count (6054), friend count (788), retweet count (55), and favorite count (5389). Below the profile, there are several tweets from Nigel Cameron, all retweeted from "The Economist". The tweets are:

- "It's just a matter of time until most human functions are outsourced to machines. Nigel Cameron, president and chief executive officer, Centre for Policy and Emerging Technologies" (12 min ago)
- "So disheartening. @nytimes: Why cartels are killing Mexico's mayors https://t.co/1MKiTqAoz via @nytopinion" (16 min ago)
- "Wow. Scary. RT @allisonanonymou: Brigadier general + 11 Army leaders, workers facing possible (cont) https://t.co/MVtryvBD" (20 min ago)
- "RT @DefTechPat: My scoop from this week ... @"durov: As I predicted, ISIS launched its own messaging app. https://t.co/rPvYRcOrcs" (27 min ago)
- "Brill RT @brainpicker: Tolkien reads from LoTR and sings "Sam's Rhyme of the Troll" https://t.co/fUKoVtBHZ" (20 min ago)

Each tweet includes the language (English) and sentiment score (e.g., -28.10%, -67.11%, 60.19%, -7.10%).

On the right side of the interface, there are several data visualizations:

- A line chart titled "Average Sentiment: (-13.69%)" showing sentiment over time from 2016-01-12 to 2016-01-18.
- A network graph titled "Click to Expand Network" showing connections between various users.
- Two tables at the bottom:
 - "Top #Tags" table:

Tag	Count
#sotu	5
#gopdebate	5
#privacy	2
#immigrati	2
#cruz	2
#uk	2
#connected	2
#sotu?	1
#trump	1
#bush	1
#sotu2016	1

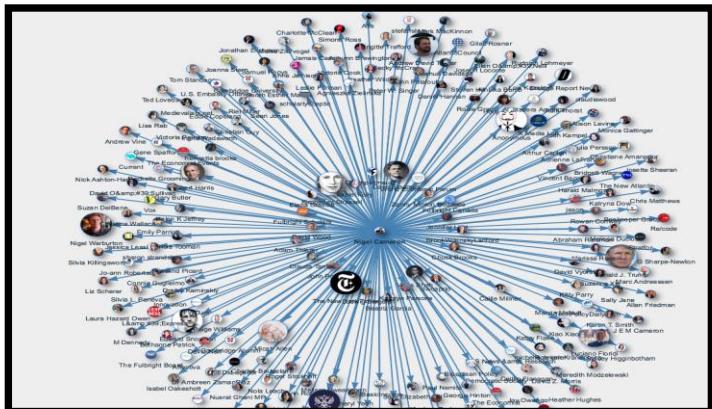
 - "Top User Mentions" table:

Mention	Count
washington	7
politico	4
mashable	4
NickKristof	3
nigelcamer	3
CaitlinPac	3
nytimes	3
Ianbremmer	3
realDonaldTrump	3
Drudge_Rep	3
BlogsofWar	3

BlueTAS

BlueTAS is a cognitive multilingual IBM Twitter mining application for conducting analysis and data visualization

The screenshot shows the BlueTAS application interface. At the top, there's a search bar with the query "obama". Below it, a sidebar lists categories like Home, Collect, Search, People, Timeline, Alerts, and Connections. A main content area displays tweets from users such as @ahuranein, @TariqAbdullah, @Waleed_Nasser, @Ashraf_Koth, and @worldnews. Each tweet includes the user's profile picture, handle, name, timestamp, follower count, friend count, language, and sentiment score. To the right of the tweets is a map of Washington, D.C., with a central location marked. Below the map are three charts: "Top Users", "Top Influencers", and "Top Tags/Links". The "Top Users" chart shows Karim e, Radio Sawa, and Tariq Alb as top users. The "Top Influencers" chart shows #obama, #peace, and #المرأة as top influencers. The "Top Tags/Links" chart shows #obama, #peace, and #المرأة as top tags.



BlueTAS Analytics

- BlueTAS integrates Watson Discovery Advisor (WDA) for correlation between live data and established facts
- Automatically extract mentions and relation and formulate dynamic questions to WDA
- Automatic Language Identification and Translation
- Sentiment Analysis
- Trend and Network Analysis
- Image Tagging and Recognition

