



Technology Overview – Watson

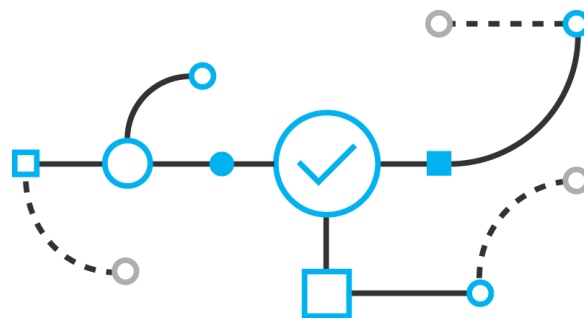
Purushothaman K Narayanan
Technical Leader, IBM Watson Implementations

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.

Watson is ushering in a new era of computing

Tabulating
Systems Era

1900

Programmable
Systems Era

1950

Cognitive
Systems Era

2011



Why is it so hard for computers to understand humans

Structured Data

Where was Einstein born?

Physicist	Birth Place
A. Einstein	Ulm
N. Bohr	Copenhagen
M. Curie	Warsaw

Source: Excel File, Database, etc.

Unstructured Data

“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”

Source: <http://www.schaeffenacker-ulm.de/en/otto.html>

Welch ran this?

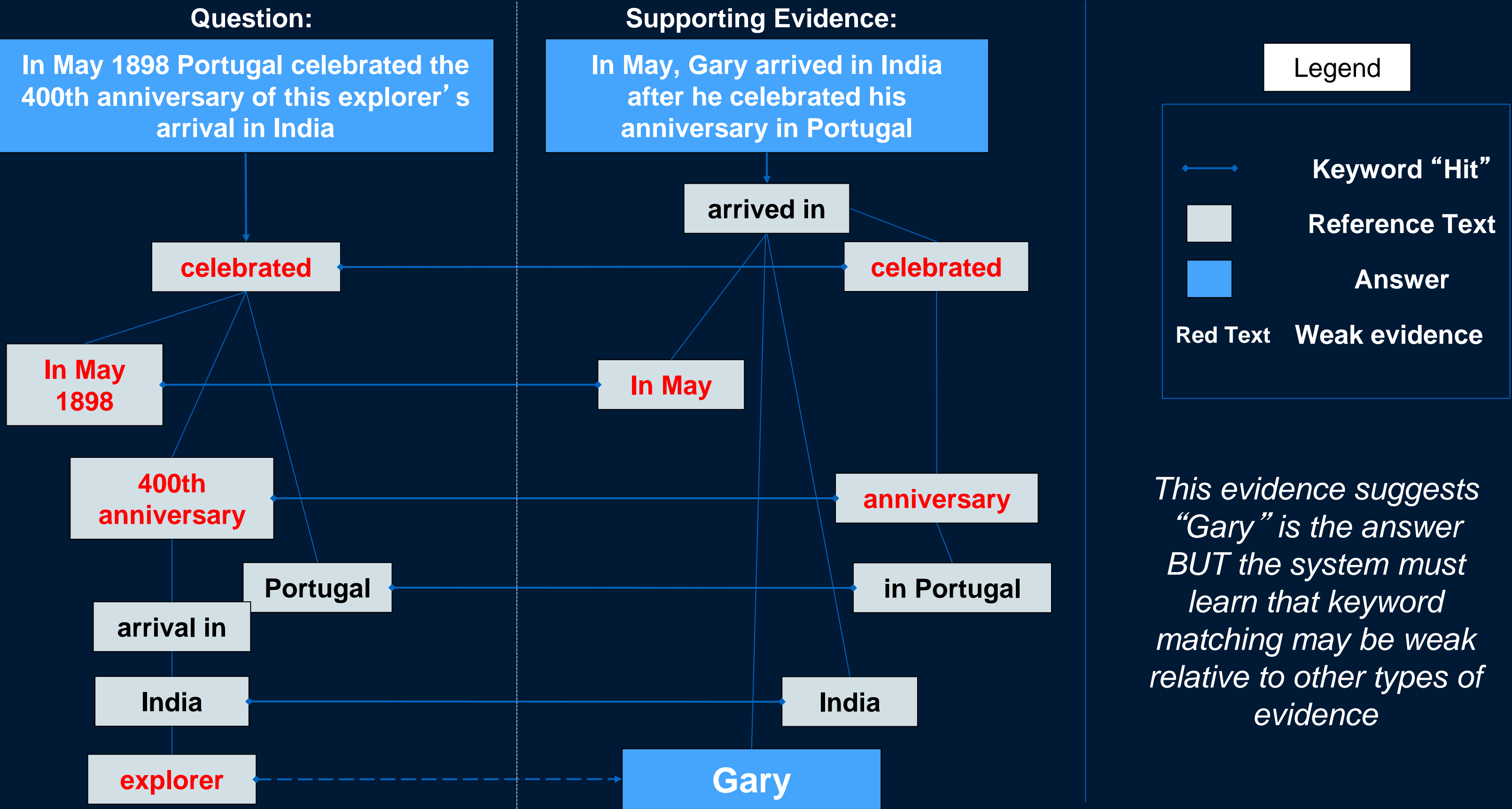
Person	Organization
L. Gerstner	IBM
J. Welch	GE
W. Gates	Microsoft

Source: Excel File, Database, etc.

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

Source: *Jack Welch and the GE Way*, Robert Slater

Answering complex questions requires more than keyword evidence



Watson leverages multiple algorithms to perform deeper analysis

Question:

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

Supporting Evidence:

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

Legend

- Temporal Reasoning
- Statistical Paraphrasing
- GeoSpatial Reasoning
- Reference Text
- Answer

Stronger evidence can be much harder to find and score...

- Search far and wide
- Explore many hypotheses
- Find judge evidence
- Many inference algorithms

celebrated

Portugal

May 1898

400th anniversary

arrival
in

India

explorer

landed in

27th May 1498

Date
Match

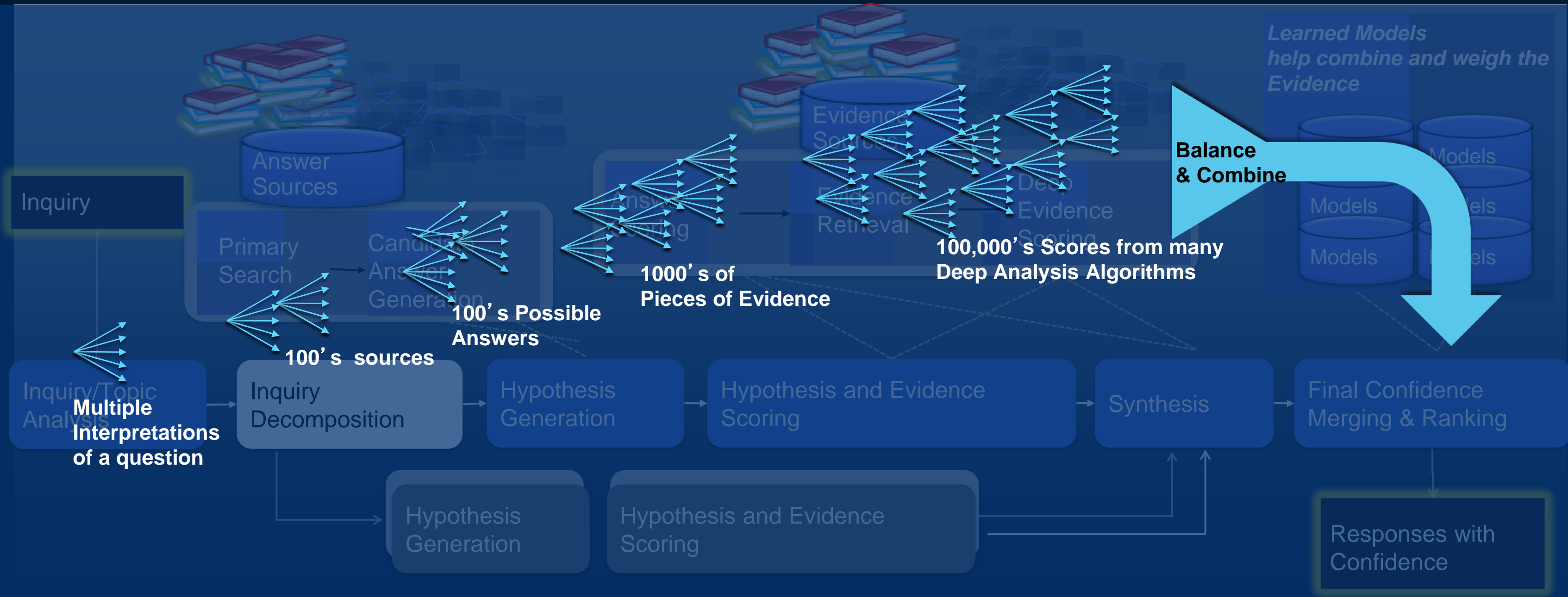
Para-
phrases

Geo-KB

Kappad Beach

Vasco da Gama

DeepQA Architecture for Question Answering

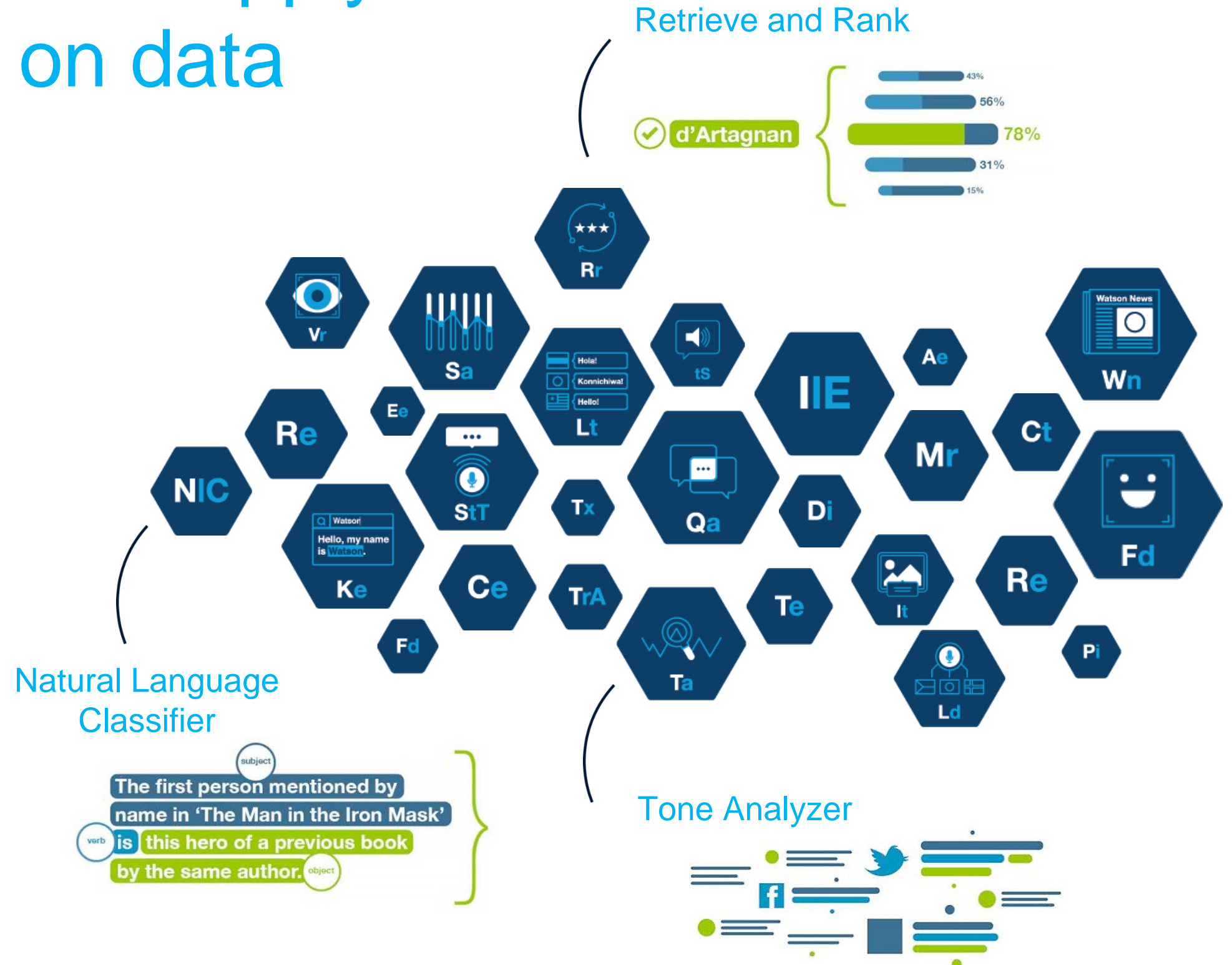


Leverage Watson APIs to apply cognitive capabilities on data

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
AlchemyData News
Tradeoff Analytics
Conversation



Conversational apps

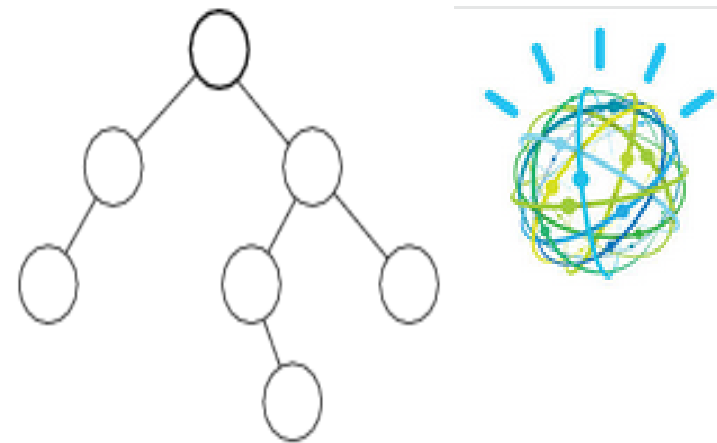
**Speech to Text,
Text to Speech**



Phone, Text, Chat



Conversation



How do I open an account?
Convert Speech to Text

Identify Intent

- Intent = "Open_Account"
- Confidence: 0.876655900

Dialog tree walks user to desired outcome

- Intent="Open_Account"
- Context = "Online Banking"
- Dialog could call a DB or CMS

Explore & Discover



Answer Retrieval

Community Fork on GitHub

🔍 Travelling to Peru should I include Brazil in my trip?

[Random query](#)

Compare the top Watson result to a standard Solr search on Stack Exchange.

Retrieve and Rank with Custom Scoring

Standard Search

You're asking for opinions which are very personal. But... Peru has plenty to offer. You're probably flying into Lima but not one person I've ...

[See full answer](#)

🔍 Rank 1 | ▲ 3

The official answer appears to be NO strong . I e mailed the Brazilian Consulate in Houston and this was their ambiguous response Dear Sir M ...

[See full answer](#)

🔍 Rank 1 | ▲ 5

Show More Results

IBM



IBM Watson News Explorer

recent news about

Current Events

investigate

advanced [+]



Trending Queries

- IBM and blockchain
- IBM
- Harry Potter
- Donald Trump
- Puppet
- Devops
- Nice
- Syria

Trending Connections

- Donald Trump + Vladimir Putin
- IBM + Apple
- Melania Trump + Michelle Obama
- virtual reality + education
- Donald Trump + Hillary Clinton
- Stephen Hawking + IBM
- siriusxm + spotify
- korea + thaad

Breaking News

Current Events:

Art and Entertainment:

Business and Industrial:

Education:

Finance:

Health and Fitness:

Law, Government and Politics:

Religion and Spirituality:

Science:

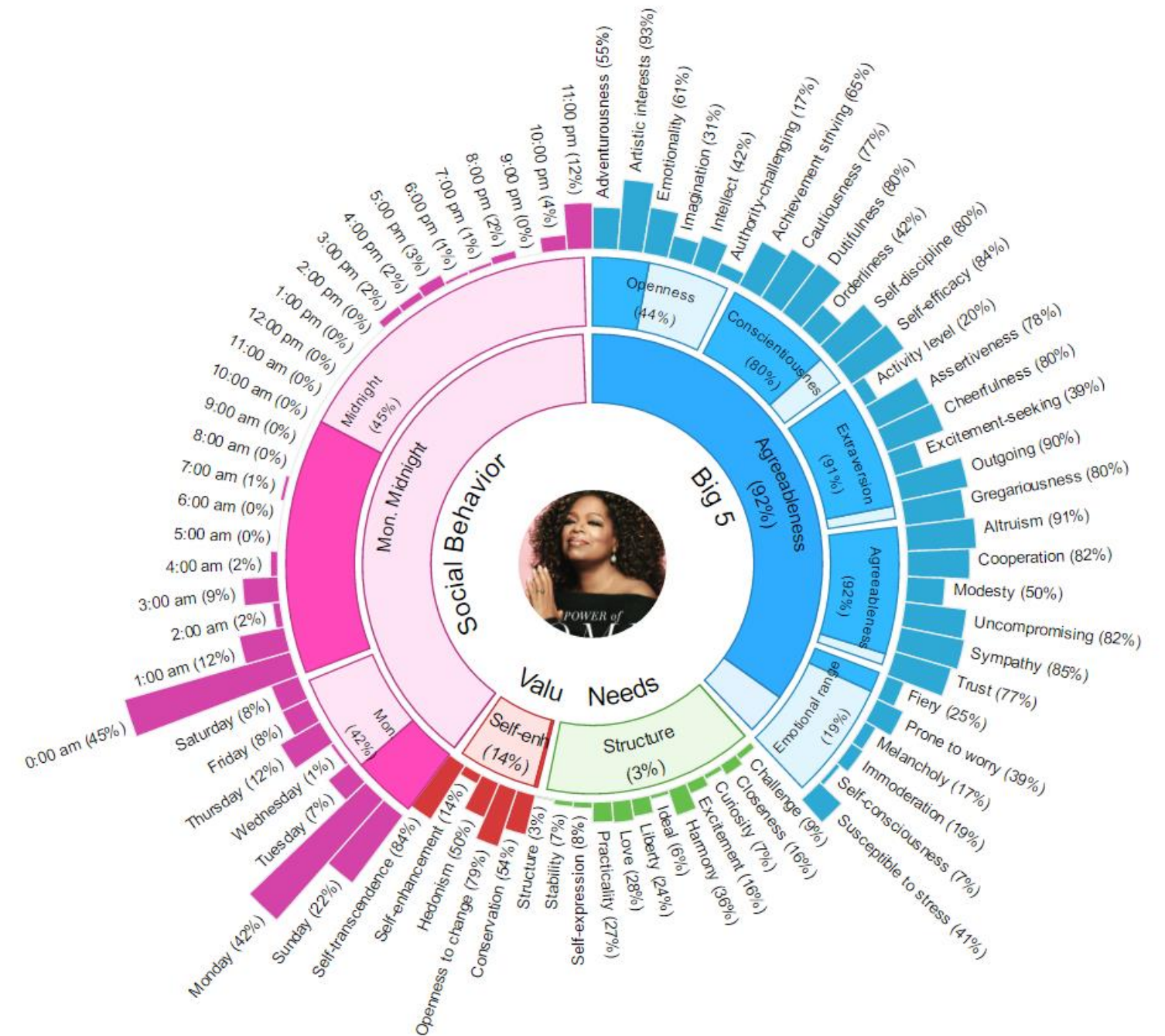
Sports:

Technology and Computing:

Donald Trump Republican party Hillary Rodham Clinton
Donald Trump Star Trek San Francisco Museum of Modern Art Jon Carroll
LinkedIn Celtics DuPont Dow Chemical Company
STANFORD Lili Thompson Tara VanDerveer Mark Halvorson Karlie Samuelson Erica McCall
Dow Jones Industrial Average Health care CalPERS
San Francisco Museum of Modern Art AIDS Survivors
San Francisco Museum of Modern Art LinkedIn
Panchen Lama Free Tibet Dalai Lama Xinhua News Agency
National Weather Service Wind sun Mike Brancati Lighthouse Alyssa Hoyt Frank Orefice
Red Sox Giants Los Angeles Dodgers Baseball statistics Matt Cain New York Yankees
Facebook Nintendo Niantic Tesla Motors Elon Musk Autopilot

Emotion, Tone & Personality

<express-as type="Apology"> I am sorry to inform you that the items you requested are back-ordered. We apologize for the inconvenience.**</express-as><express-as type="GoodNews">**Because we want you to be a happy customer, management has decided to give you a 50% discount! **</express-as>**



Tone Analyzer



YELP REVIEW #1

Wonderful spot down in the east village.

I have only been to this location but I hear that all of their locations are just as good.

Cute little restaurant, with a clean white feel.

The food was great.

The service was great.

They have a few tables outside which are perfect on a summer afternoon for lunch.

It can get a little crowded so i recommend going at on off hour.

(late lunhc, early dinner).

I had the chicken burger, which i highly recommend.

The salads looked phenomenal as well.

Sweet potatoes fries were delicious.

Great staple in the area.

Good for small groups and couples.

YELP REVIEW #1 ----- 92% JOY

YELP REVIEW #2 ----- 62% JOY

YELP REVIEW #3 ----- 54% DISGUST

YELP REVIEW #4 ----- 59% DISGUST

YELP REVIEW #5 ----- 70% ANGER

YELP REVIEW #6 ----- 81% JOY

YELP REVIEW #7 ----- 57% JOY

YELP REVIEW #8 ----- 93% JOY

Visual Recognition



Examples of BASEBALL



Examples of CRICKET



What will you do with Watson?