

Data Dr

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ENGINEERING

Electrical Engineering & Computer Science

Professor, Computer Science

narrative  science

Chief Scientist, Co-Founder

My Point of View

Don't focus on the technology

Focus on the functionality

The functionality is driven by business needs

The functionality is supported by algorithms & data

The algorithms are instrumental to business

The current AI message

Be afraid

Tech Chart of the Day

Probability Robots Will Take Your Job In Next 20 Years, 1=Certain

Telemarketers



- Management, Business, and Financial
- Computer, Engineering, and Science
- Education, Legal, Community Service, Arts, and Media
- Healthcare Practitioners and Technical Service
- Sales and Related
- Office and Administrative Support
- Farming, Fishing, and Forestry
- Construction and Extraction
- Installation, Maintenance, and Repair
- Production
- Transportation and Material Moving

400M

← Low →
33% Employment

← Medium →
19% Employment

← High →
47% Employment

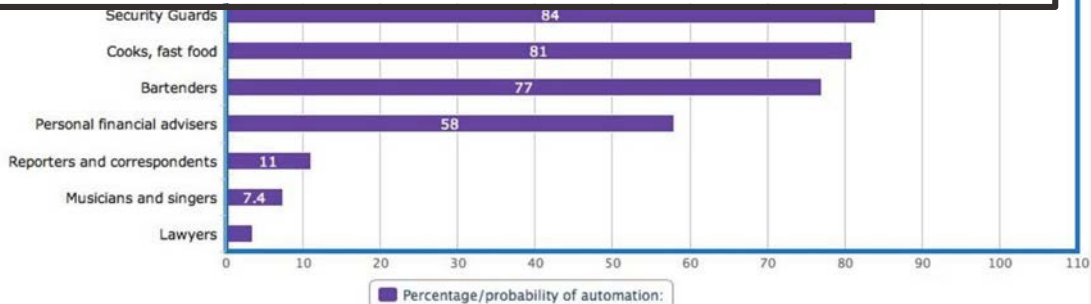
5 Industries A.I. Will Disrupt in the Next 10 Years

Is your industry on the list?

Does your job mainly require you to:

- Squeeze into small spaces?
- Assemble objects?
- Manipulate small objects?

✗ Your job is at higher risk of automation



meta-chart.com

Everyone is falling behind

CIOs Must Put AI on the Fast Track

By Samuel Greengard | Posted 06-15-2017  Print  Email

 Share  1  Tweet  1

CIOs must begin to formulate their business practices and t

Survey: companies want to implement more AI, but struggle

Survey shows half of UK firms expect AI to transform their industry

Navigating disruption in the financial industry with Artificial Intelligence

Artificial Intelligence Will Impact Future Company Valuations

Artificial intelligence and the coming health revolution

June 19, 2017 by Rob Lever

Northwestern University

It is very, very complex



Carlos E.
Deep Learning

Bayesian

FEBRUARY 1



Conference

al networks

Companies have AI issues

The C-Suite needs an “AI” strategy

Engineering wants to get its hands on Machine Learning

Marketing wants to include “AI” in product descriptions

Product is afraid of falling behind

Everyone is pitching you technology

Artificial Intelligence

Systems designed to perform actions that, if performed by humans, would be considered intelligent

And what makes us so smart?

We can:

- Make decisions
- Understand language
- Draw inferences
- Diagnose problems
- Explain the past
- Understand the present
- Plan for the future

The Tasks of Intelligence

Sensing


Language
Understanding

Learning
Planning
Problem Solving
Knowledge
Inference
Decision Making

Language
Generation

Control

Robotics



All of this is driven by our ability to learn from the past to characterize the present and predict the future.

This link to learning
holds for Machine
Intelligence as well

Nearly all of the work in AI
we see today is based on
successes in Machine
Learning

Why/How? learning
holds for Machine
Intelligence as well

Mostly all of the data AI
requires today is based on
trends in Machine
Learning



Self Driving Cars



Intelligent Factories



Insurance

AI Winter





A Sea Change

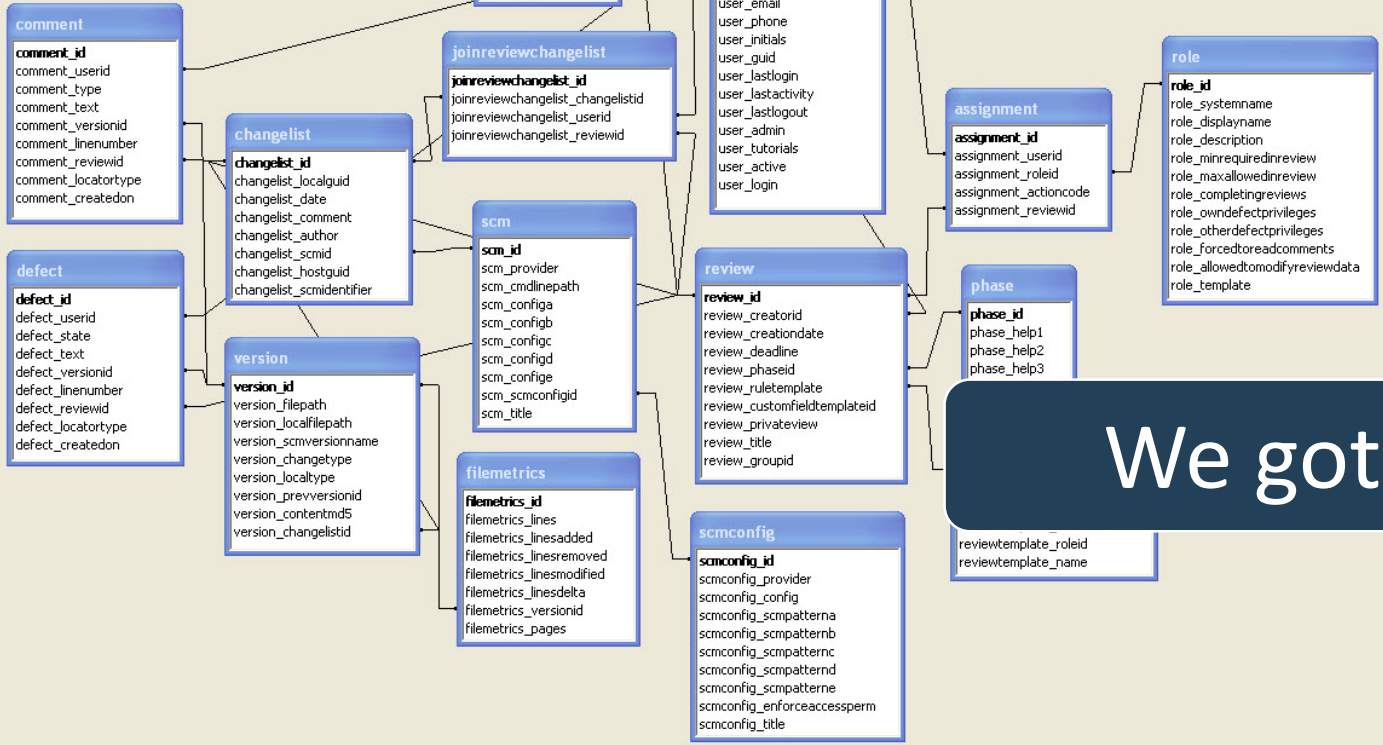
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We wanted Information

We got data

We wanted Information



est
who
are
we

We got data

reviewtemplate_roleid
reviewtemplate_name

The machine's world

Router Data
Network Utilization
Transactions
Passwords
Utilization logs
Pages Viewed
Application Use
Searches
Crime
Punishment
Up time
Demographics
Your car
Psychographics
Your searches
History
Types of stories
Stocks
Your home
Jobs
Your body
Sales
Salaries
Emigration
Housing
Education
Drug effectiveness
War
Your DNA
Health
Drug effects
Sports
Outcomes
Actions
Census
Traffic



- 2.5 Zetabytes of data are produced every day



250,000 Libraries
of Congress,
every day

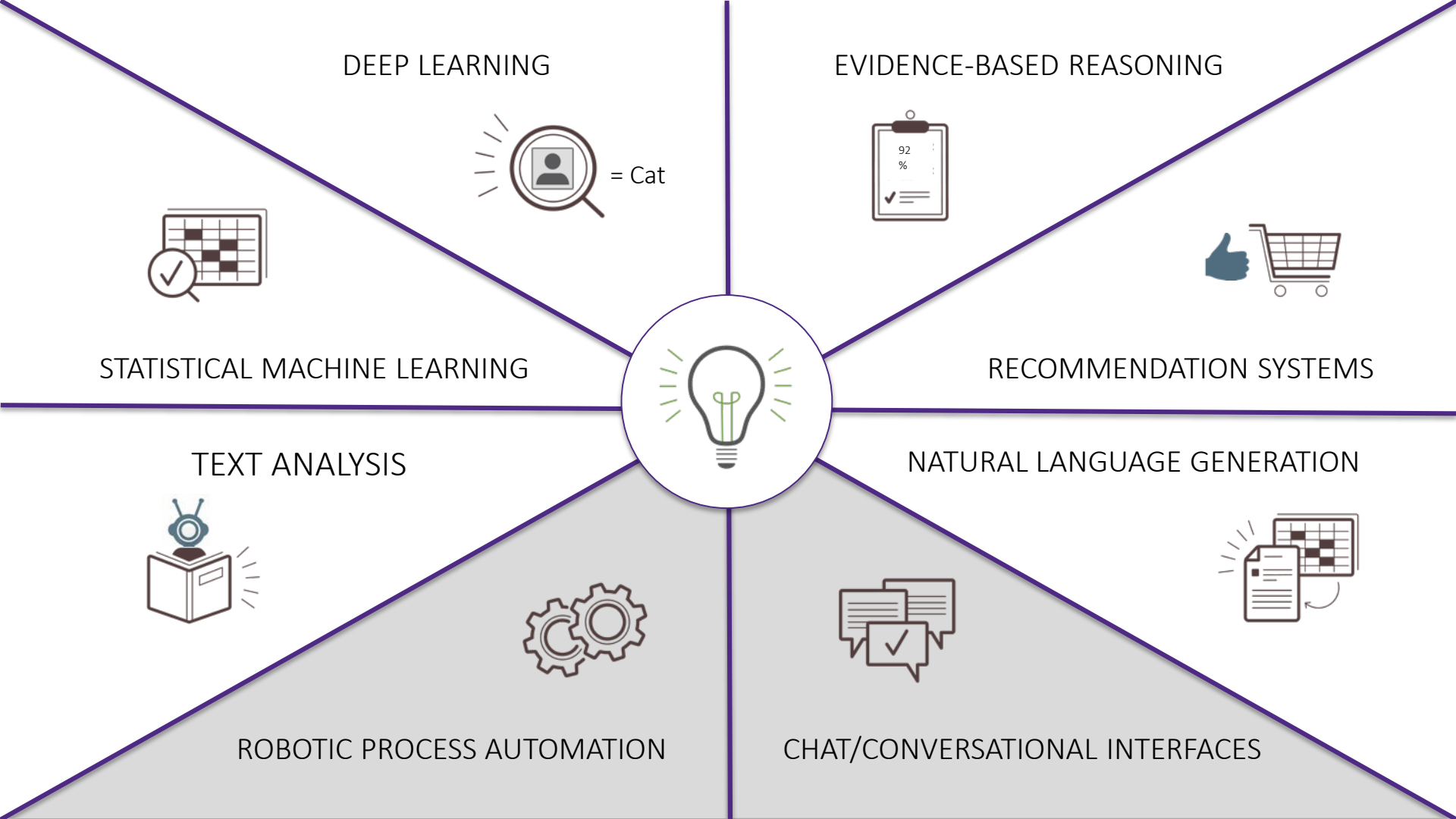


500 books a day
for every person
on the planet

The machine captures
everything about the world that
can be metered or monitored

And we are trying to meter
everything

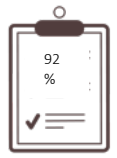




DEEP LEARNING



EVIDENCE-BASED REASONING



RECOMMENDATION SYSTEMS

NATURAL LANGUAGE GENERATION



CHAT/CONVERSATIONAL INTERFACES



ROBOTIC PROCESS AUTOMATION

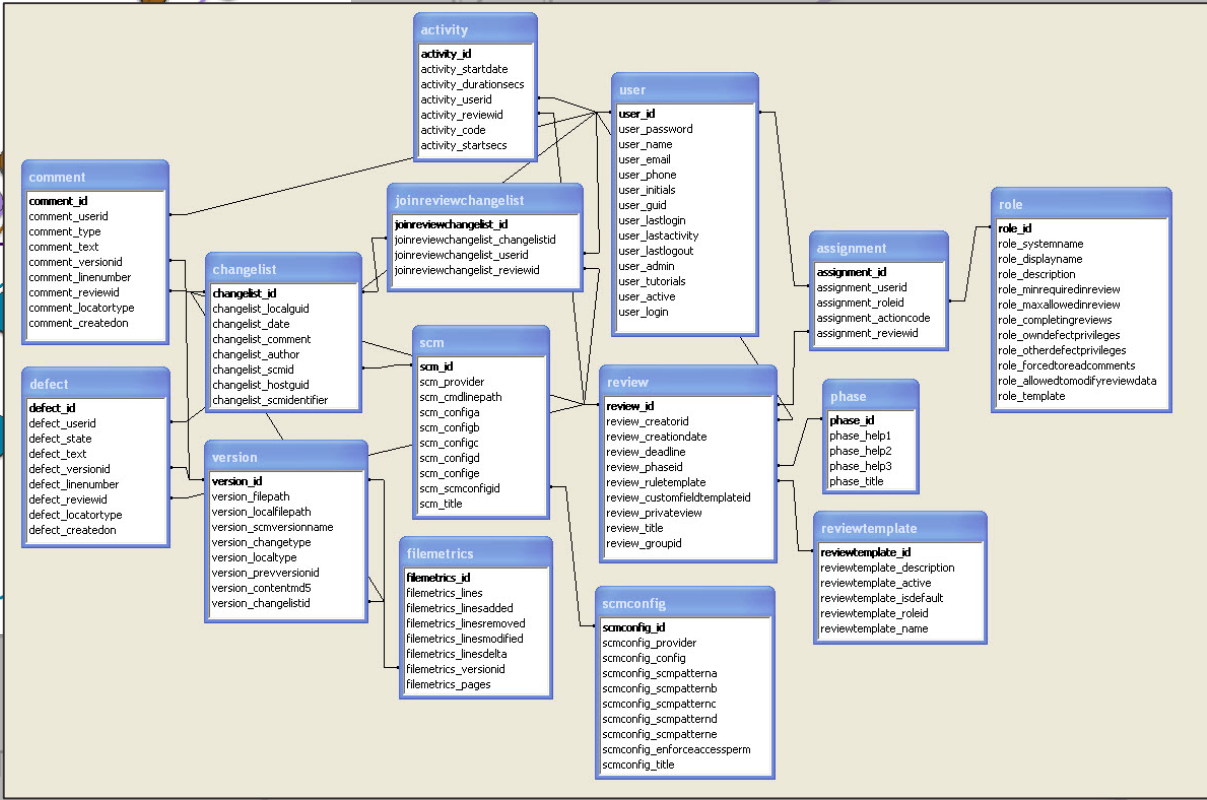
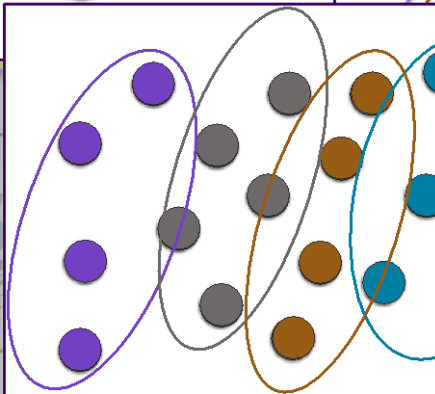
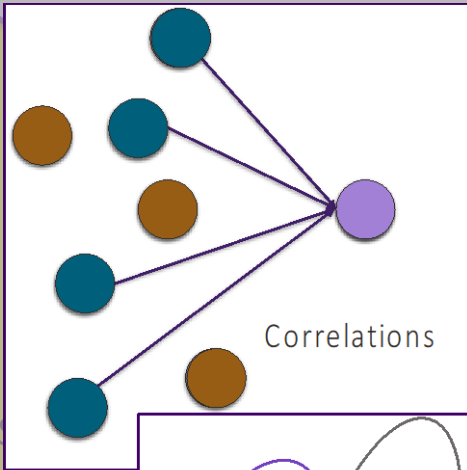


TEXT ANALYSIS

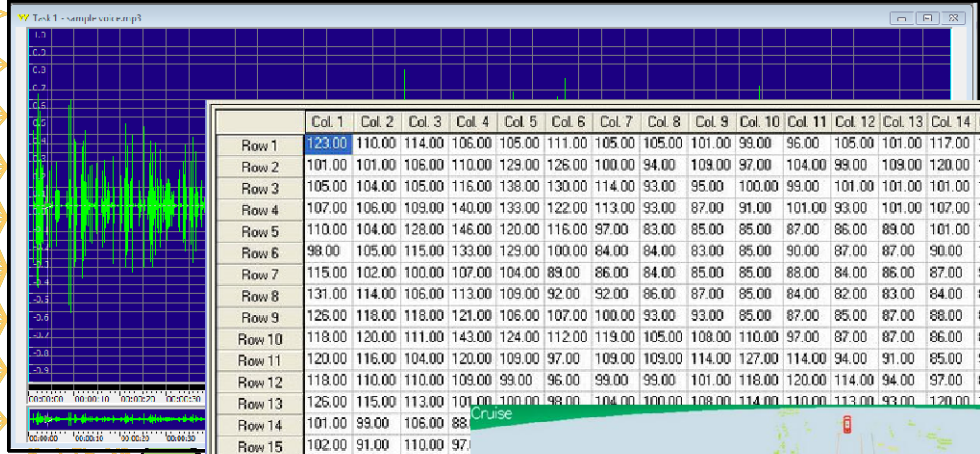
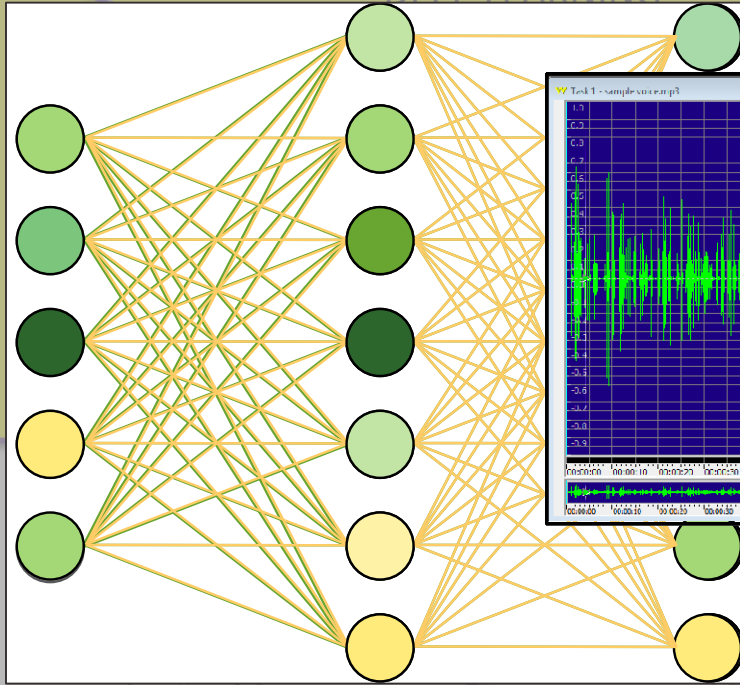


STATISTICAL MACHINE LEARNING

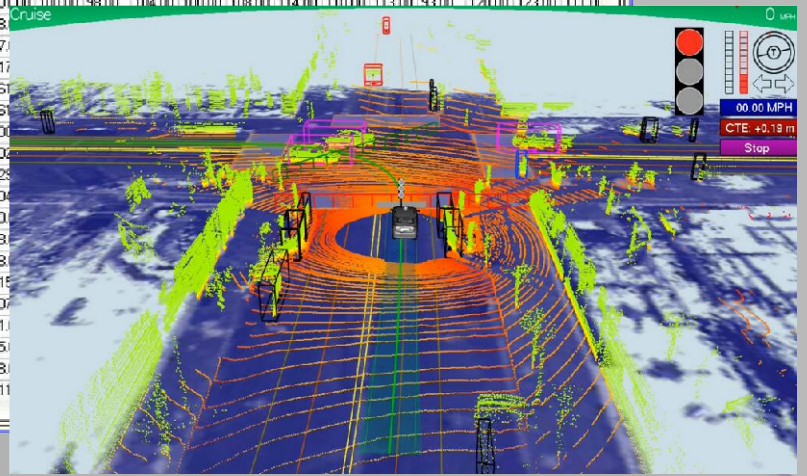




Statistical Machine Learning



SYSTEMS



Deep Learning

Tattoo

Ticket

Cologne

Pin

Spain

From Wikipedia, the free encyclopedia

For c

"Esp

Middle Ages: Muslim era and Reconquista

Main articles: [Al-Andalus](#) and [Reconquista](#)

Spain (↗)

largely l

small ter

small lan

[Portugal](#)

coastline

Spanish

the Africa

[Alborán](#),

In the 8th century, nearly all of the [Iberian Peninsula](#) was [conquered](#) (711–718) by largely [Moorish Muslim](#) armies from North Africa. These c

were part
invasion.

Under Isla

religi

Conversio

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The Musl

the bulk o

History

Main article: [History of Spain](#)

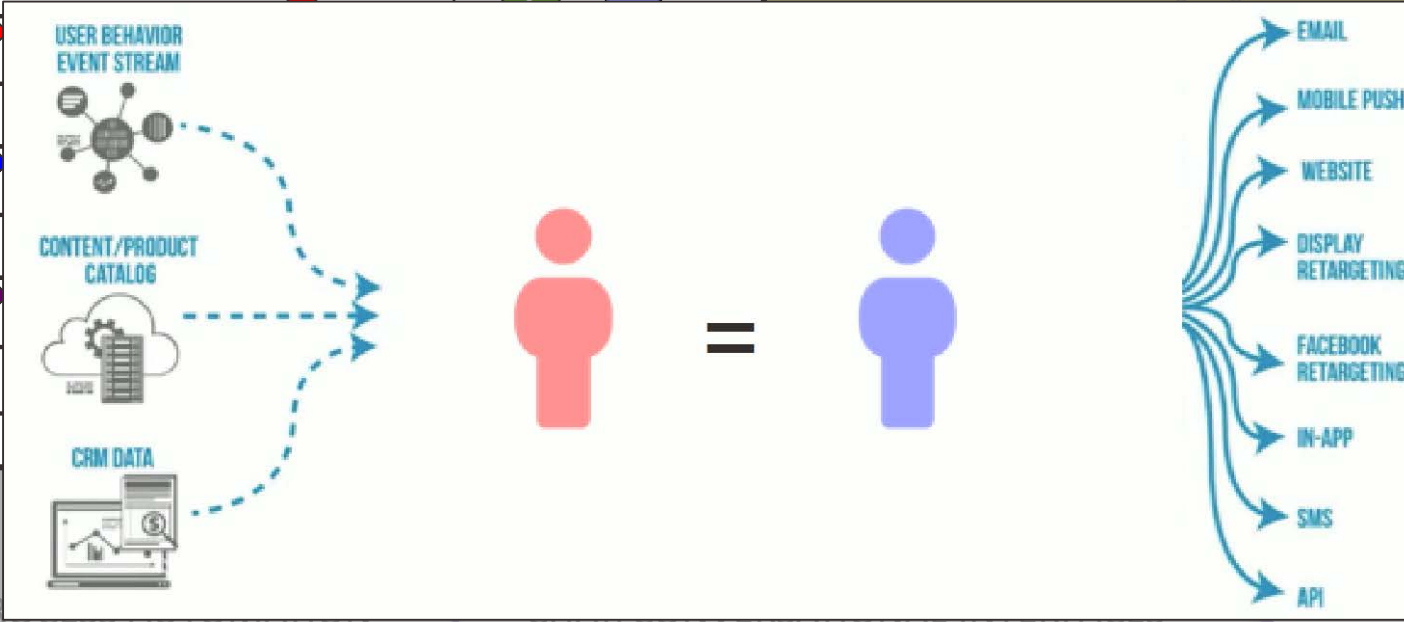
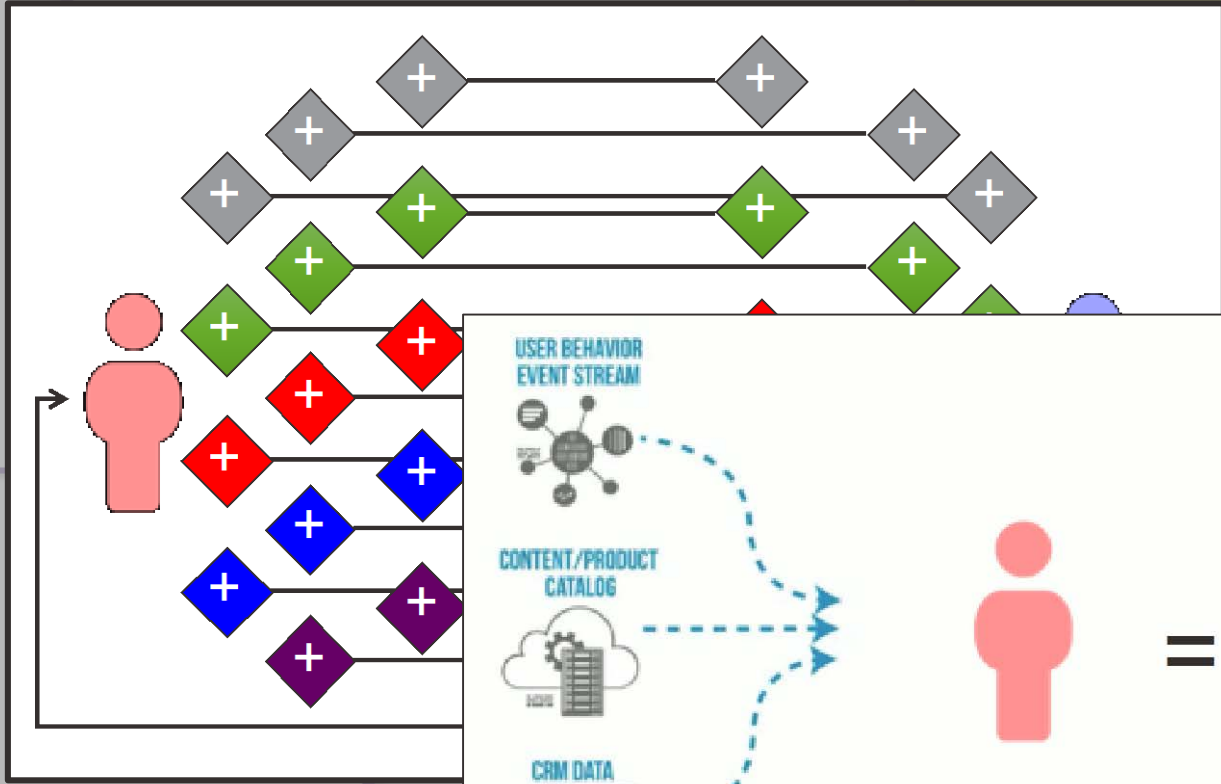
Iberia enters written records as a land populated largely by the [Iberians](#), [Basques](#) and [Celts](#). After an [arduous conquest](#), the penins was under the rule of the [Roman Empire](#). During the early Middle Ages it came under Germanic rule but later, much of it was conquered by [Moorish](#) armies from North Africa. In a process that took centuries, the small Christian kingdoms in the north gradually regained control of the peninsula. The last [Moorish](#) kingdom fell in the same year Columbus reached the Americas. A global empire began which saw Spain become the strongest power in Europe, the leading world power for a century and a half, and the largest overseas empire for three centuries.

Continued wars and other problems eventually led to a diminished status. The Napoleonic invasions of Spain led to chaos, triggering independence movements that tore apart most of the empire and left the country politically unstable. Prior to the Second World War, Spain suffered a civil war and came under the rule of an authoritarian government, which oversaw a period of stagnation that was followed by a surge in the economy. Eventually democracy was peacefully restored in the form of a parliamentary constitutional monarchy. Spain joined the European Union, experiencing a cultural renaissance and steady economic growth.

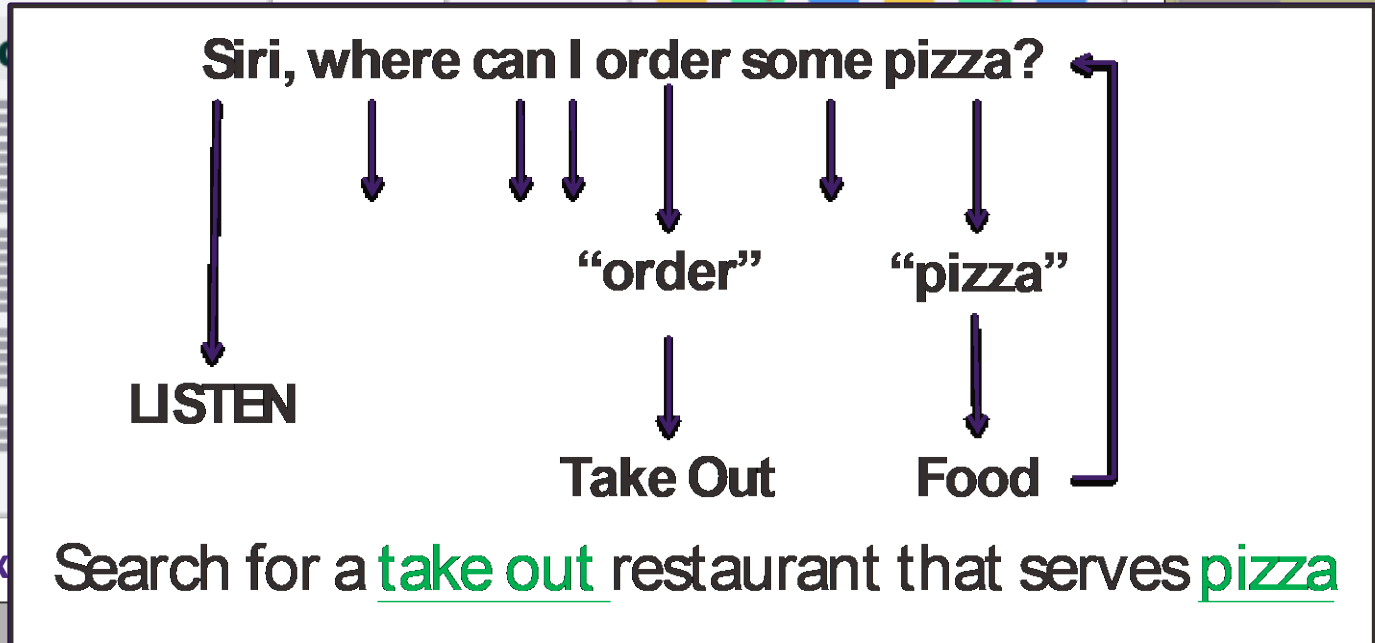
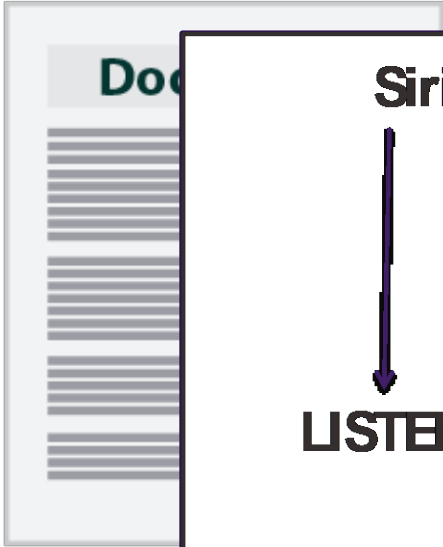
Evidence Based Reasoning

AUTOMATION

CHAT/CONVERSATIONAL INTERFACES



Recommendation



Search for a take out restaurant that serves pizza

Text Analytics

Intent Extraction

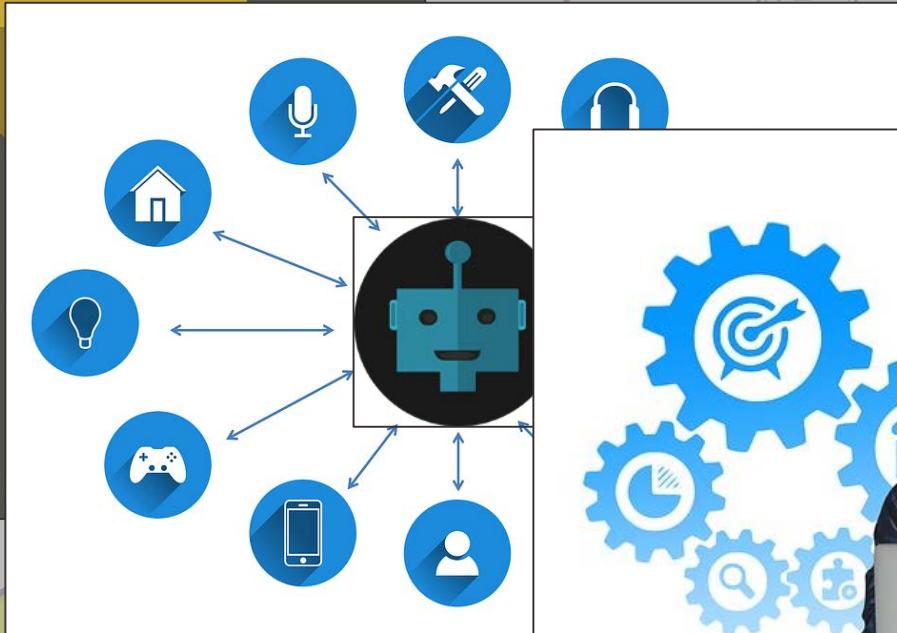
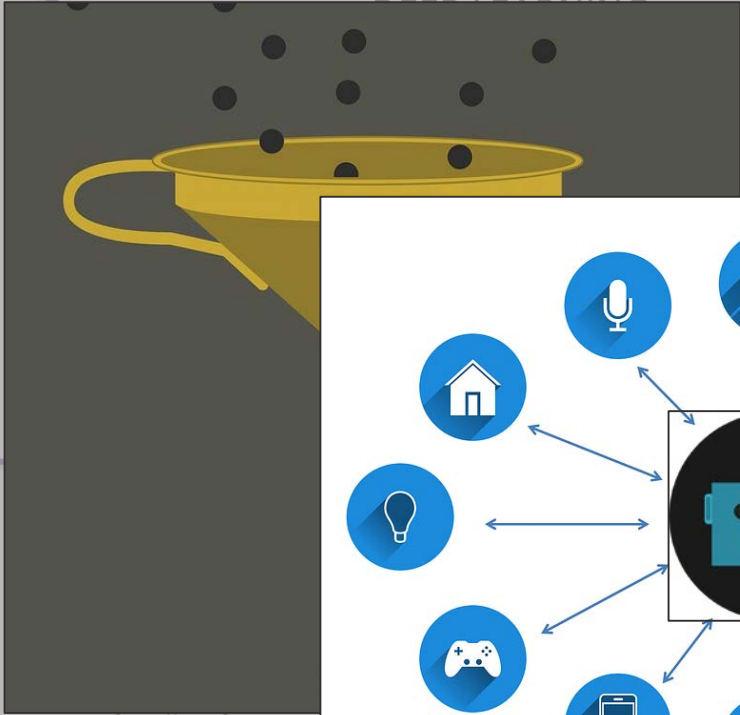
Quarter	Product	Sales
Q1	ID_0075	\$ 2 500 000
Q2		
Q3		
Q4		
Q1		
Q2		
Q3		
Q4	ID_0078	

While still slightly better than sales of the small light widget, sales of the overly large widget have been on the decline over the last year. During the same period, sales of the small light widget have been steadily improving.

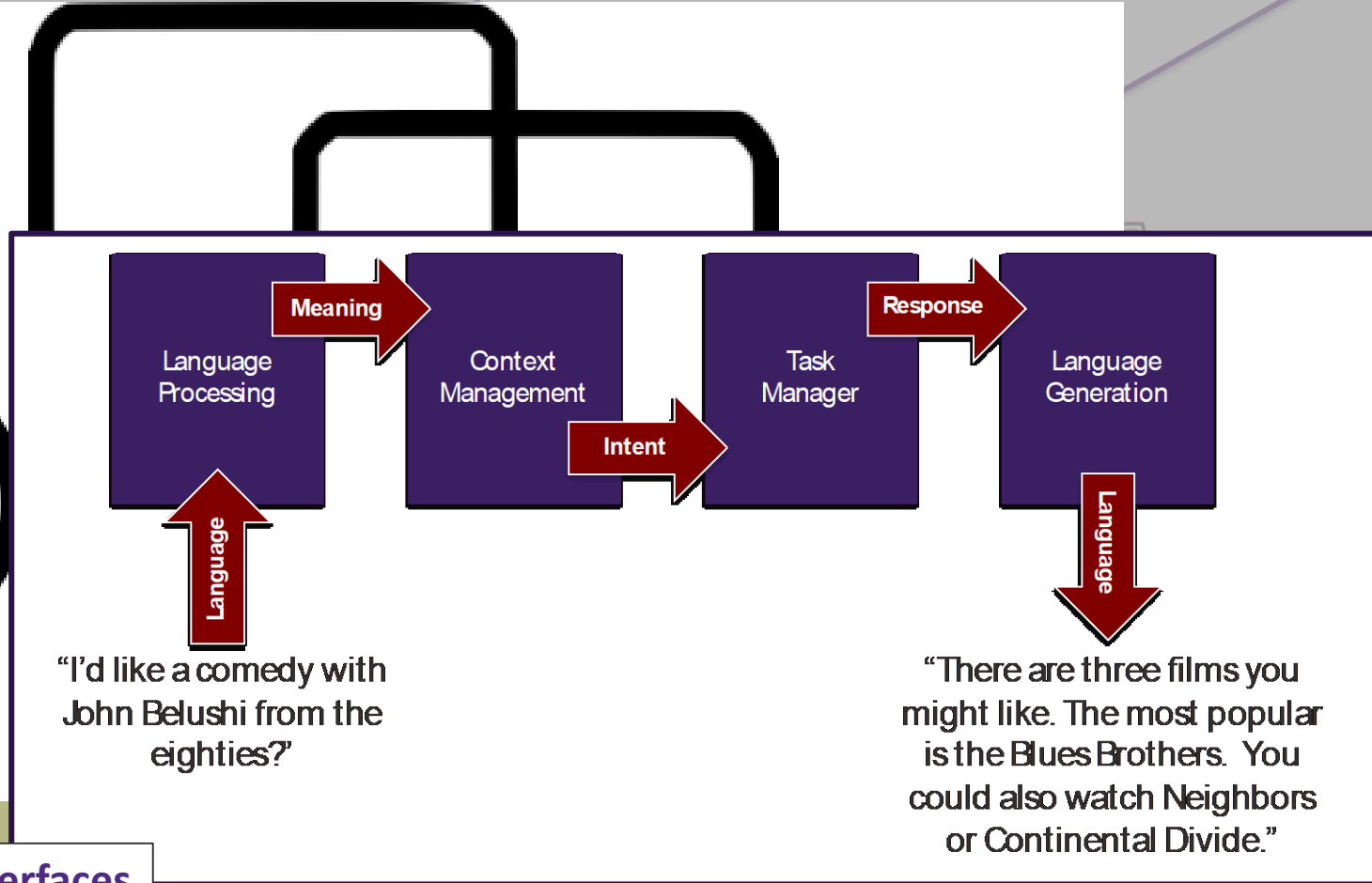
Natural Language Generation

EVIDENCE-BASED REASONING

Cat



Robotic Process Automation ATOMATION



Conversational Interfaces



The new AI technologies are driven by data and analytics

Machine Learning basics

Historical Data



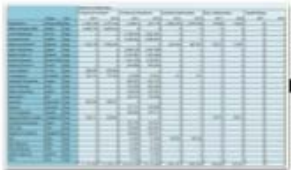
Training



Prediction



New Data



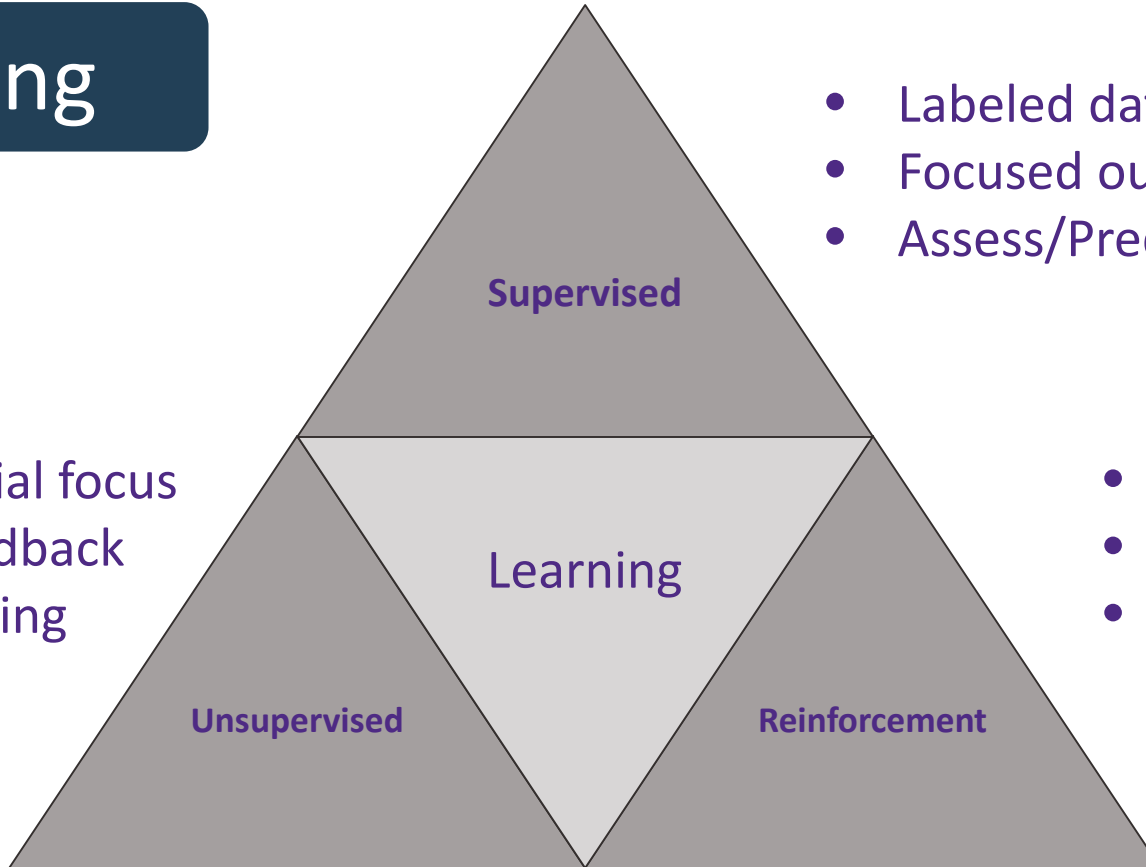
Re-Training



Machine Learning
is at the fore of
most of them

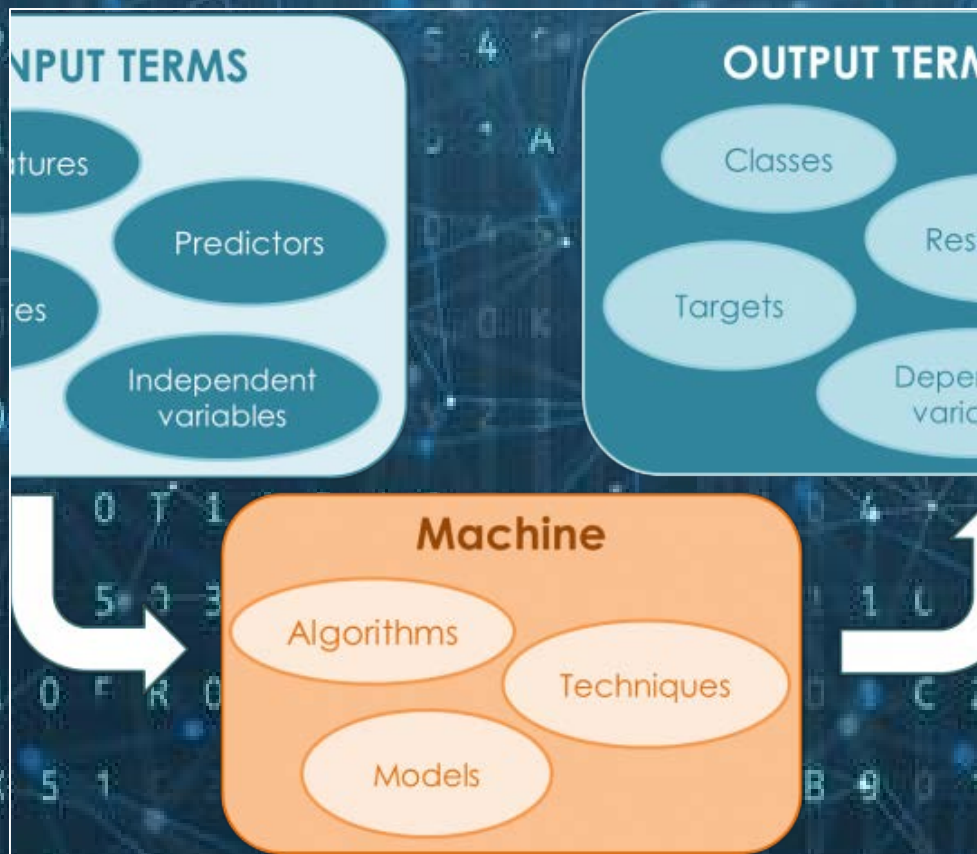
Learning

- No initial focus
- No feedback
- Clustering

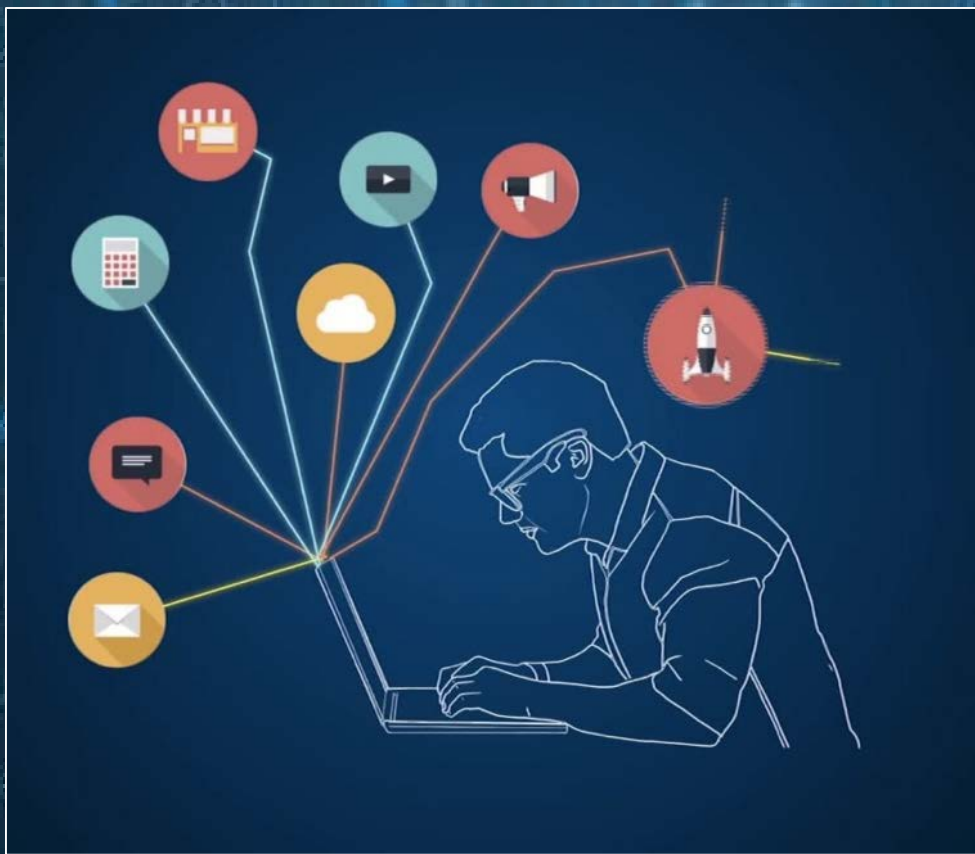


- Labeled data
- Focused outcomes
- Assess/Predict

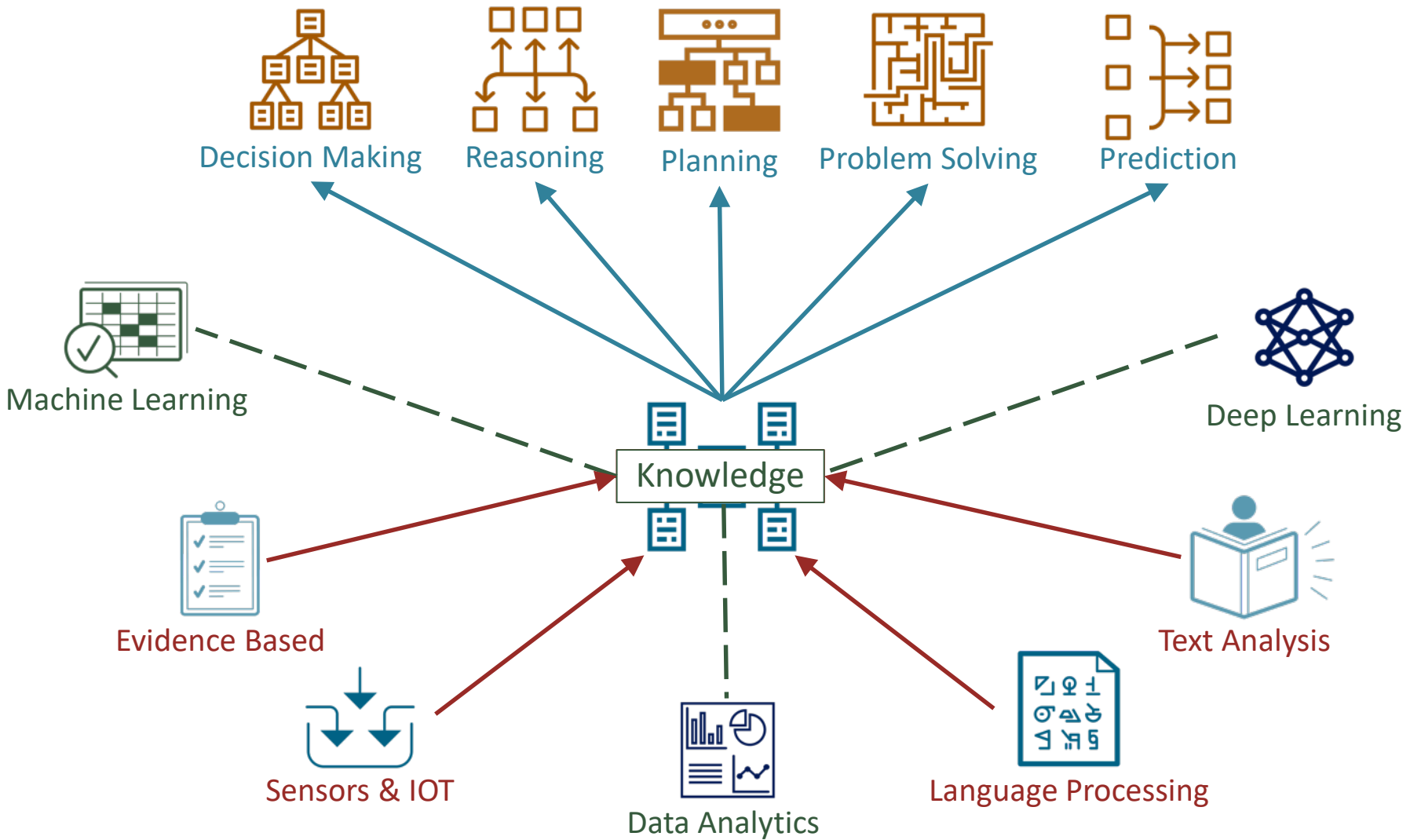
- Action/Results
- Reward function
- Learning for planning or action



But we don't
solve problems
with Machine
Learning



We solve
problems with the
rules and
knowledge that
ML builds



Each step supports the next



Partnership

Reasoning

Machine Learning

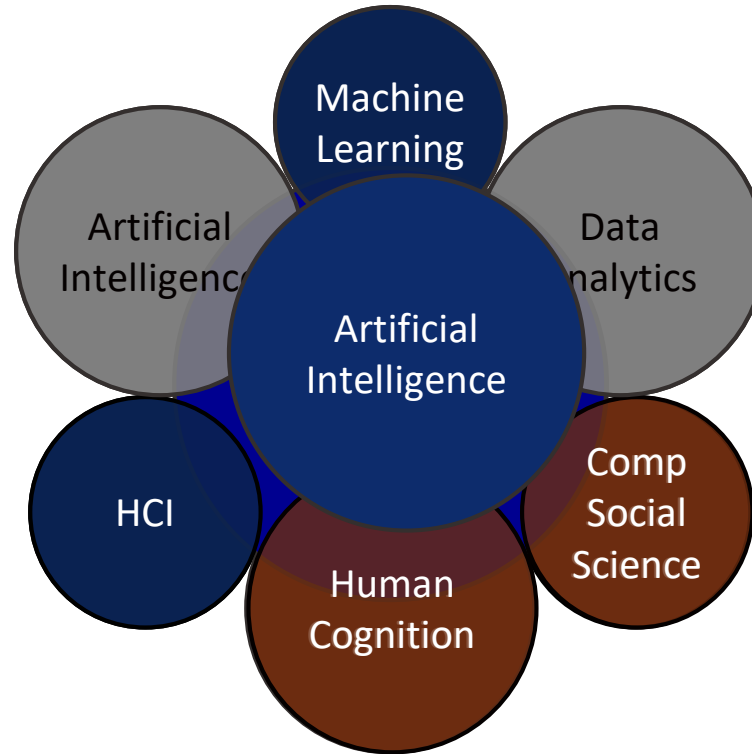
Data and Analytics

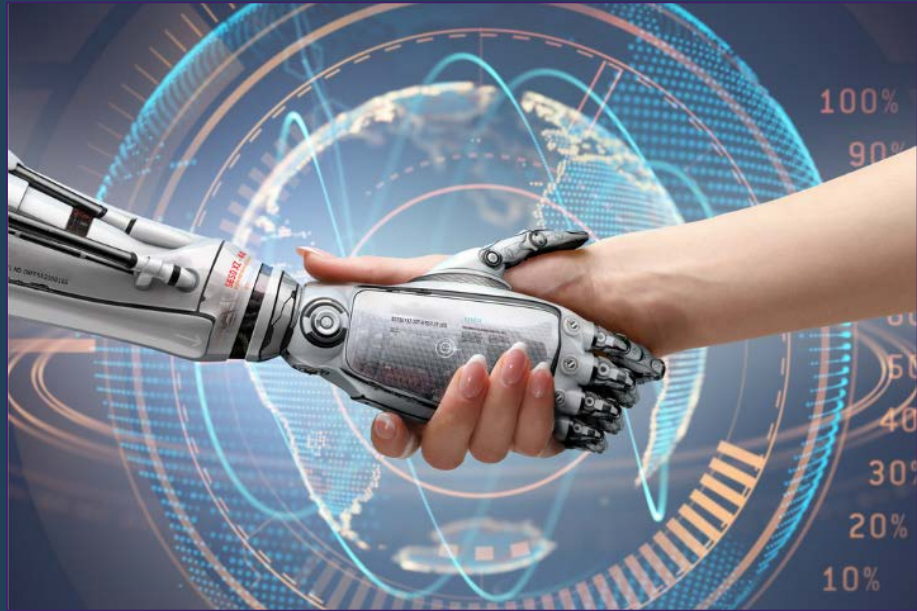




Intelligent systems that work with people need to integrate analysis, reasoning and interaction

Integrated Intelligence





Integration leads to
partnership