Data Science Workshop

Data Science, a Digital Transformation enabler

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ISEN
ALL IS DIGITAL!
MÉDITERRANÉE

CEOs are asking three critical questions

1 Is my strategy ambitious enough?	→	Innovate the Experience and the Business Model
2 Is my execution fast enough?	→	Leverage the Ecosystem and Digital Technology
3 How do I transform my people and their capabilities?	→	Grow the Digital Reinvention Drivers, whose the key driver: **Data Science**

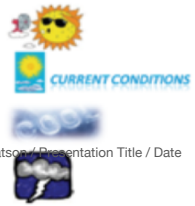
Experiences are being transformed by Big Data & Analytics

A coffee house chain delivers design-thinking developed experiences empowered by cognitive analytics that leverage internal and external data

Retail Example

1. Model Builder

Cognitive analysis reads local news, pulls weather and social data and combines it with loyalty data to build a predictive model



2. Predictive/Cognitive Model

Josie likes smoothies and frozen coffes on a hot day after a ball game, especially if her favorite barista, Rafe, is working

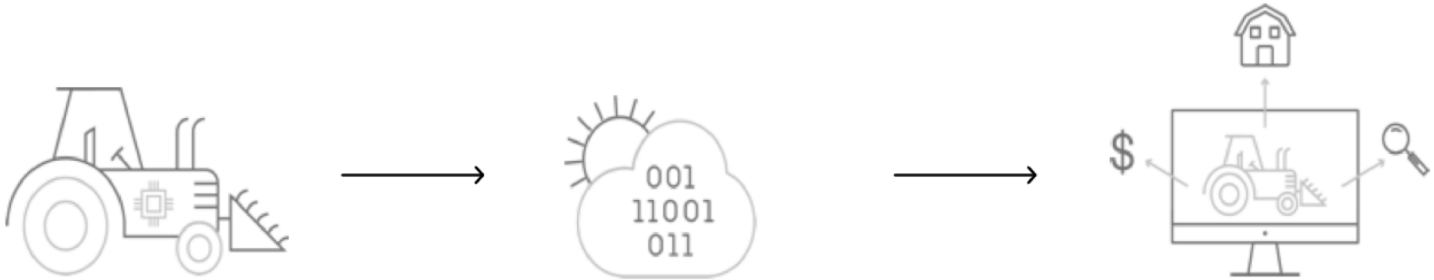
3. Real-time Offers

It is 3 PM on a Sunday and Josie is 2 blocks from a coffee outlet. A mobile alert is sent with a discount offer and to let her know Rafe is there

Internet of Things is altering business models

Analytics, IoT and Cloud transformed a farm equipment manufacturer into an information publisher that enables farmers and suppliers around the world to improve crop yields

Industrial Example



Sensor data
- Downtime
- Soil conditions
- Crop features

External Data and analytics
- Local weather
- Market prices
- Retailer needs

Information sold to
- Farmers
- Agribusiness
- Retailers

Better Operations
- Reduced equipment down time
- Improved fuel economy
- Higher crop yields

Better Business
- Optimal harvest timing
- Tuned packaging
- Better price realization

Better Strategy
- New Business Model
- New Ecosystem
- New Revenue Stream

The customer Experience FIRST

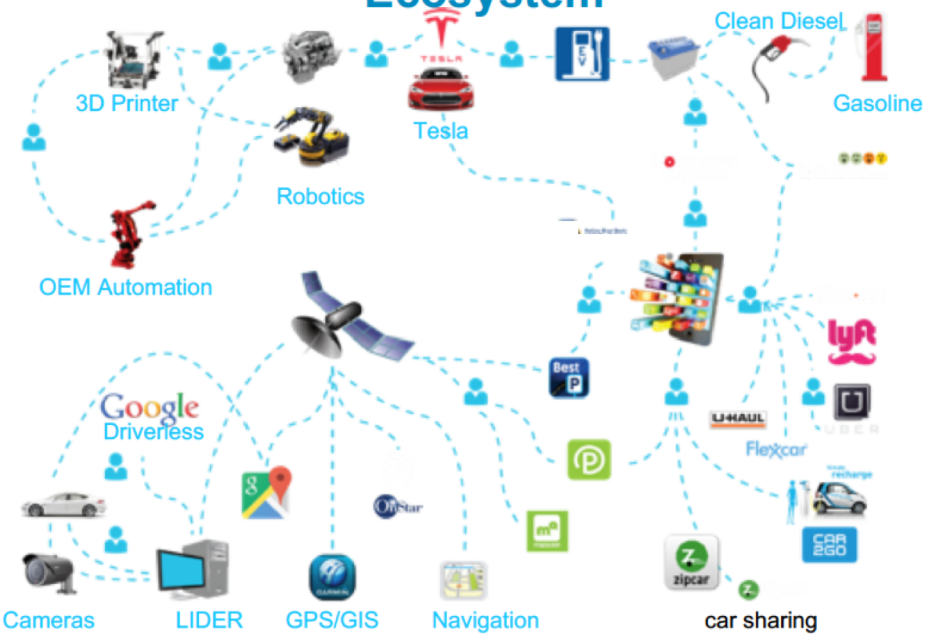
World's largest taxi company…	World's most popular media owner…	World's most valuable retailer…	World's largest accommodation provider…	World's largest <Your Industry Here>, …
owns no vehicles	creates no content	has no inventory	owns no real estate	has no ??
UBER		Alibaba.com	airbnb	?

The automotive industry illustrates the shift to ecosystems

Automotive Example

Traditional Automotive Value Chain

Emerging Mobility Ecosystem



Data Science – Business Challenges

Industry Use Cases

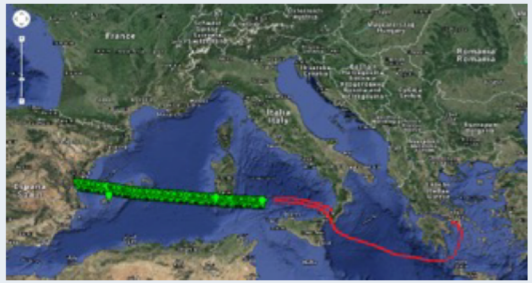
Examples

Example 1	Predictive Maintenance
Objective	The customer, a **multinational company operating worldwide in rail transport markets**, wished to introduce Predictive Maintenance in its service contract in order to **increase asset availability**, **reduce maintenance cost** and **improve customer satisfaction**

Solution	Design and Implementation of an Predictive Maintenance solution which answers to the following criteria of success:
	- To detect abnormal values for a given train compared to its past behaviour or compared to other trains.
	- To **predict** and **explain** with a **significant probability** a failure on a train the day before with a probability greater than 80%.
	<u>Methodologies</u>:
	- Data Collection & Integration (Event Data)
	- Data Exploration (technical and functional cleaning, creation of variables, Selections,…)
	- Feature Engineering
	- Alert Detection steps:
	  - The first approach consists in classifying alerts and finding anomalies that helps to understand different behaviours of alerts (or type of alerts)
	  - The second approach consists in finding patterns of alerts (or types of alerts)
	- Results evaluation
	 

Example 2	**Fraud detection**
Objective	The customer, an **Insurance Health company**, wished to build and operate a unique platform for **Fraud & Abuse Management**
Solution	Design and Implement a counter fraud management platform, based on demand of reimbursements. Methodologies: - Business rules helping to detect suspicious cases, tuned with statistical information (mean, standard deviation, ….) - Anomaly detection (from a mathematical point of view) in behavior that could indicate fraud - Known business rules and indicators and creates suspicious cases scores / profiles of practitioners - Design and Implementation of a meta-score calculation allowing to target the most relevant suspicious cases - Operational Reporting for managing the fraud (health practioner and beneficiaries)  

Examples

Example 3	Operational efficiency
Objective	The company, a **worldwide container transportation and shipping company**, wished to find the way to **optimize vessels roads and so decisions to take during the navigation of vessels**.
Solution	Design and Implementation of an Analytics solution which provides destination harbors prediction at each vessel position, from marine traffic open data (AIS data). <u>Methodologies</u>: - Exploration (company's own vessels, competitive vessels, Harbors, Marine Traffic, ..) - Design and implementation of the Analytics foundation (business rules, data quality, data creation, ...) - Destination harbor prediction by harbors affinity - Destination harbor prediction by vessel's path learning (prediction at each maritime position) - Map visualization of Destination harbor prediction 
Example 4	**Customer knowledge**
Objective	The company, a **worldwide retail company which sells toys,** wished to **improve marketing campaign ROI and the customer knowledge.**
Solution	Design and Implementation of an Analytics solution which provides consumers profiles and next best action. <u>Methodologies</u>: - Business rules - Data Exploration (Technical and functional cleaning, creation of variables, Selections,...) - Macro segmentation (strategical segmentation) - Micro segmentation (consumer profiles) 

Data Science – What does it mean?

Definition

Data Science is

the practice of various **scientific fields**,

their **algorithms, approaches and processes**,

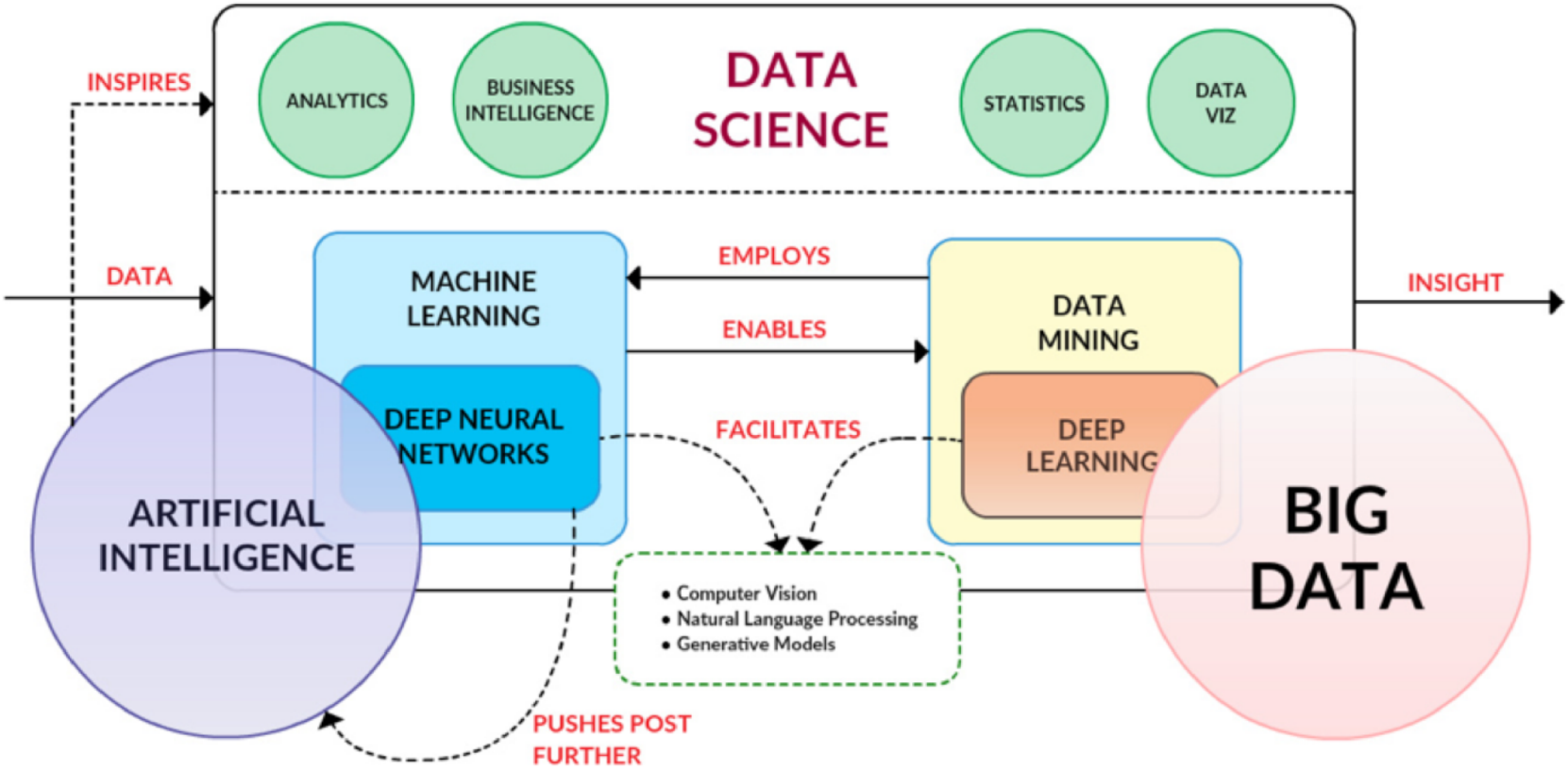
through the use of **programming languages and softwa**re frameworks,

that aims to **extract knowledge, insights and recommendations** from data,

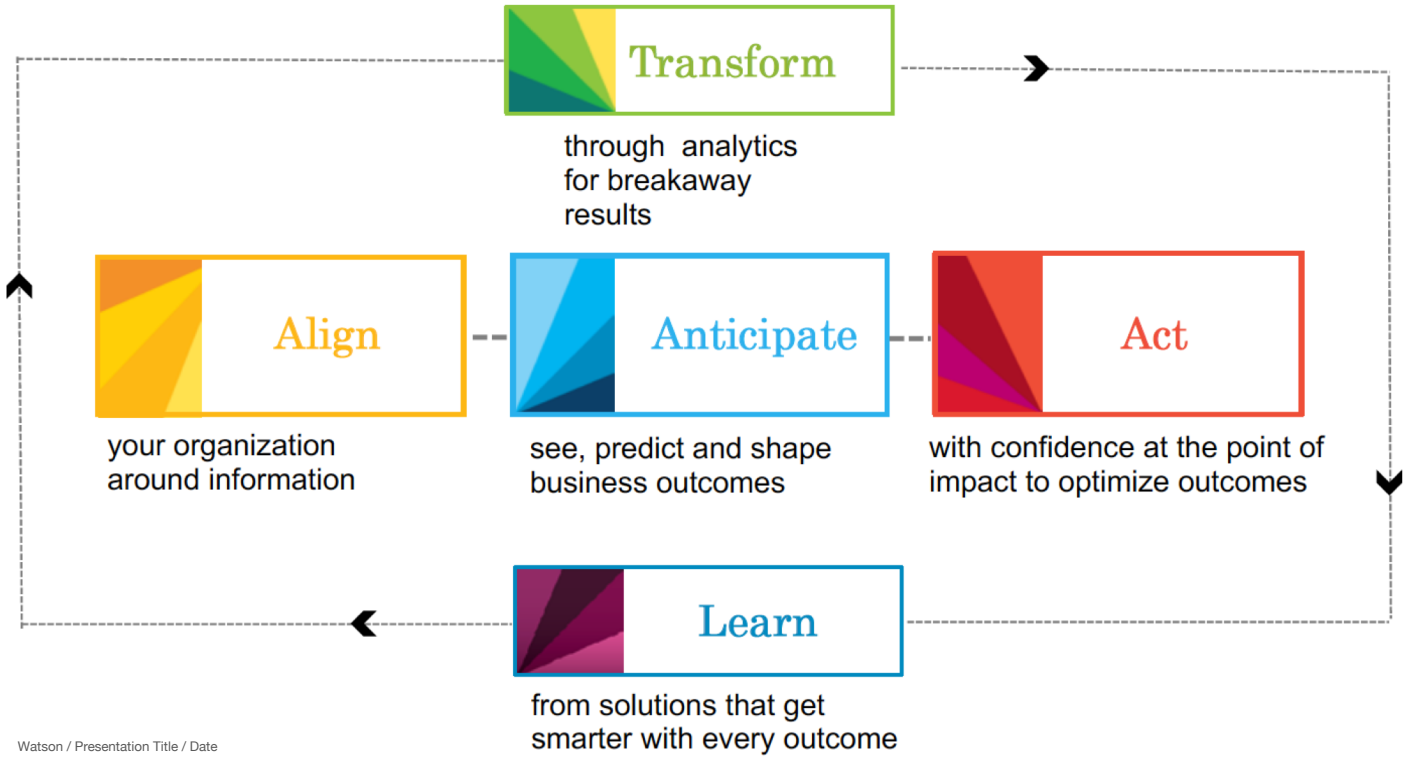
and deliver them to business users and consumers in consumable

applications.

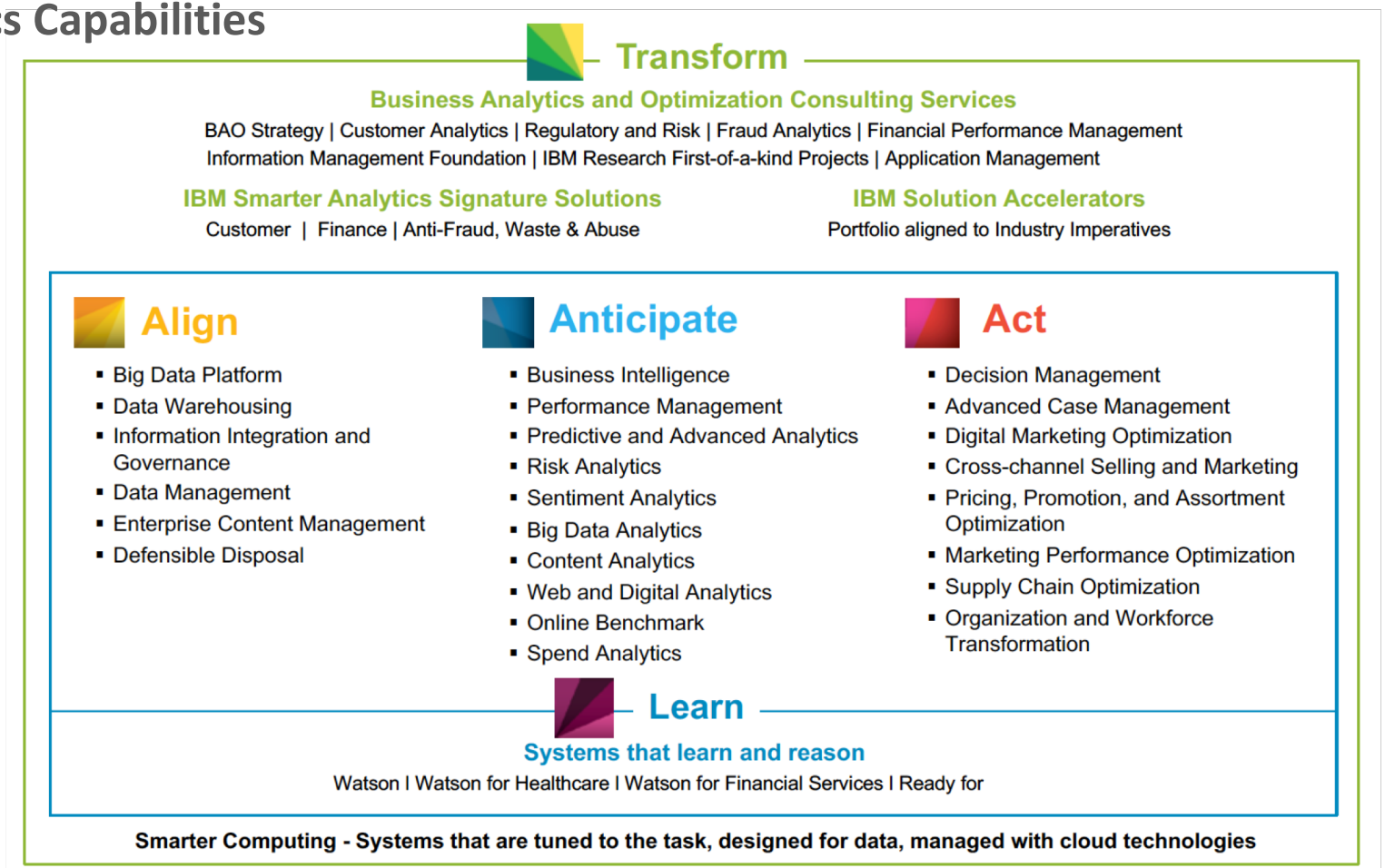
Augmented Intelligence



Analytics is a holistic approach that turns information into insight and insight into business outcomes

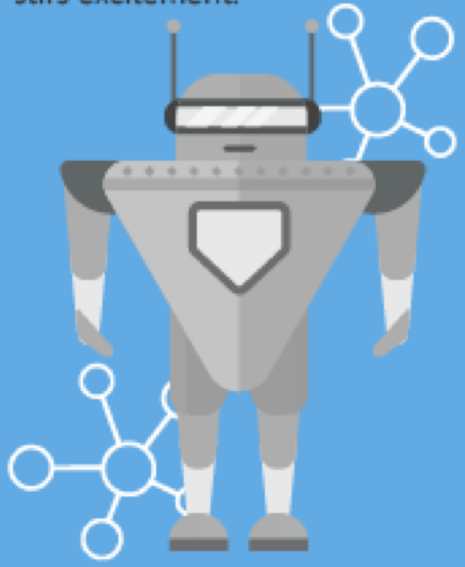


Analytics Capabilities



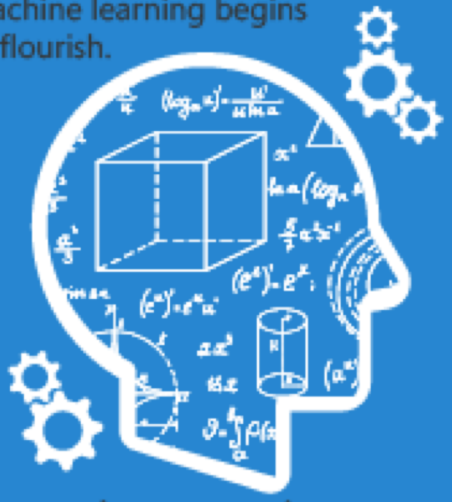
ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.

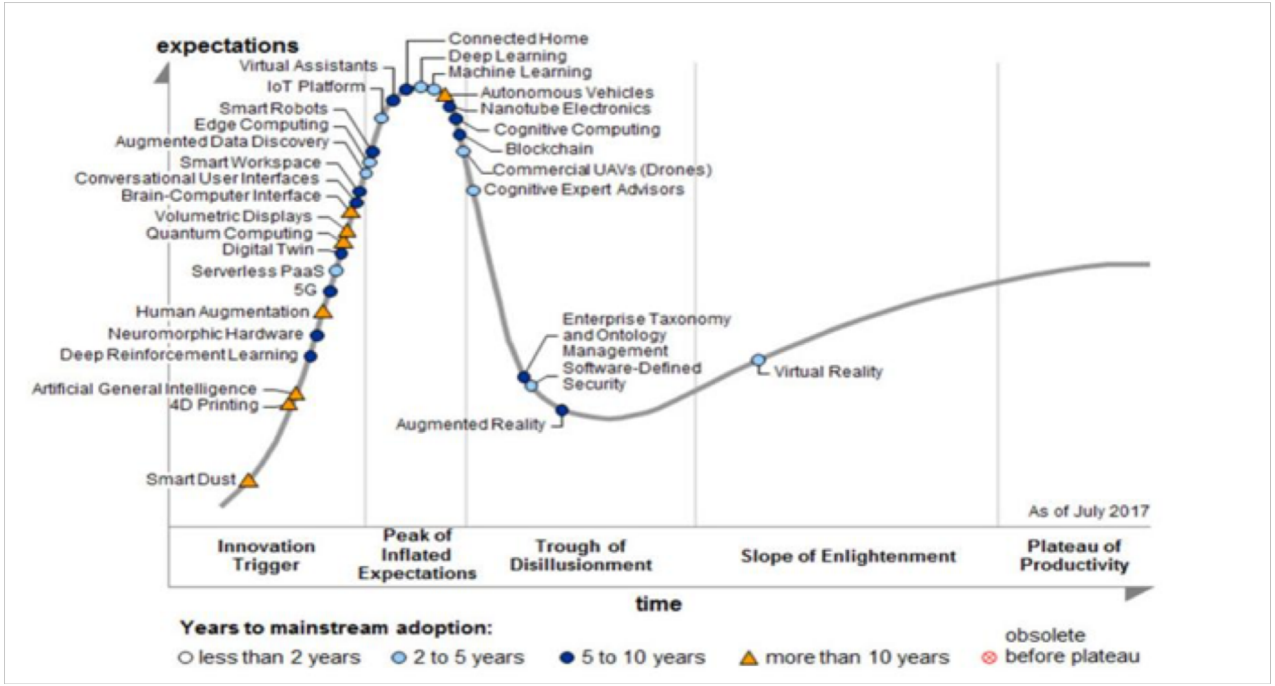
1950's 1960's 1970's 1980's 1990's 2000's 2010's

Artificial Intelligence is Exponentially Taking Off

"Intelligent software applications will become commonplace. And **machine learning will touch every industry**."

Cognitive computing, artificial intelligence, and machine learning will become the fastest growing segments of software development by the end of 2018; by 2021, 90% of organizations will be incorporating cognitive/AI and machine learning into new enterprise apps

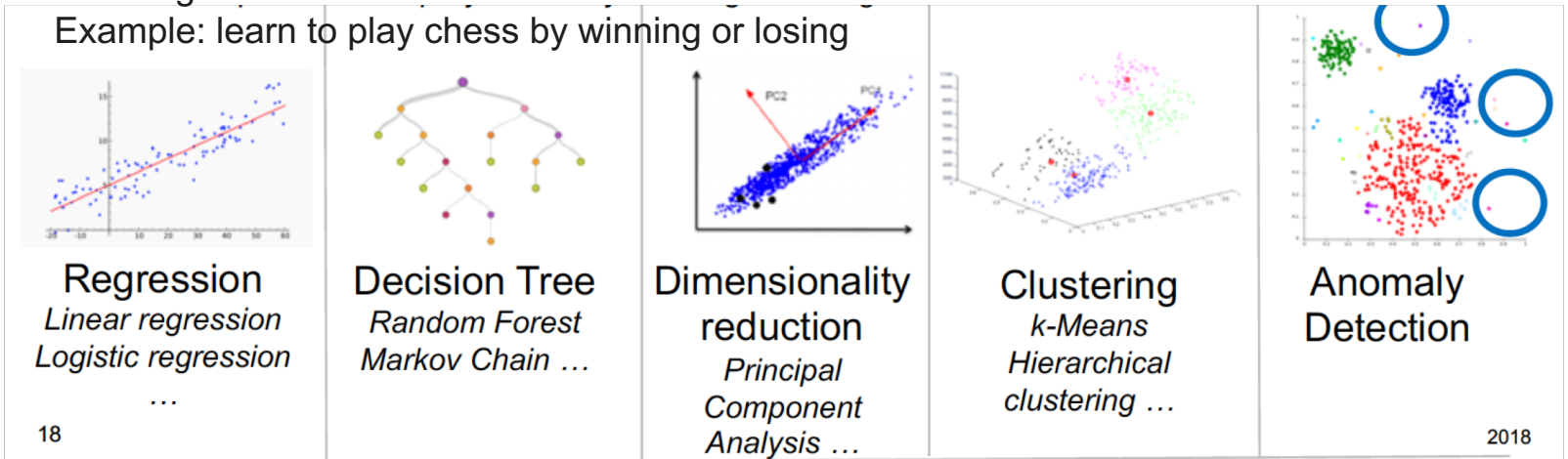
According to the father of Artificial Intelligence, John McCarthy, it is "The science and engineering of making intelligent machines, especially intelligent Computer programs".



Machine Learning

Machine Learning: Algorithms to parse data, learn from it, and then make a determination or prediction about something in the world

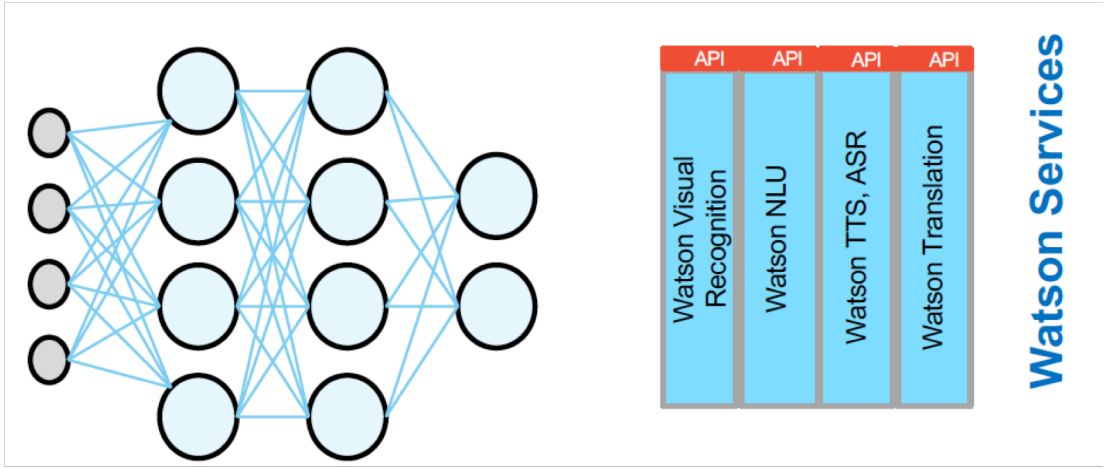
- **Supervised Learning**
  - Learning with a labelled training set
  - Example: email spam detector with training sets of already labelled emails
- **Unsupervised learning**
  - Discovering patterns in unlabeled data
  - Example: cluster similar documents based on text content
- **Reinforcement Learning**
  - Learning based on feedback or reward
  - Example: learn to play chess by winning or losing



Deep Learning

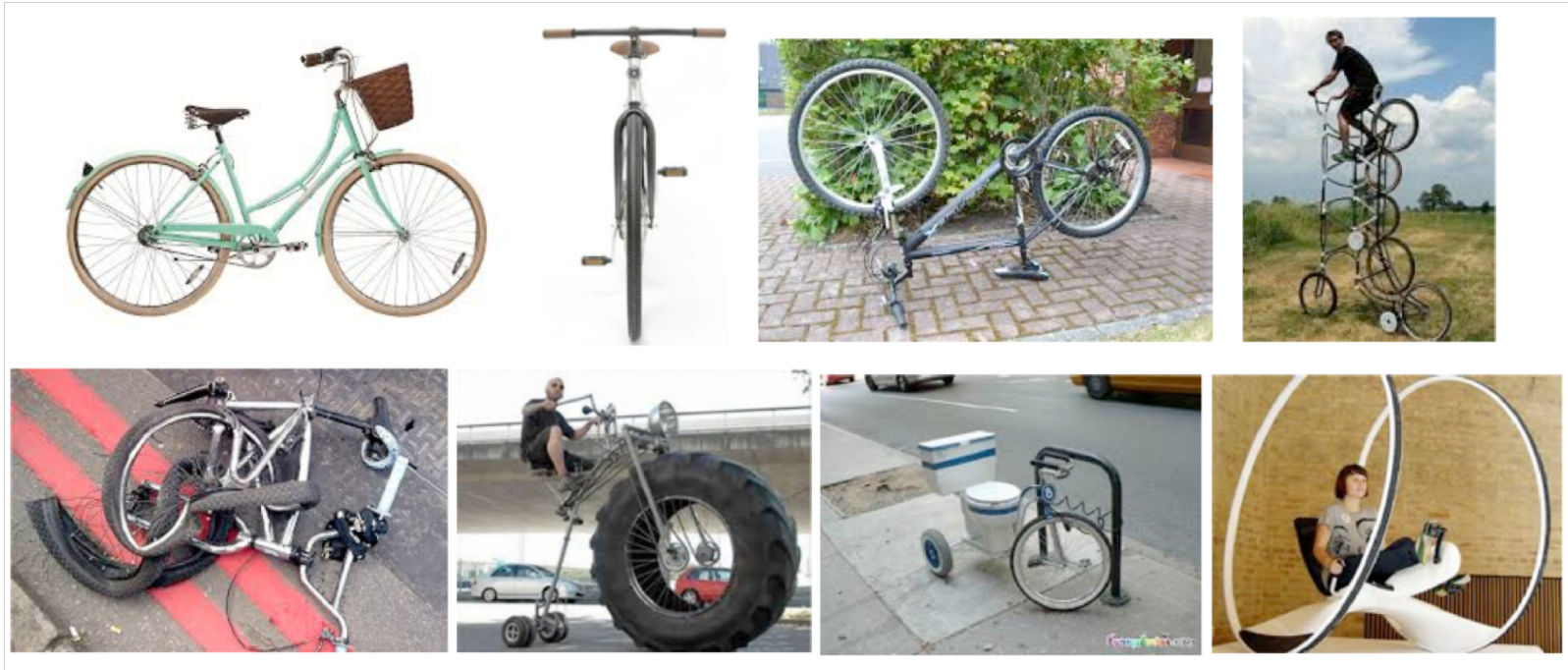
Deep Learning = **A**rtificial **N**eural **N**etworks are inspired by our understanding of the biology of our brains – all those interconnections between the neurons
- Universal function estimator, without feature engineering
- Requires lots of training data
- Black box approach

- Speech recognition
  - Speech to text
  - Sentiment analysis
- Computer vision
  - Object recognition
  - Image tagging
  - Image classification
- Natural Language Processing
  - Sentiment analysis
  - Legal requirements analysis
  - Chatbots



Deep Learning Framework
(Caffe, Torch, Theano, TensorFlow, etc.)

Through experience, exposure, and repetition, we learn to perceive the world around us

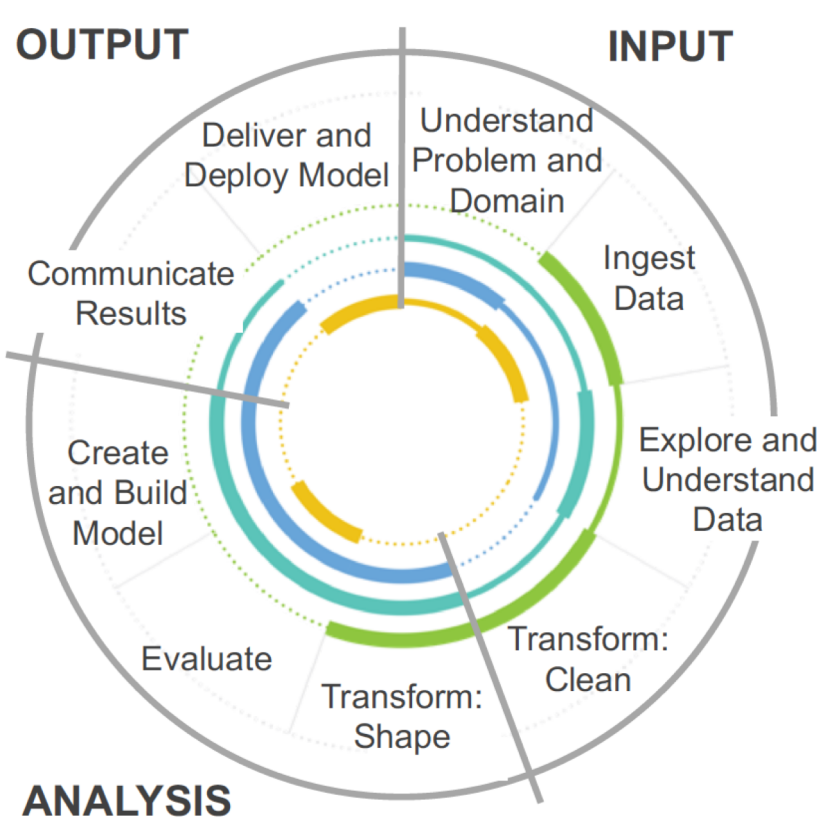


Deep Learning – Industry use cases

Automotive and Transportation	Defense, Security, Public Safety	Consumer Web, Mobile, Retail	Medicine and Biology	Broadcast, Media and Entertainment

• Autonomous driving:
  • Pedestrian detection
  • Accident avoidance
	• Video Surveillance
	• Image analysis
	• Facial recognition and detection
		• Image tagging
		• Speech recognition
		• Natural language processing
		• Recommendation and sentiment analysis
			• Drug discovery
			• Diagnostic assistance
			• Cancer cell detection
				• Captioning
				• Search
				• Recommendations
				• Real time translation

IBM Data Science Solution - Tailored Experiences and User Collaboration



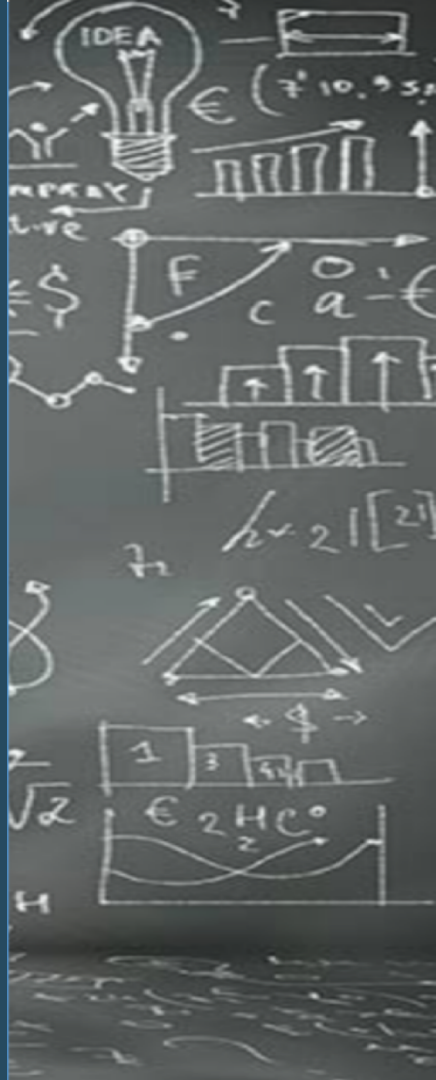
Data Engineer
Architects how data is organized & ensures operability
Data Connect

Data Scientist
Gets deep into the data to draw hidden insights for the business
Data Science Experience

Business Analyst
Works with data to apply insights to the business strategy
Watson Analytics

App Developer
Plugs into data and models & writes code to build apps
IBM Cloud platform

Thank You



Useful Links & Resources

External

Getting Started:
Service Homepage
Feature Requests / Suggestions

Case Studies:
OmniEarth
Aerialtronics
BlueChasm
iTrend

Tutorials & Best Practices:
Training models with Watson Studio
Getting started with Watson + Core ML
Stacking Multiple Custom Models
Create a Calorie Counting App
Watson Visual Recognition & Twilio
Best Practices for Custom Models

Code Patterns:
Classify vehicle damage
Analyze industrial equipment for defects
Create an Android calorie-counter app

External continued

Books:
Redbook: Building Cognitive Application using IBM Watson Services vol3 – Watson Visual Recognition

Blogs:
IBM Watson on Medium

Internal

Slack Channel: #ibmvisual-recognition
Service Roadmap
IBMer key limit increase request form
ZACS portal
Digital Sales Play
Content Request & Feedback Form