

# **Digital Transformation**

## **Class # 3: Technology Drivers # 2 – Big Data & Artificial Intelligence (AI)**

**EPITA | Fall 2025**

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**Valeriu Petruian**

# Digital Transformation Class 3



- Admin
  - Recap
  - Thoughts for the day

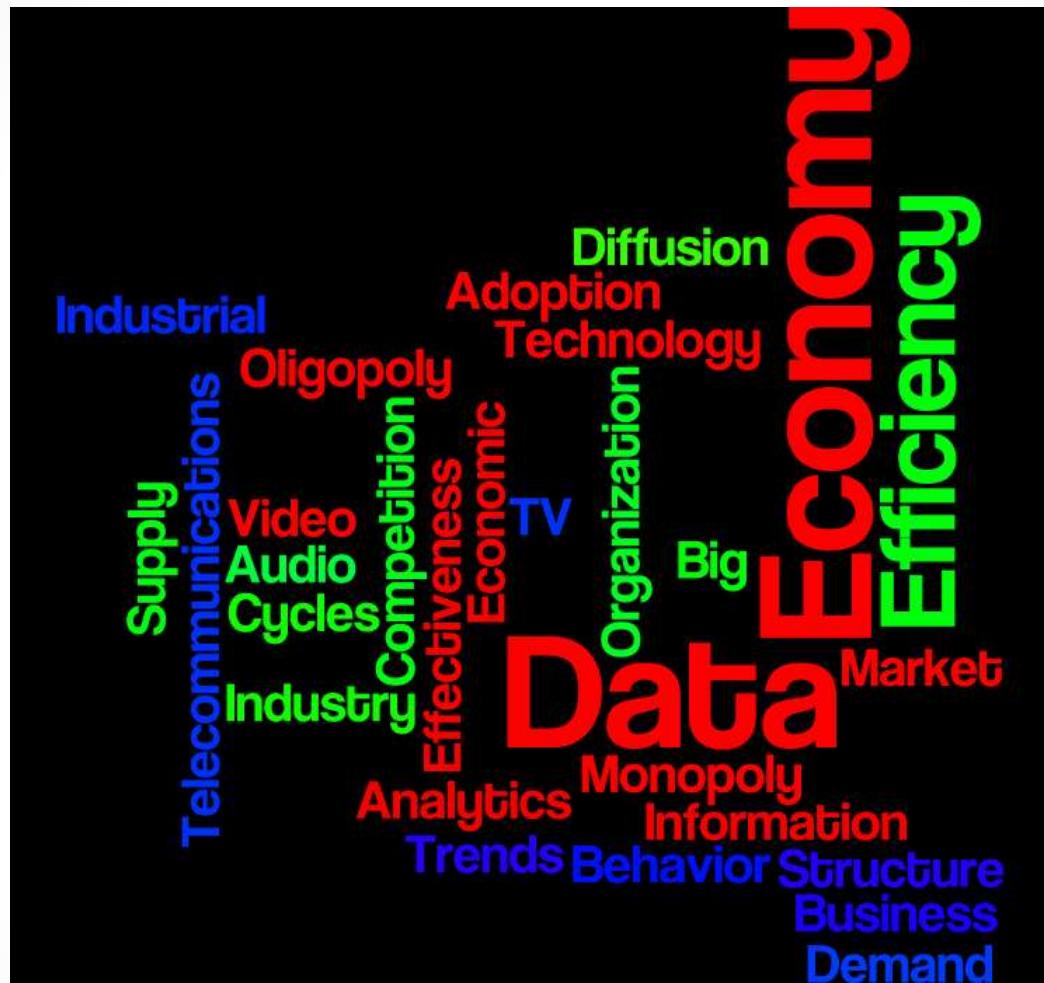
# Course Breakdown

## EPITA Fall 2025

Class	Date & Time   Topics
Class # 1	Welcome to the Digital Economy!
Class # 2	Technology Drivers # 1: Internet of Things (IoT), Blockchain
Class # 3	Technology Drivers # 2: Big Data & Artificial Intelligence (AI)
Class # 4	Other (non-technical) drivers of Digital Transformation
Class # 5	Digital Business Models: Platforms
Class # 6	Beyond Products: Designing Digital Businesses, and Markets   Course Wrap-Up
Class # 7	Final Presentations

### Today's Reference:

- **Andrew McAfee.** *Generally Faster: The Economic Impact of Generative AI.* MIT – Google Technology & Society Program, April 25<sup>th</sup>, 2024



## Class # 3

# Big Data & Artificial Intelligence (AI)

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# What do we know about Digital Transformation, so far? (1/2)

- ① Thesis # 1:** Digital Transformation is the consequence of technology adoption by individuals and organizations
- ② Thesis # 2:** As technology gets adopted by a larger number of people, global infrastructures get built, supporting the entire economy and society
  - Electrical bulb, dynamo => Electricity/Energy networks
  - Telephone => Telecom networks
  - Computer => The Internet

# What do we know about Digital Transformation, so far? (2/2)

**③ Thesis # 3:** Much of the current technology adoption process is about replacing technology itself, either continuously (upgrade), or discontinuously (renewal)

- Smart phone replacing feature phone (discontinuous)
- 5G technology replacing 4G technology
- Cloud-based software replacing on premise IT resources
- Big data technology replacing traditional storage and database systems

**④ Thesis # 4:** In the process, transformations are happening, at all levels, and in all areas:

- New jobs, new skills; technology itself creates new types of jobs that it shall destroy, as it develops itself further
- New industries, new types of players emerge
- Existing industries and companies get “transformed” as they adopt digital technologies

# Big Data & Artificial Intelligence (AI)



- Data is everywhere, in large volumes (hence, Big), but where does it come from? And why has it become some important?
- Artificial Intelligence (AI) is a predominant digital technology
- Together, as fundamental Digital Transformation trends, they have the potential to transform radically the way we interact, work and, possibly, think

# Big Data & AI | Introductory considerations



IDC Digital Universe 2014 Report.  
<http://www.emc.com/collateral/analyst-reports/idc-digital-universe-2014.pdf>



# Class Discussion

## USAGES OF DATA

- What do we do with all this data?
- Who needs it?
  - We, humans?
  - « The infrastructure » (e.g., the internet)
  - Our computers and smartphones?
  - ... somebody/something else?

## QUANTITY & QUALITY OF DATA

- Bad Bots (per Class 2)
- « Duplication » of data
- Data to serve the system (highway example)
- Data to train complex AI models

# Artificial Intelligence (AI) | Fundamentals

## ARTIFICIAL

- “Made or produced by human beings rather than occurring naturally, especially as a copy of something natural. Not natural.”
- Unreal
- Factitious
- Fabricated

## INTELLIGENCE

- « The ability to acquire and apply knowledge and skills.”
- Brilliance
- Intellect
- Judgment
- Perception

# Artificial Intelligence (AI) | Fundamentals Milestones

- 1950 – Turing Test
- 1956 – Dartmouth College conference, term is coined
- 1959 - 1965 – GPS (General Problem Solver) - ELIZA natural language software
- 1997 – Deep Blue defeats chess world champion Garry Kasparov
- 2009 – Google self-driving car prototype
- 2011 – IBM Watson wins at Jeopardy!
- 2014 – Personal assistants
- 2016 – AlphaGo victory
- 2018 – Turing Prize awarded to Deep Learning pioneers Y Bengio, G Hinton, Y Le Cun
- 2023 – It took ChatGPT **2 months** to reach 100 million users (as compared to 120 for Netflix)

AI

## A First Classification

- « **Artificial Intelligence** » = a set of several techniques, each one of which has more precise objectives than just « intelligent reasoning :
  - (1) Systems that think like humans (e.g., cognitive architectures and neural networks);
  - (2) Systems that act like humans (e.g., pass the Turing test via natural language processing; knowledge representation, automated reasoning, and learning),
  - (3) Systems that think rationally (e.g., logic solvers, inference, and optimization);
  - (4) Systems that act rationally (e.g., intelligent software agents and embodied robots that achieve goals via perception, planning, reasoning, learning, communicating, decision-making, and acting).

**Source:** White House Report. *Preparing for the future of artificial intelligence*. October 2016

**AI**

## **A Second Classification**

- **Perception** (images, sounds, forms), ex: machine vision
- **Natural Language Processing**
- **Planning and Navigation** (problem solving for operational research)
- **Knowledge representation**
- **Logical reasoning** (symbolic processing, expert systems)

**Source:** White House Report. *Preparing for the future of artificial intelligence.* October 2016

AI

## A Third Classification

- (1) “Symbolists” use logical reasoning based on abstract symbols,
- (2) “Connectionists” build structures inspired by the human brain;
- (3) “Evolutionaries” use methods inspired by Darwinian evolution;
- (4) “Bayesians” use probabilistic inference; and
- (5) “Analogizers” extrapolate from similar cases seen previously

**Source:** White House Report. *Preparing for the future of artificial intelligence.* October 2016

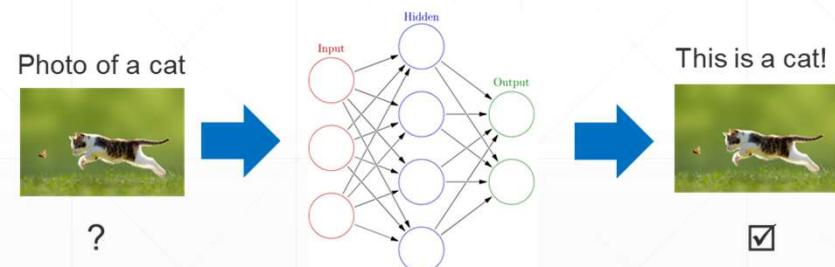
# 2 forms of AI Illustration with machine vision

## Symbolic AI



## Connectionist AI

Neural networks trained  
on a large number of photos of cats



# AI Fundamentals

## Narrow AI and General AI

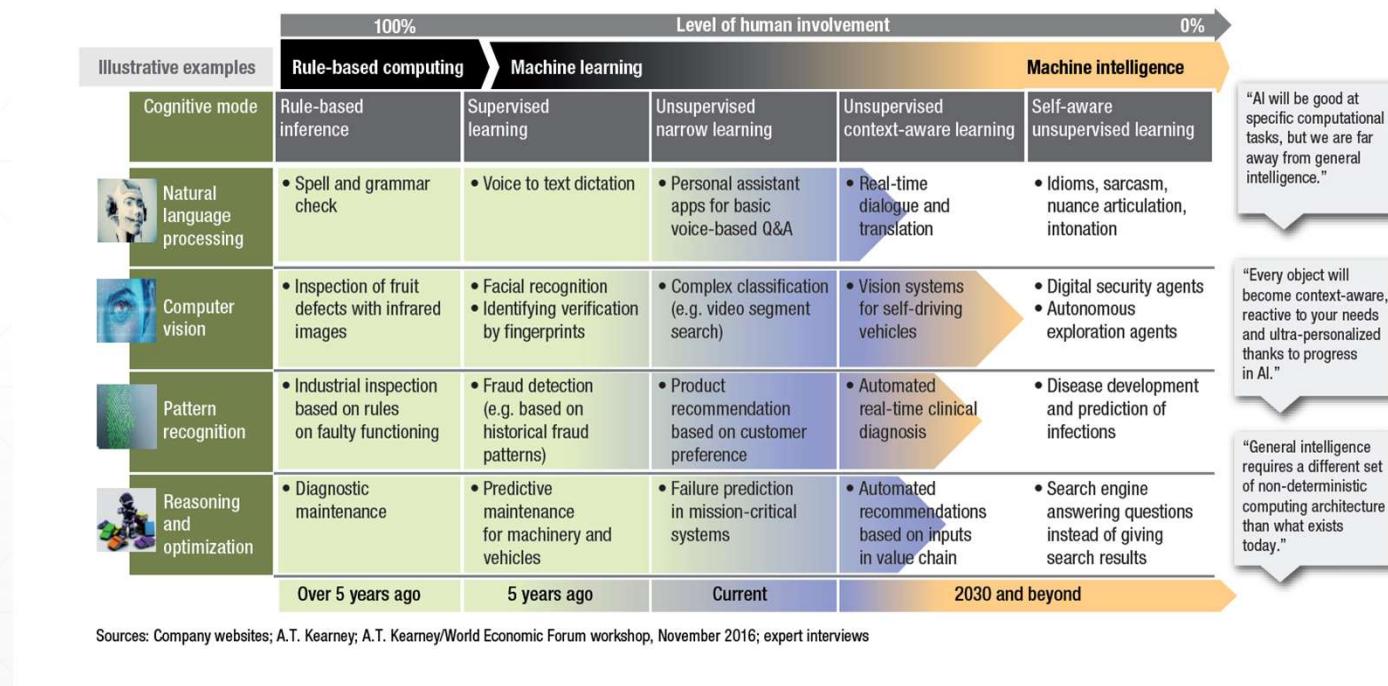
- Arthur Samuel, an IBM engineer, has created in 1962 a computer program designed to play checkers, based on self-learning capabilities
- “Logic Theorist” and « General Problem Solver » are programs created in 1956 and 1957 by Herbert Simon, Alan Newell and Cliff Shaw, which implement the idea of complex problem resolution
  - They have generalized the principle that, as soon as there is a need to solve problems beyond the limited scope of a given AI technique, then several AI techniques need to be combined
- The two examples above are illustrations of what is commonly known as **Artificial Narrow Intelligence (ANI)** and **Artificial General Intelligence (AGI)**



All images source: Wikipedia

# Artificial Intelligence State of the Art

**Figure 7:** Development of AI and its future state



**World Economic Forum, in collaboration with AT Kearney. Technology and Innovation for the Future of Production: Accelerating Value Creation. WEF White Paper, Geneva, March 2017.**

# Machine Learning NLP example

The | challenge | of | Digital | Transformation | is | that | it | \_\_\_\_\_



101 | 4664 | 98 | 5738 | 6995 | 152 | 202 | 103 |

dare provocation summons  
problem difficult task test trial trouble  
bother obstacle **challenge** confrontation with  
dispute with stand against test of  
opposition disagreement with  
questioning of defiance ultimatum

numerical  
electronic **digital** computational  
cyber software computerised digit  
number cipher

change alteration modification variation  
conversion revision metamorphosis  
transfiguration evolution mutation  
remodelling reshaping remoulding  
redoing reconstruction rebuilding  
reshuffling restyling renewal  
renovation overhaul revolutionizing  
transmutation **transformation**

The | challenge | of | Digital | Transformation | is | that | it | **revolutionizes 75%**

The  
**challenge**  
of  
digital  
transformation  
is  
that  
it

0.5      The  
0.04     challenge  
0.12    of  
0.3     digital  
0.07   transformation  
0.14    is  
0.02    that  
0.01    it

changes 60%  
modifies 30%  
transfigures 25%  
reshuffles 23%  
rebuids 15%

# **Artificial Intelligence**

## **Machine Learning**

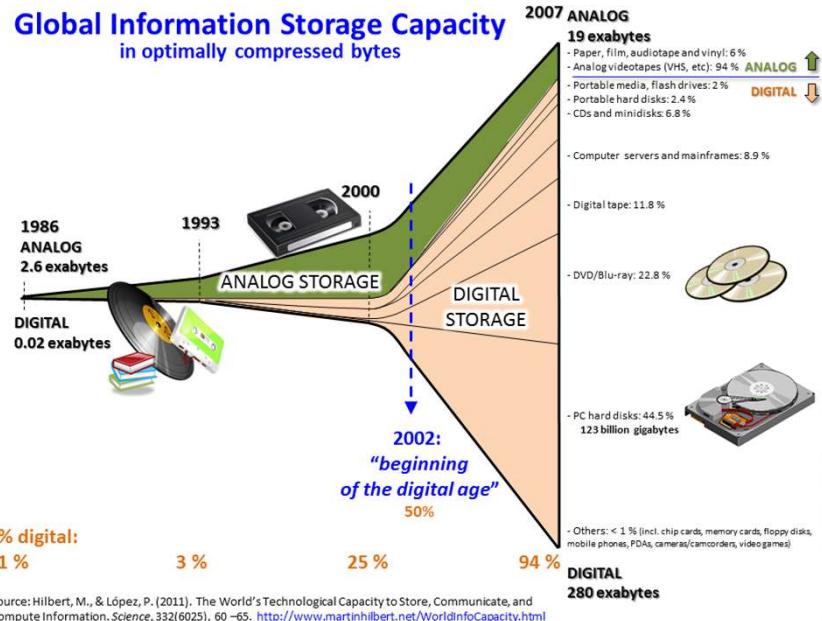
- Wikipedia – « **Machine learning (ML)** is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without using explicit instructions, relying on patterns and inference instead.”
- Learning methods:
  - Supervised learning, Unsupervised learning, Reinforcement learning, Self learning, Feature learning, Sparse dictionary learning, Anomaly detection, Association rules
- Training DATA, Test DATA

# **Artificial Intelligence**

## **Deep Learning**

- Wikipedia – « **Deep learning** (also known as **deep structured learning** or **differential programming**) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised.”
- DL relies on Artificial Neural Networks (ANNs) and Deep Neural Networks (DNNs)
- DL and ML have in common the use of **LARGE DATA SETS**

# Big Data Fundamentals

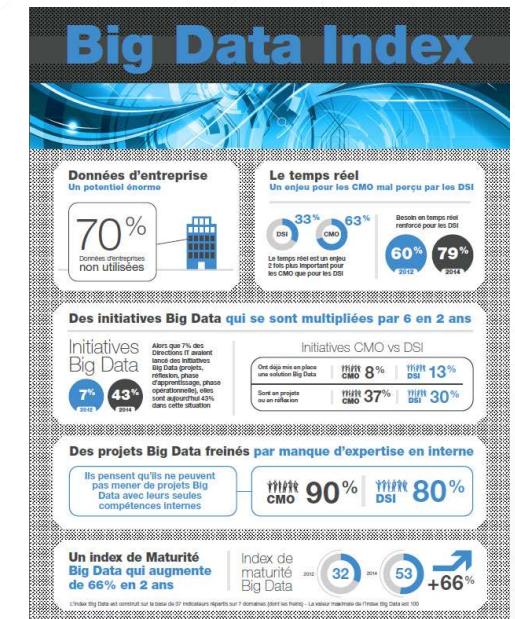
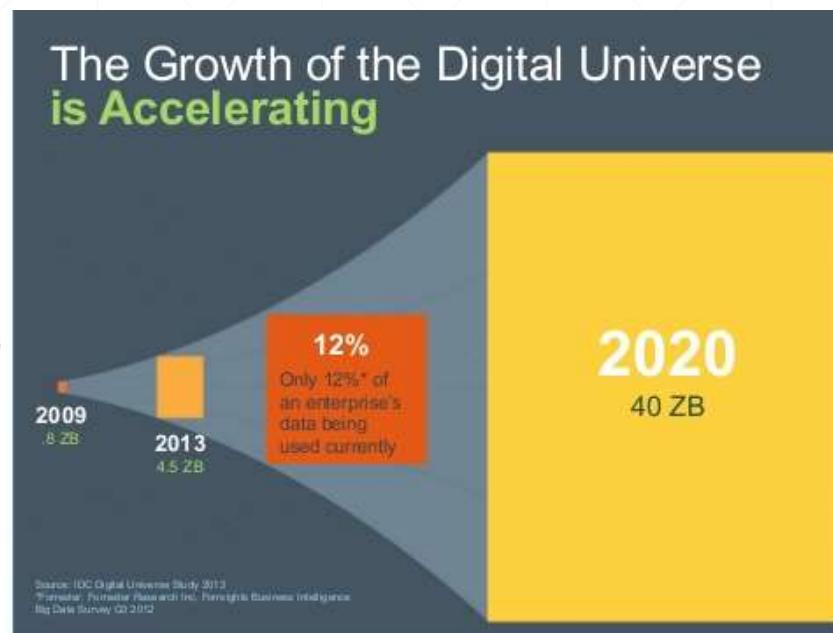
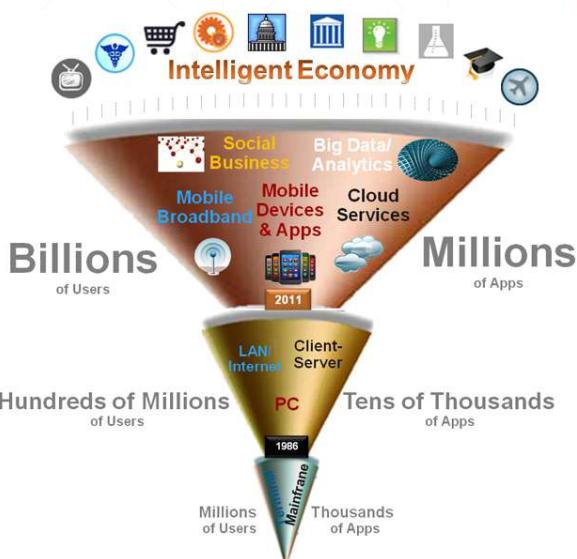


**Big data** is a field that treats ways to analyze, systematically extract information from, or otherwise deal with data sets that are too large or complex to be dealt with by traditional data-processing application software. Big data was originally associated with three key concepts: *volume*, *variety*, and *velocity*.

[Source: [https://en.wikipedia.org/wiki/Big\\_data](https://en.wikipedia.org/wiki/Big_data) [Image File:Hilbert InfoGrowth.png|thumb|Hilbert InfoGrowth]]

# Today's Digital Economy = Data Economy

## Few figures ...



<https://idc-community.com/energy/smart-grid/big-data-and-analytics-for-the-smart-grid>

<http://www.journaldunet.com/solutions/dsi/big-data-barometre-idc-emc-132014.shtml>

<http://fr.slideshare.net/MapRTechnologies/webinar-fast-and-furiousfrompoctoenterprisebigdatastack20140424>



# Class Discussion

## The Question

### GOFAI

- Previous form of « intelligent systems »
- « Expert systems », rules-based
- They have been around for some decades
- Widespread adoption by business organizations

### New AI FORMS (ML, DL, ...)

- Recent forms of AI
- Adoption is influenced both by their novelty and by pre-existing « intelligent systems »
- History matters?
- Paradigm shift?

**QUESTION: IS THEIR COEXISTENCE AND/OR COMBINATION POSSIBLE?**



# Class Discussion - continued

## THE SCIENTIST'S POSITION

Machine Learning sucks! (compared to humans and animals)

- ▶ Supervised learning (SL) requires large numbers of labeled samples.
  - ▶ Reinforcement learning (RL) requires insane amounts of trials.
  - ▶ Self-Supervised Learning (SSL) requires large numbers of unlabeled samples.
  - ▶ Most current ML-based AI systems:
    - ▶ make stupid mistakes, do not reason nor plan
  - ▶ Animals and humans:
    - ▶ Can learn new tasks **very** quickly.
    - ▶ Understand how the world works
    - ▶ Can reason and plan
  - ▶ Humans and animals have common sense
  - ▶ current machines, not so much (it's very superficial).

# THE PHILOSOPHER'S POSITION

**Y LeCun, Do large language models need sensory grounding for meaning and understanding?** NYU Conference, 24 March 23  
**G Koenig, L'IA, la bombe nucléaire cognitive?** Les Echos, 4 avril 2023



# Class Discussion

## The Answer

### IS THE ANSWER: NEURO-SYMBOLIC AI?

- “The main problem with big tech’s experiment with artificial intelligence (AI) is not that it could take over humanity. It’s that large language models (LLMs) like Open AI’s ChatGPT, Google’s Gemini and Meta’s Llama continue to get things wrong, and the problem is intractable, these phenomena is known as “hallucinations.” (Source: The Conversation, A. Garcez, May 2025)
- “**Neuro-symbolic AI** is a type of artificial intelligence that integrates neural and symbolic AI architectures to address the weaknesses of each, providing a robust AI capable of reasoning, learning, and cognitive modeling.” (Source: Wikipedia)

# **Big Data & AI | Supply-side considerations ... it's a complex world ...**



The 2025 MAD (ML, AI & Data) Landscape

## **Discussion:**

- A large variety of frameworks, architectures, technologies, applications, ..
- Frameworks
- Storage
- Databases
- Data Science
- Analytics & AI
- Industry-specific solutions
- Open vs proprietary standards, ...

# Big Data & AI Fundamentals

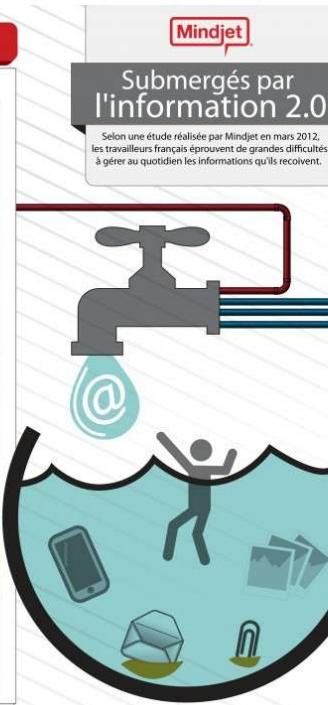
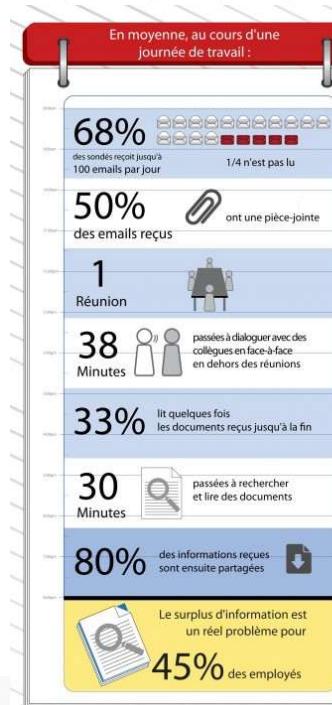
## Technologies and environments

- Hadoop
- NoSQL
- NewSQL
- Streaming
- In-Memory processing
- Parallel computing
- LLM, RAG, AI Agents
- Virtualization
- On premise and in-the-cloud
- Integration of several types of data sources
- Real-time ... or not
- Machine-to-machine versus machine-to-human orientation
- ...

# Big Data & AI Information overload



Illustrations: <http://www.pavillon-orange.org/blog/?p=2530>



# The Digital Economy & Information Society

## One paradox and one bottleneck

### RARITY => VALUE

- On the one hand, abundance of something (**data**) creates a scarcity in other areas (**attention**)
- Whenever something is scarce (**human ability to process massive amounts of information**), then there is value in providing the rare item (**augmented processing capacity**)

### EFFICIENCY/PRODUCTIVITY

- On the other hand, the question arises as to how to organize efficiently in order to cater – in the most effective way - for the needs to be fulfilled through scarce goods or services

### IS ARTIFICIAL INTELLIGENCE THE ANSWER?

# Data from an economic perspective

## Two metaphors

CURRENCY



OIL

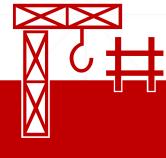


Source: [https://fr.wikipedia.org/wiki/Puits\\_de\\_p%C3%A9role#/media/Fichier:Puits\\_de\\_p%C3%A9role.jpg](https://fr.wikipedia.org/wiki/Puits_de_p%C3%A9role#/media/Fichier:Puits_de_p%C3%A9role.jpg)

# Generative AI

## What changes?

- « **Generative artificial intelligence (Generative AI, GenAI, or GAI)** is a subfield of artificial intelligence that uses generative models to produce text, images, videos, or other forms of data. These models learn the underlying patterns and structures of their training data and use them to produce new data based on the input, which often comes in the form of natural language prompts.” (Source: Wikipedia)
- **At the origin of Gen AI:** transformer-based deep neural networks, particularly large language models (LLMs).
- Examples:
  - Chatbots : ChatGPT, Copilot, Gemini, Claude, Grok, DeepSeek-R1, Ernie Bot
  - Text-to-image models : Midjourney, DALL-E,
  - Text-to-video models : Veo and Sora.
- Technology companies examples: OpenAI, Anthropic, Meta AI, Microsoft, Google, X, DeepSeek, and Baidu.



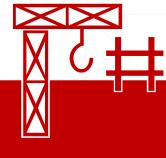
# Class Assignment

Please read the following article:

<https://ide.mit.edu/wp-content/uploads/2024/04/Davos-Report-Draft-XFN-Copy-01112024-Print-Version.pdf?x76181>

Based on today's reading material and the discussion in class, please comment on the following:

- The appropriateness of using AI, and specifically, autonomous AI agents, in the following business settings:

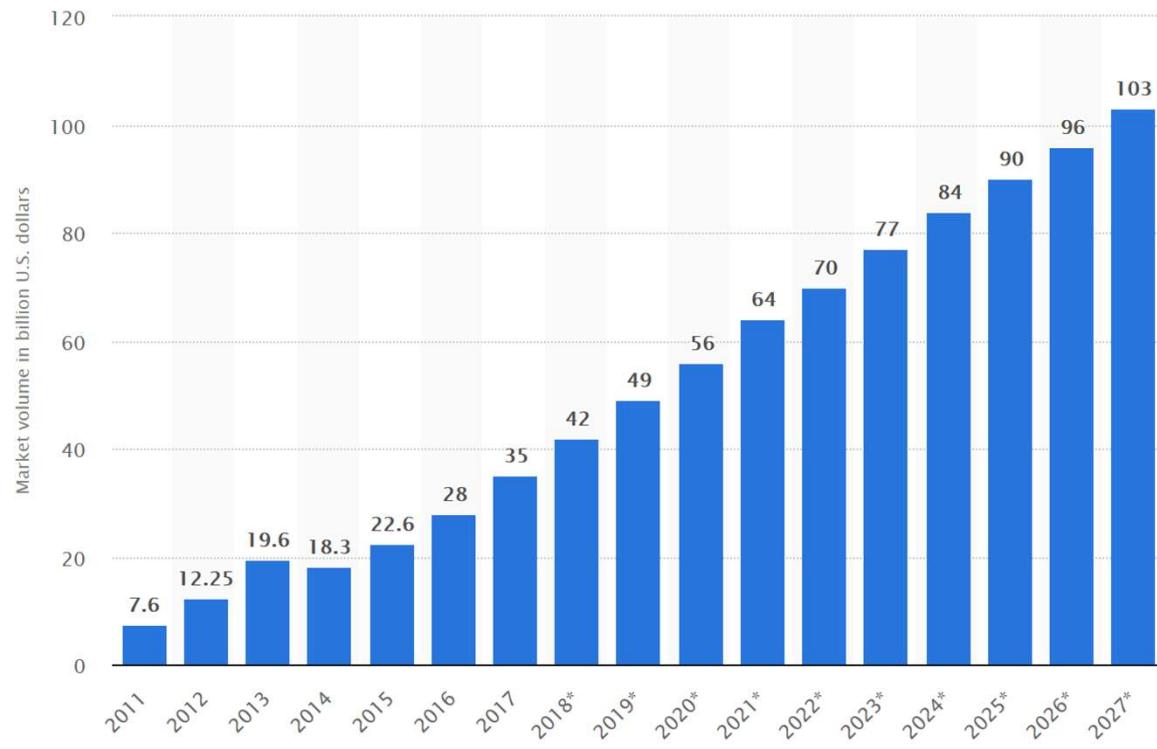


# Class Assignment Business Settings

1. A **health professional** providing diagnostics and prescriptions
2. An **insurance company** providing health insurance services
3. A **financial services company** providing credit scoring services to other companies
4. A **recommendation engine** providing « cross-sell » and « up-sell » information
5. A **targeted advertising service** providing personalized ads across multiple devices and channels
6. A **retail merchant** with both online and physical presence
7. A « **driverless car** » **service** in the context of driving in heavy traffic
8. An **industrial manufacturing company** providing maintenance services

# Big Data & AI | Demand-side considerations

## Aggregated demand



Source: Statista. <https://www.statista.com/statistics/254266/global-big-data-market-forecast/>

# Data | Supply-side considerations

## Global Market Forecast

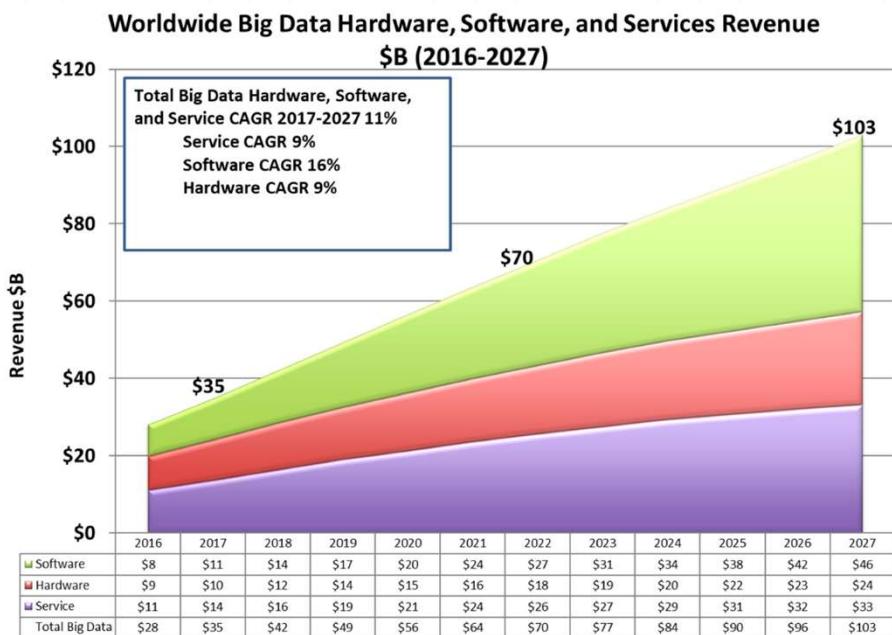


Chart: Wikibon. <https://wikibon.com/wikibons-2018-big-data-analytics-trends-forecast/>

- The chart on the left (from Wikibon's 2018 Report) shows the projected growth of the market for Big Data
- Insights (consistent with previous editions):
  - Among the **main drivers for growth**, the report quotes increased cooperation/concentration between vendors
  - In terms of **adoption barriers**, the report emphasizes the lack of practices to integrate Big Data analytics and AI into existing processes

# Big Data & AI | Supply-side considerations Databases

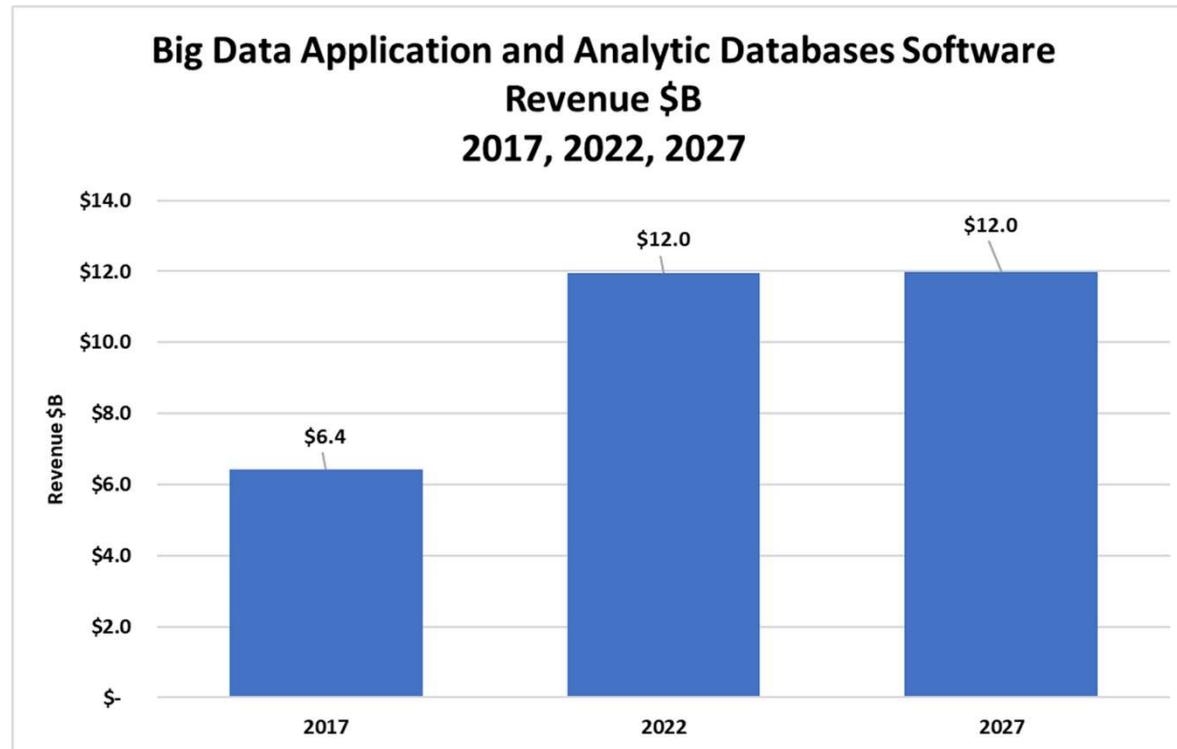


Chart: Wikibon. <https://wikibon.com/wikibons-2018-big-data-analytics-trends-forecast/>

# Big Data & AI | Supply-side considerations Software Analytics

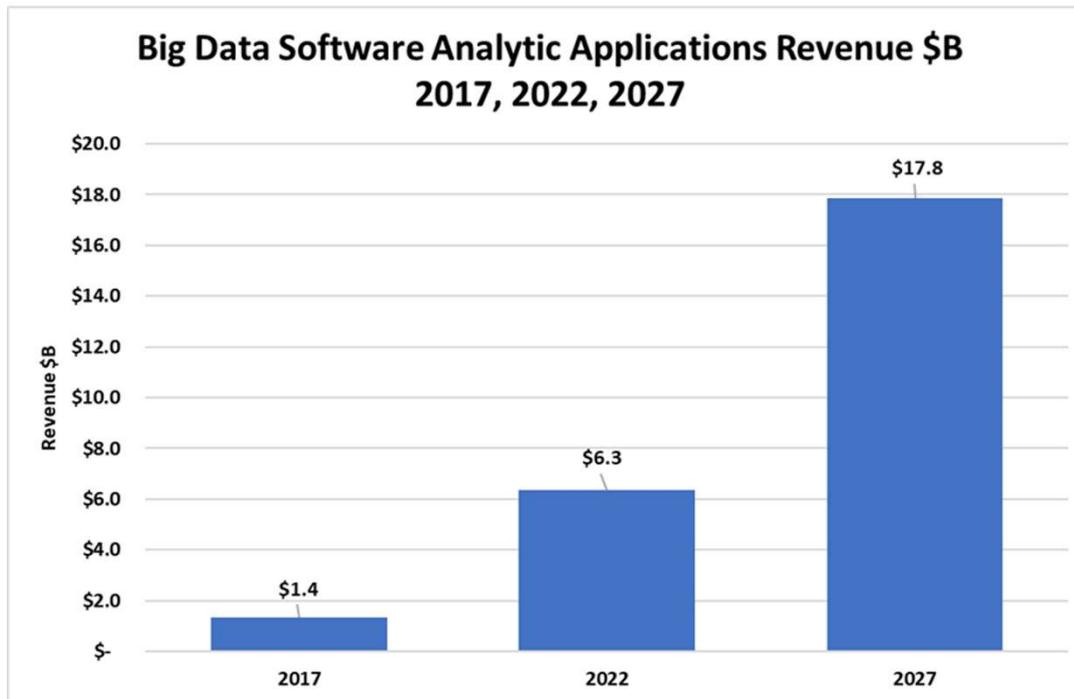


Figure 4: Big Data Analytic Applications Software Revenue \$B – 2017, 2022, 2027

Chart: Wikibon. <https://wikibon.com/wikibons-2018-big-data-analytics-trends-forecast/>

# Big Data & AI | Supply-side considerations Data Science

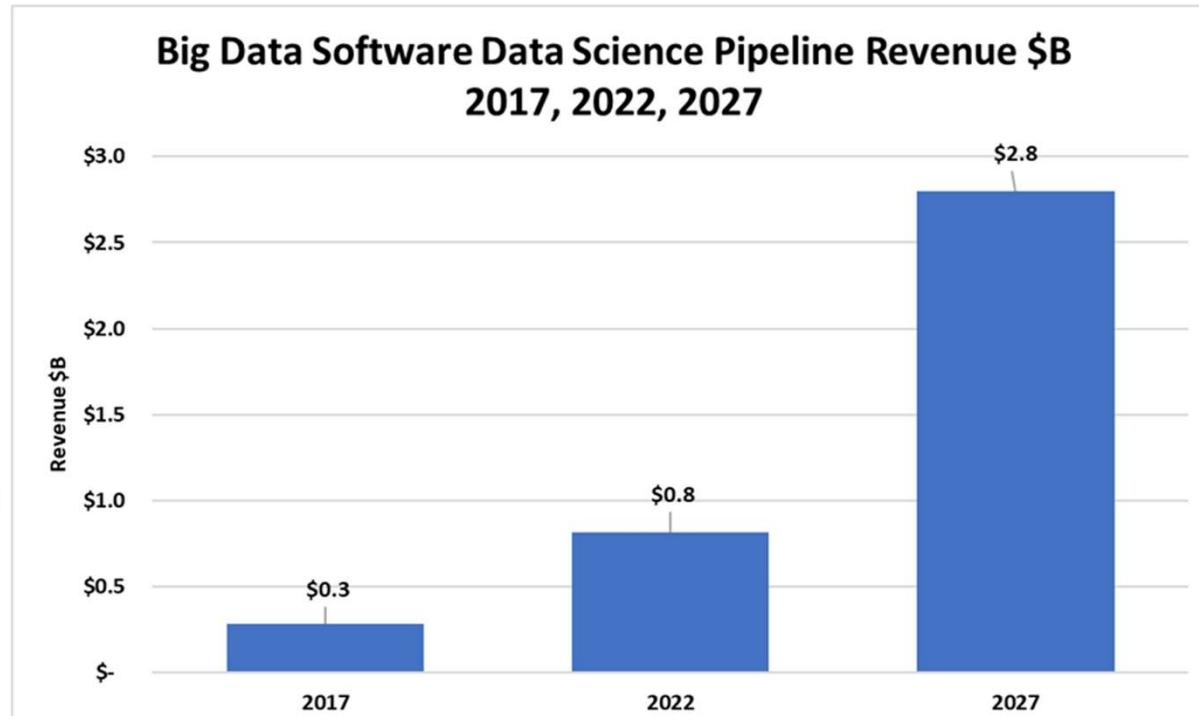


Figure 5: Big Data Data Science Pipelines Software Revenue \$B – 2017, 2022, 2027

Chart: Wikibon. <https://wikibon.com/wikibons-2018-big-data-analytics-trends-forecast/>

# Big Data & AI | Supply-side considerations Professional Services

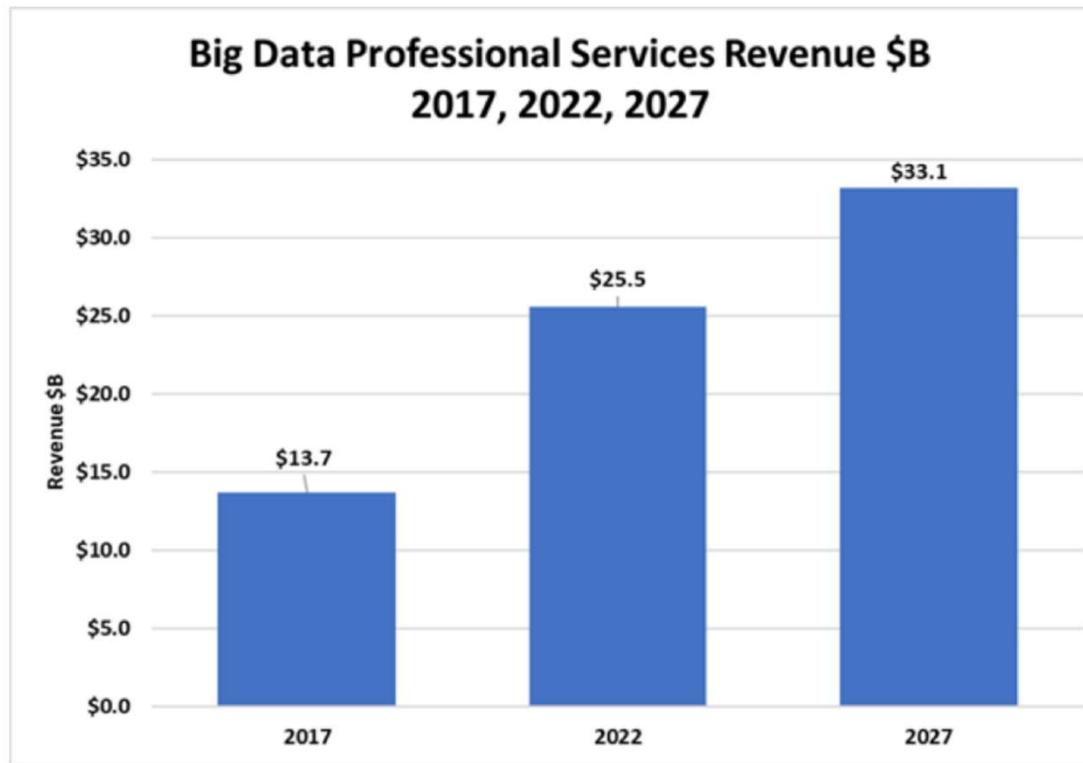
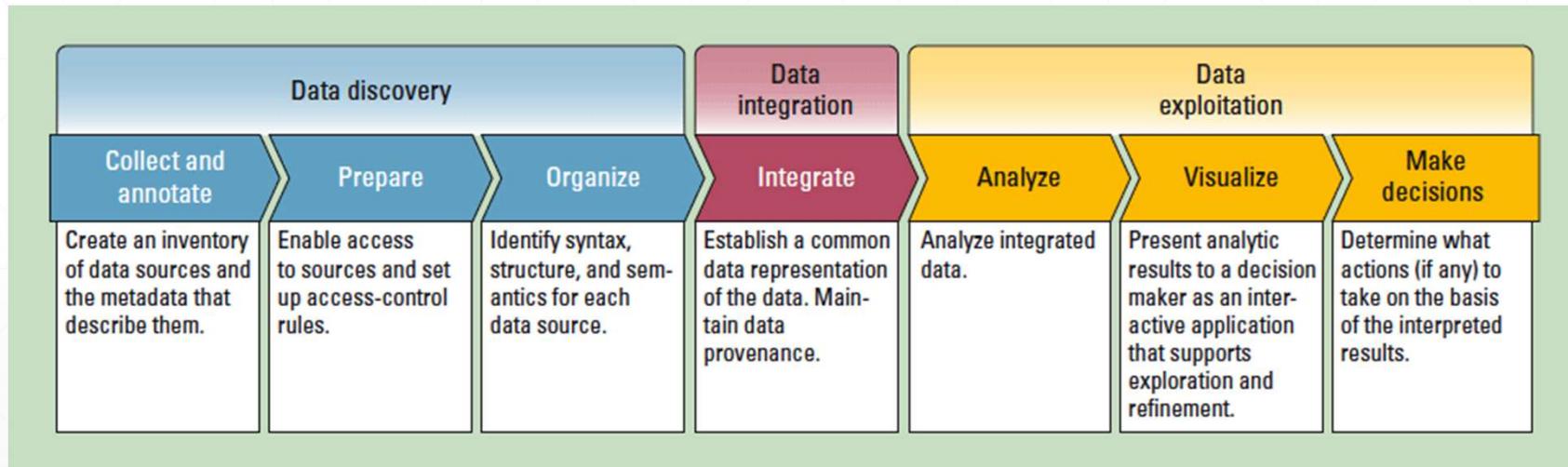


Chart: Wikibon. <https://wikibon.com/wikibons-2018-big-data-analytics-trends-forecast/>

# Big Data & AI| Extracting value

## What is the proposed value chain?



H. Gilbert Miller, Peter Mork, "From Data to Decisions: A Value Chain for Big Data", *IT Professional*, vol.15, no. 1, pp. 57-59, Jan.-Feb. 2013, doi:10.1109/MITP.2013.11http://www.computer.org/csdl/mags/it/2013/01/mit2013010057-abs.html

# Big Data & AI Discussion

## Value Chain

### Value Creation

#### Data Generation

#### Data acquisition & discovery

- Ability to store large volumes of data
- Ability to organize data from various sources

#### Data integration

- Ability to establish a common view of disparate data

#### Data Exploitation

- Ability to extract useful information from data
- For one own's purpose or for third parties

## Players

### Types of Companies

Technology companies – HW, SW, Services

Internet Players (large, ex.: GAFAM, BATX)

Industry (Manufacturing)

Utilities (energy, telecoms, public transport)

Retail (including e-commerce)

Media

Financial Services (Banks, Insurance, etc)

Government

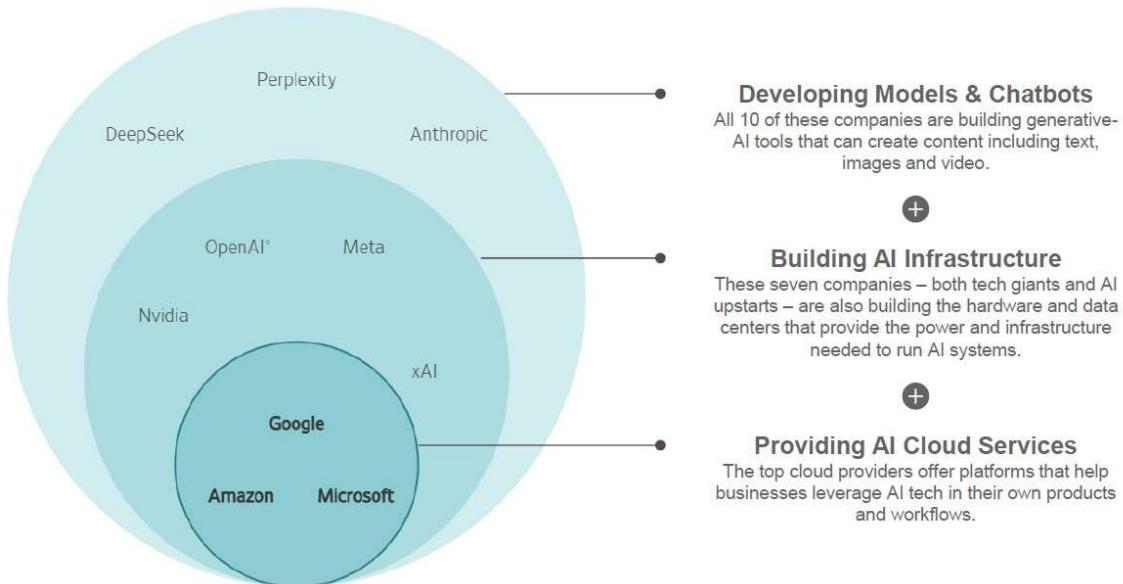
**USERS or CREATORS?**





# Specialisation vs Vertical Integration Discussion | Illustration

Specializations of Ten Leading AI Companies – 4/25, per *The Wall Street Journal*

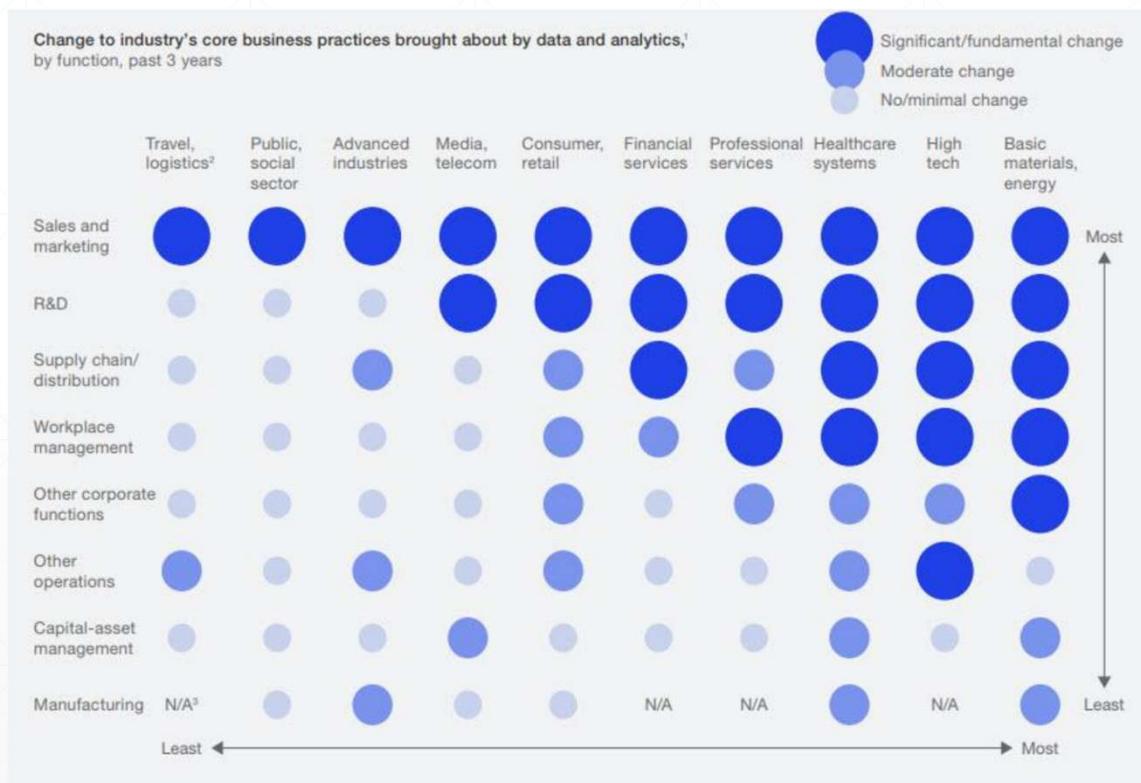


Source: BOND. Trends – Artificial Intelligence, May 2025

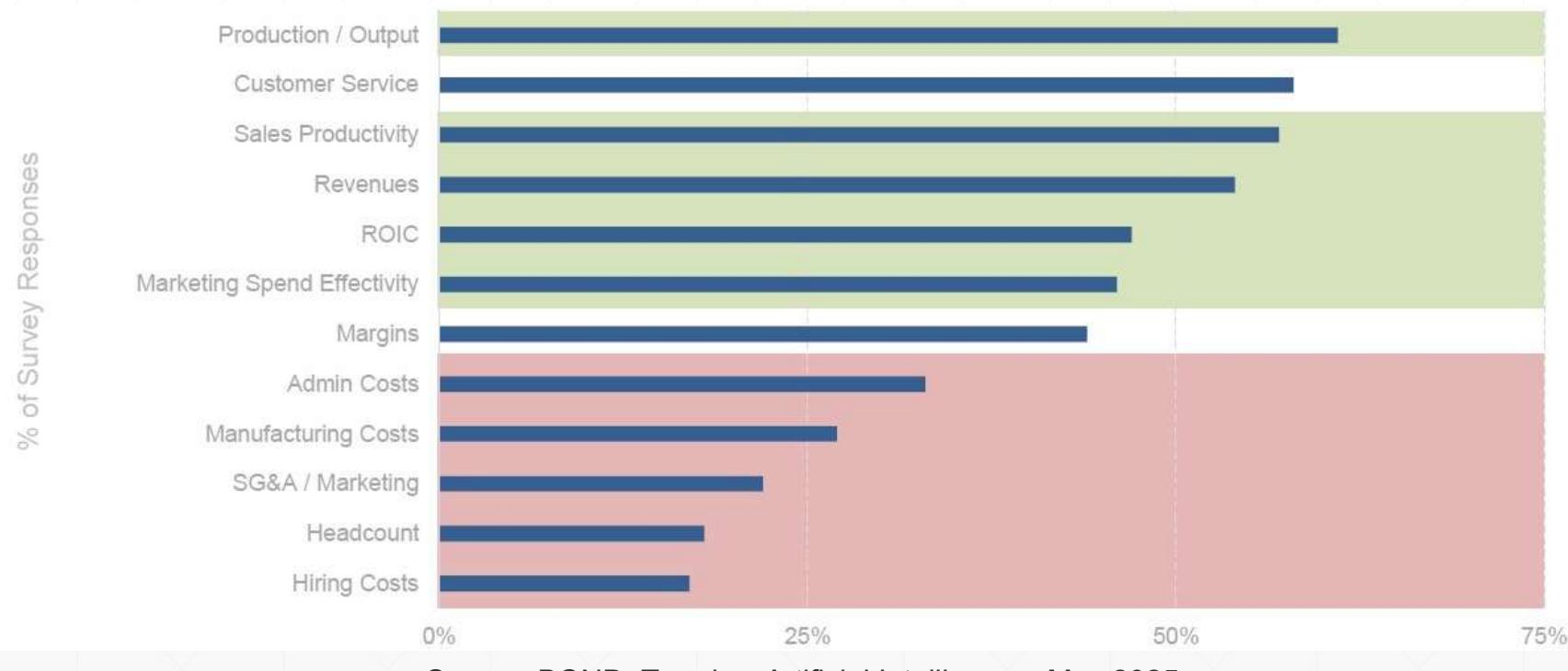
# Vertical Integration Towards Digital/AI ecosystems?



# Big Data & AI | How Companies Are Using Big Data & AI (2018) => Marketing focus



# Big Data & AI | How Companies Are Using Big Data & AI (2024) => Cross-company usages



Source: BOND. Trends – Artificial Intelligence, May 2025

# Big Data & AI

## Internal factors influencing adoption [1/3]

Intrinsic (technical) barriers to ML adoption	Description
<b>Labeling Data</b>	In supervised learning, data sets need to be enriched with outcome values. This activity is, at a time, extremely time-consuming, it requires massive investments in human labor, and may generate errors
<b>Access to large training data sets</b>	In ML, the accuracy of outcomes and the preciseness of results is largely dependent on the size of the training data sets that computer systems need to ‘ingest.’ Such large data sets are rarely available, generally speaking, and, for some specific cases (for instance, in medical applications) building such comprehensive training data ensembles may turn out to be gruesomely difficult.

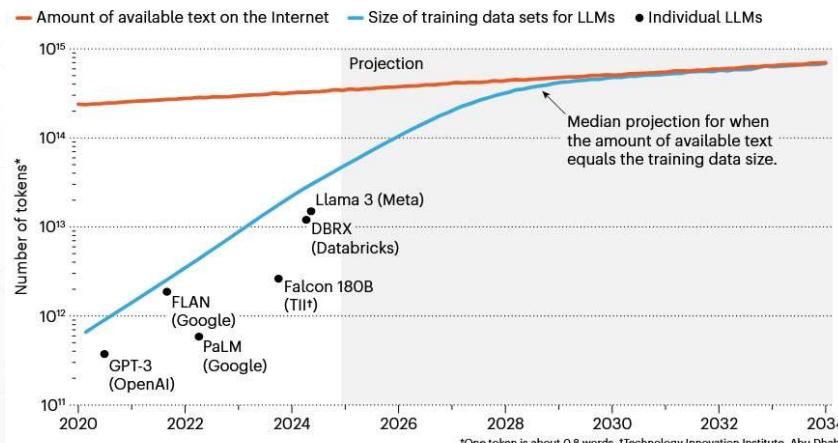
# Big Data & AI

## Internal factors influencing adoption - illustration

### LIMITATIONS ON AVAILABLE DATA...

#### RUNNING OUT OF DATA

The amount of text data used to train large language models (LLMs) is rapidly approaching a crisis point. An estimate suggests that, by 2028, developers will be using data sets that match the amount of text that is available on the Internet.



### ... CREATES PROBLEMS

- ... in the accuracy and the credibility of the created content
- ... in its originality (IP infringements)
- ... in the choice of the underlying processing models
- ... in the “generalisation” of usages for recent AI techniques (LLMs, for example)

Source: <https://www.nature.com/articles/d41586-024-03990-2>

# Big Data & AI

## Internal factors influencing adoption [2/3]

Intrinsic (technical) barriers to ML adoption	Description
<b>Explainability</b>	AI, and, in particular ML techniques appear, very often, to non-specialist users to be a “black-box”-type of a business-support system. In many circumstances, particularly when the expected output informs decision-making, this opaqueness is prone to generate reluctance in ML adoption.

# Big Data & AI

## Internal factors influencing adoption [3/3]

Intrinsic (technical) barriers to ML adoption	Description
<b>Bias(*) in data and algorithms</b>	By far, the most impeding hurdle to ML adoption, bias may be rooted both in data and in the computer model. In both cases, it generates repeatable errors that may lead to erroneous, unfair, discriminatory, potentially dangerous, or illegal conclusions and/or actions.

(\*) Bias, in the context of AI, is related to the likelihood of, systematically, producing erroneous results, or reaching wrong conclusions.

For more information on bias and ethics in AI, please see:

<https://www.institutmontaigne.org/publications/algorithmes-controle-des-biais-svp>

# **Big Data & AI: The triple challenge**

## **1. AI as General Purpose Technology**

- AI (ML) is the GPT of our era
- As such, it creates the economic growth of tomorrow
- Existing economic institutions (industries, markets) shall be substantially altered
  - Jobs disappearing, jobs transformed, jobs created
  - New value chains
  - New industries, new markets, new players

# Big Data & AI: The triple challenge

## 2. AI as an instrument of public action

- The pervasive nature of AI renders it a convenient instrument for public (collective) action:
  - « A public action instrument is a device that is both technical and social and which organizes specific social relationships between public authorities and their recipients based on the representations and meanings that it carries. » (P. Lascoumes et P. Le Galès, Gouverner par les instruments, Paris: Presses de Sciences Po, 2005)
- As such, massive adoption of AI tools raise the question of their intermediation role (agency) between the various intervening parties (governments – citizens, firms – clients, media – public)
- Should an AI chatbot be considered to be an economic agent in its own right?

HUMAN AGENCY

ALGORITHMIC AGENCY

# Big Data & AI: The triple challenge

## 3. AI as Digital Transformation driver

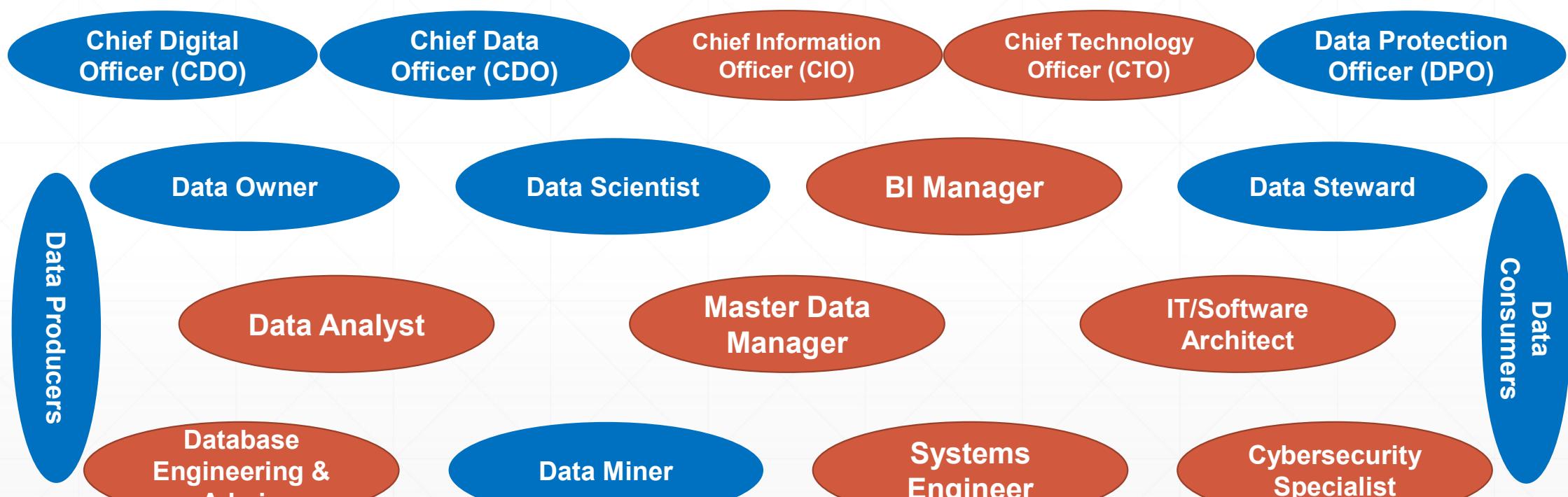
As individuals and organizations become increasingly dependent on digital technologies, massive deployment of AI solutions raise the following fundamental questions:

- Where is the frontier separating those activities that should remain “human” and the ones that can be “delegated” to machines?
- Is there is a “barrier between the ability to access, understand, and benefit from this data, and the practice of simply producing it? (knowledge gap between those with knowledge of data-driven systems and those without.) »

... both questions pertaining to a larger social phenomenon called “*The division of learning*” in the age of AI (S. Zuboff)

# Data-Driven Organizations

## Existing vs New Roles



# Future of jobs 2020 by WEF

FIGURE 22

Top 20 job roles in increasing and decreasing demand across industries

↗ Increasing demand

1	Data Analysts and Scientists
2	AI and Machine Learning Specialists
3	Big Data Specialists
4	Digital Marketing and Strategy Specialists
5	Process Automation Specialists
6	Business Development Professionals
7	Digital Transformation Specialists
8	Information Security Analysts
9	Software and Applications Developers
10	Internet of Things Specialists
11	Project Managers
12	Business Services and Administration Managers
13	Database and Network Professionals
14	Robotics Engineers
15	Strategic Advisors
16	Management and Organization Analysts
17	FinTech Engineers
18	Mechanics and Machinery Repairers
19	Organizational Development Specialists
20	Risk Management Specialists

↘ Decreasing demand

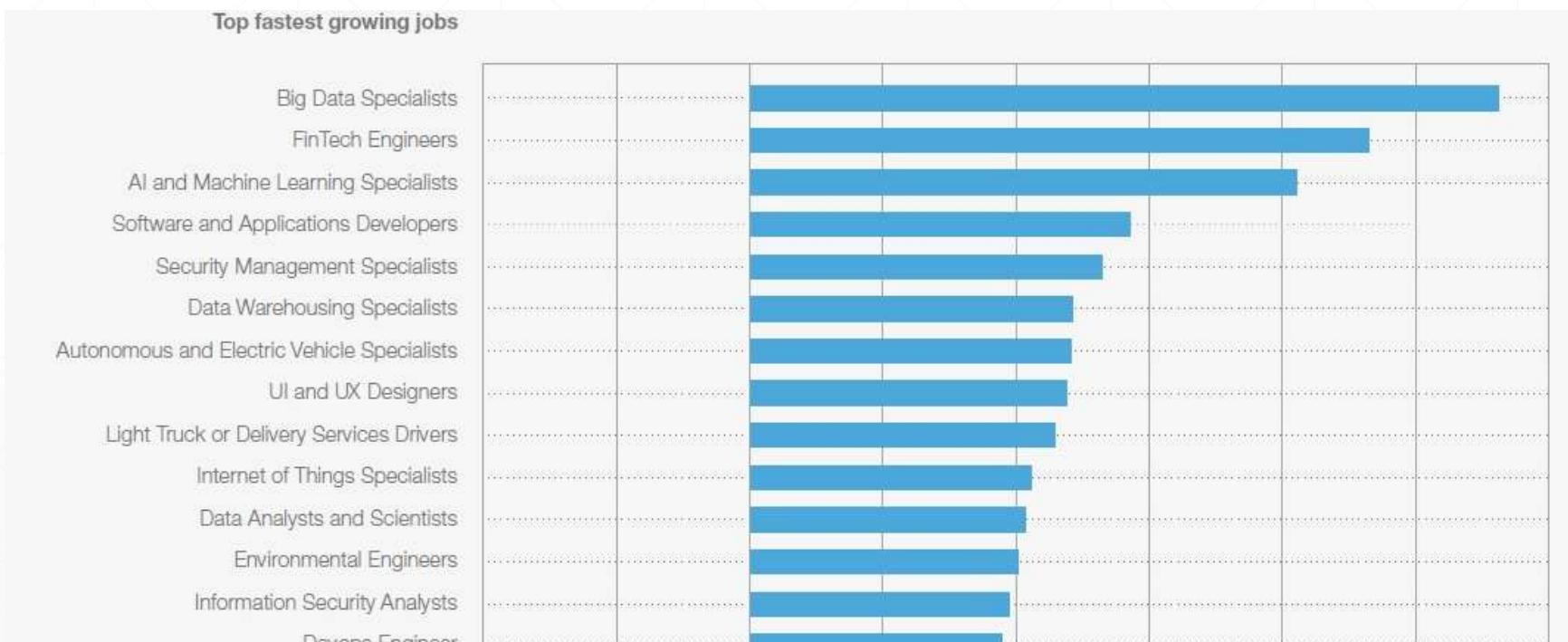
1	Data Entry Clerks
2	Administrative and Executive Secretaries
3	Accounting, Bookkeeping and Payroll Clerks
4	Accountants and Auditors
5	Assembly and Factory Workers
6	Business Services and Administration Managers
7	Client Information and Customer Service Workers
8	General and Operations Managers
9	Mechanics and Machinery Repairers
10	Material-Recording and Stock-Keeping Clerks
11	Financial Analysts
12	Postal Service Clerks
13	Sales Rep., Wholesale and Manuf., Tech. and Sci.Products
14	Relationship Managers
15	Bank Tellers and Related Clerks
16	Door-To-Door Sales, News and Street Vendors
17	Electronics and Telecoms Installers and Repairers
18	Human Resources Specialists
19	Training and Development Specialists
20	Construction Laborers

Source

Future of Jobs Survey 2020, World Economic Forum.

**Source:** WEF. [http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs\\_2020.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf)

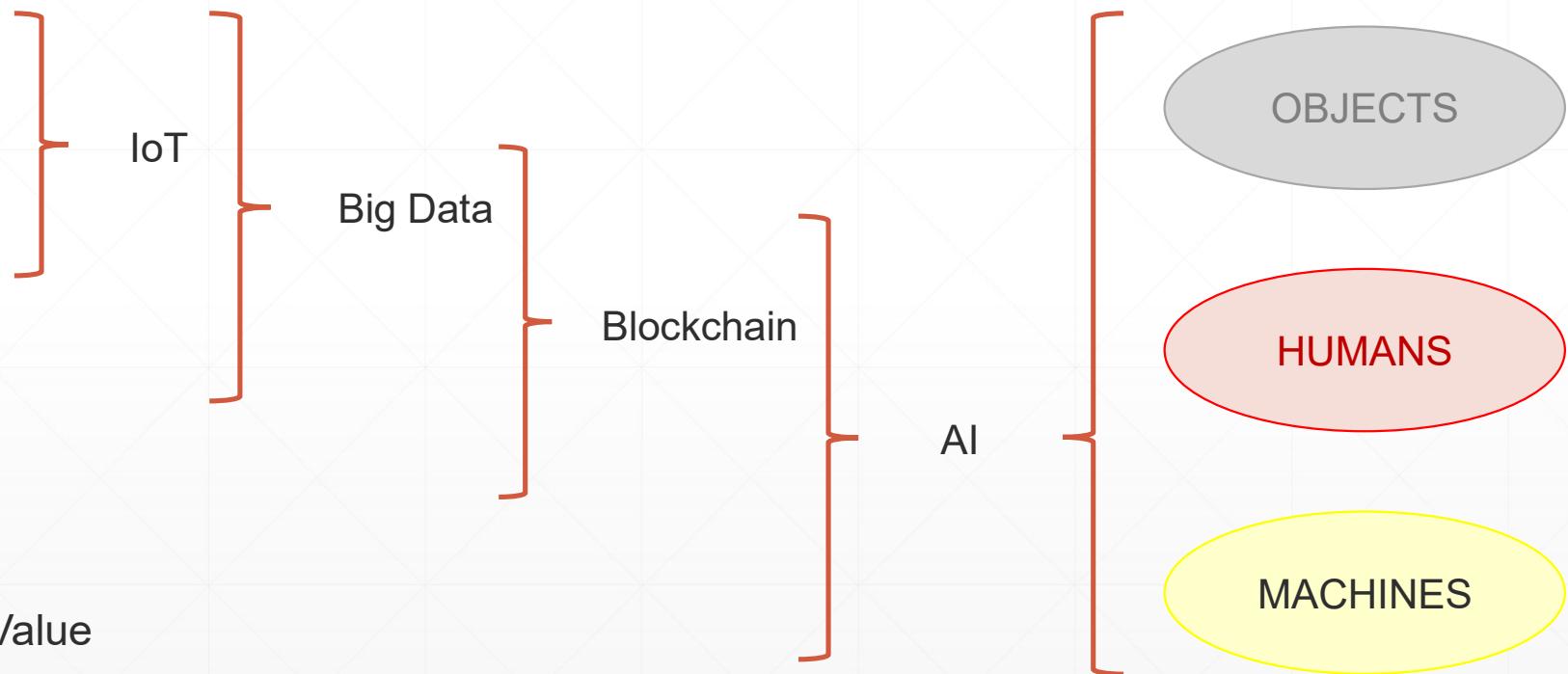
# Future of jobs 2025-2030 by WEF



Source: WEF. <https://www.weforum.org/publications/the-future-of-jobs-report-2025/>

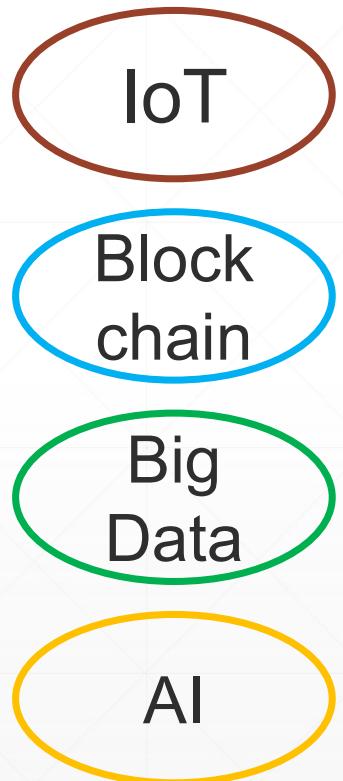
# IoT, Blockchain, Big Data & AI Combinatorial Effects - I

- Volume
- Variety
- Velocity
- inViolability
- Veracity and Value



# IoT, Blockchain, Big Data & AI Combinatorial Effects - II

- Abundance of Data
- ... creates the need to:
  - Build trust in a decentralized and distributed global infrastructure
  - Design and implement the technical environments capable of handling volume, variety, velocity, etc...
  - Transform data into relevant and trustworthy information and knowledge



# The class/reference example IoT-Blockchain-Big Data-AI

- **IoT** is the technology enabling objects to be connected to a network, either existing, or new
  - In our case, the reader of reference and student IDs and the portable ID for each “item”
- **Blockchain** is the technology allowing trust to be embedded in the system
  - In our case, the rules that make sure that all references are returned at the end, and, that students may exchange references between them without going through a central point (professor)
- **Big Data** is the technology that allows variety of references (books, articles, videos, pictures, audio recordings), volume (Zettabytes) and velocity (real time)
  - In our case, making information about multiple types of references usage available in real time, and the possibility to create a central, digital, catalogue
- **Artificial Intelligence** is the set of rules that optimizes the usage of references by students for improved learning experience
  - In our case, providing this year’s class with information about prior usage (historical), and recommendation on the best reference combinations depending on the final subject presentations

# IoT, Blockchain, Big Data & AI - Wrap-Up

## Adoption considerations

- Combination of several technologies
- Adoption discussion:
  - Standards (ex: MS-DOS)
  - Installed base (ex: QWERTY keyboard)
  - Convergence between different types of knowledge
    - (ex: computer: binary arithmetic, symbolic logic, programming)
  - Co-existence of what initially was considered to be rival technologies (ex: DC and AC)

# Big Data & AI Class 3 Summary



- Big Data & AI is a powerful combination of technologies
  - Work structure inherited from the past is questioned, as we are in the presence of Man-Machine interactions of a new type. Decision making processes are increasingly spread across people, processes and technology
- There are internal factors influencing adoption, the most important being: explainability, and bias

***“The most important general-purpose technology of our era is artificial intelligence (AI), particularly machine learning (ML).”***

(Brynjolfsson & McAfee, 2017)

# Thank You!

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