



CURSO DE VERANO UPM 2022  
Ciencia e ingeniería de datos en defensa y seguridad: los  
retos del Big Data en los nuevos escenarios de conflicto  
27-28 June 2022

# Big Data Technologies: Applications in Security and Defence

*Ignacio Montiel Sánchez - REA 27 June 2022*

*Disclaimer: The information and views set out in this article are those of the author and do not necessarily reflect the official opinion of the European Commission*

# EUROPEAN RESEARCH EXECUTIVE AGENCY IN NUMBERS

IMPLEMENTING SEVEN HORIZON EUROPE AND TWO OTHER EU PROGRAMMES<sup>1</sup>  
WITH €22.7 BILLION<sup>2</sup> FROM 2021 TO 2027 IN PARTNERSHIP WITH 7 COMMISSION SERVICES

●  
DG Research  
and Innovation

●  
DG Education,  
Youth, Culture  
and Sport

●  
DG Agriculture  
and Rural  
Development

●  
DG Communications  
Networks, Content  
& Technology

●  
DG Migration &  
Home Affairs

●  
DG Environment

●  
DG Employment,  
Social Affairs  
and Inclusion

## Horizon Europe



€6.2 billion



€1.8 billion



€3.1 billion



€7.4 billion



€2.4 billion



€371 million

## Other EU programmes



€780 million



€679 million

<sup>1</sup>in addition to ongoing Horizon 2020 projects

<sup>2</sup>figures are rounded

# REA'S CENTRAL ROLE IN HORIZON EUROPE



## Pillar I EXCELLENT SCIENCE

European Research Council

Marie Skłodowska-Curie

Research Infrastructures



## Pillar II GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS

Clusters

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Joint Research Centre



## Pillar III INNOVATIVE EUROPE

European Innovation Council

European Innovation  
Ecosystems

European Institute of  
Innovation & Technology

## WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA

Widening participation & spreading excellence

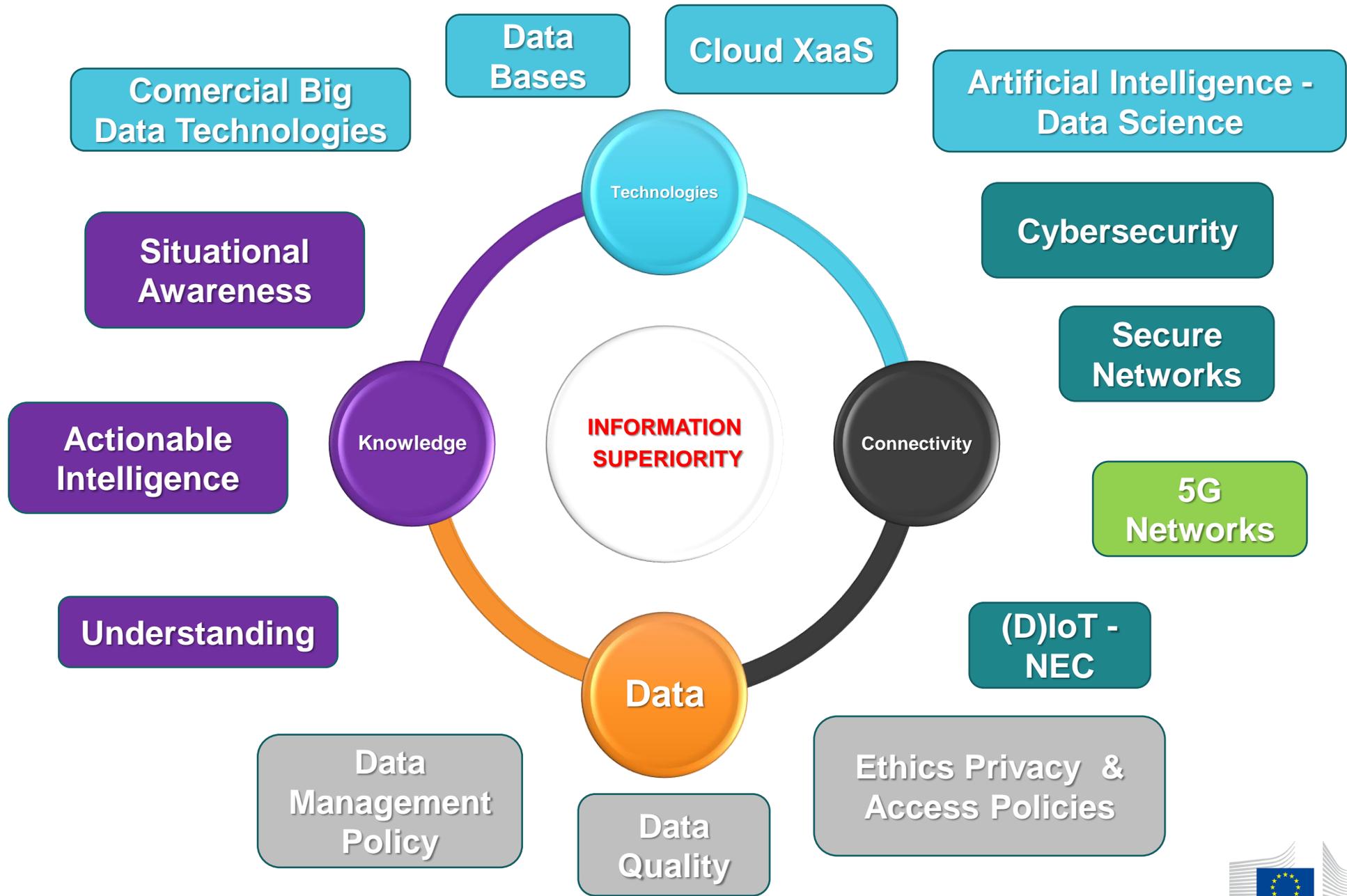
Reforming & Enhancing the European R&I system

# INDEX

1. Big Data Technologies and the Digital Transformation
2. Data Policies in the EU Framework
3. EU Research Programmes funding Big Data
  - A. European Defence Fund
  - B. EU Joint Undertakings
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Examples of H2020 Projects in Border Management using Big Data Analysis

4. Conclusions



# Big Data Technologies and the Digital Transformation

To understand that the application of Big Data is so ubiquitous that current technology landscape and an infinity of applications cannot be understood without it

# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

## What is Big Data?

- Big Data definition. [Definition of Big Data - IT Glossary | Gartner](#)
  - **Big data** is high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of (storage and) information processing that enable enhanced insight, decision making, and process automation.
  - Data that is too large or complex for analysis in traditional relational databases
- Typified by the “3 V’s”:
  - Volume – Huge amounts of data to process
  - Variety – A mixture of structured and unstructured data
  - Velocity – New data generated extremely frequently

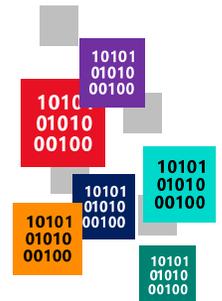
Web server log reporting



Social media sentiment analysis



Sensor and IoT Processing



# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

[IRJET-V4I957.pdf](#) The 17 Vs of Big Data --> Challenges

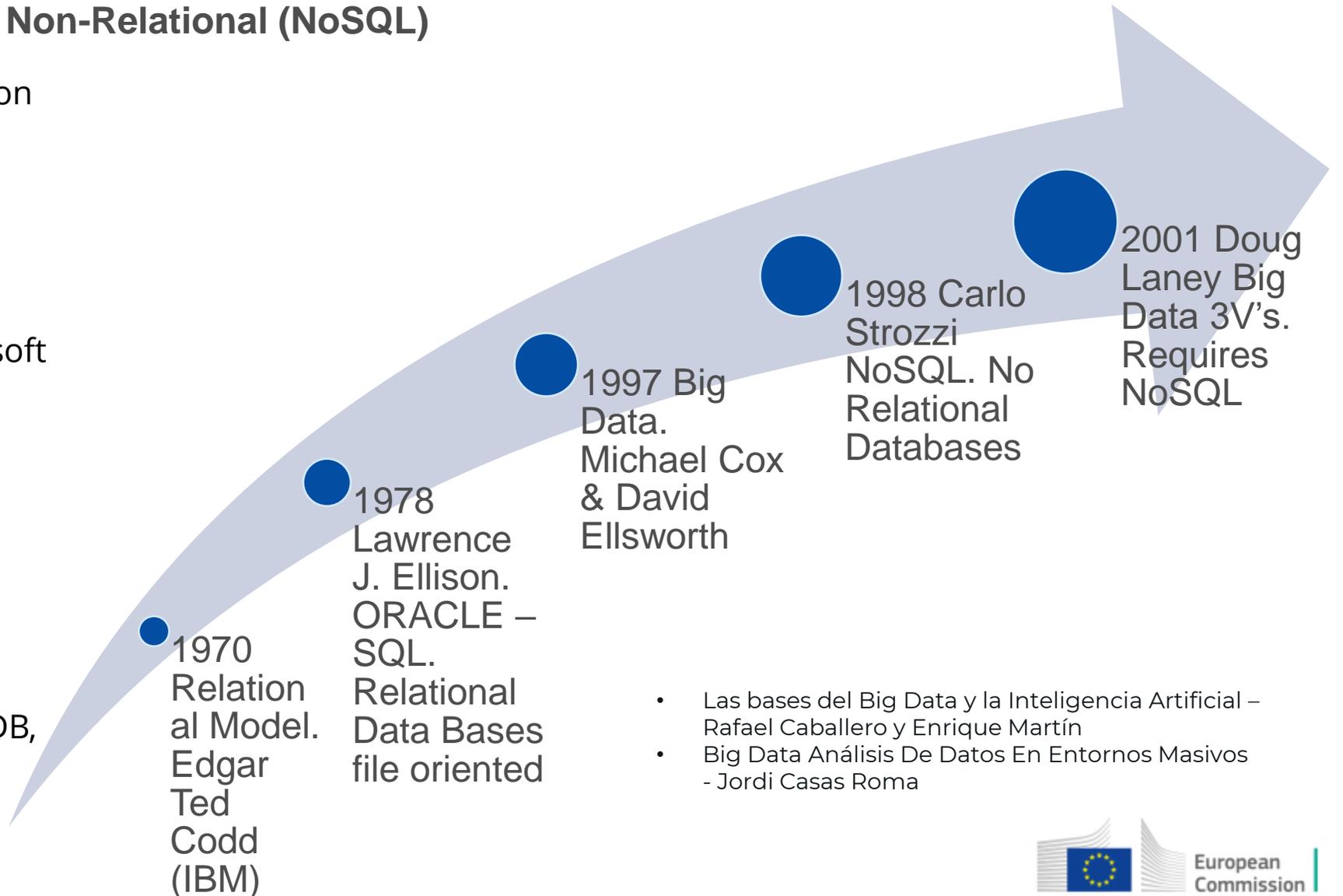


The 10 Vs of Big Data

# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

## DATABASES: Relational vs Non-Relational (NoSQL)

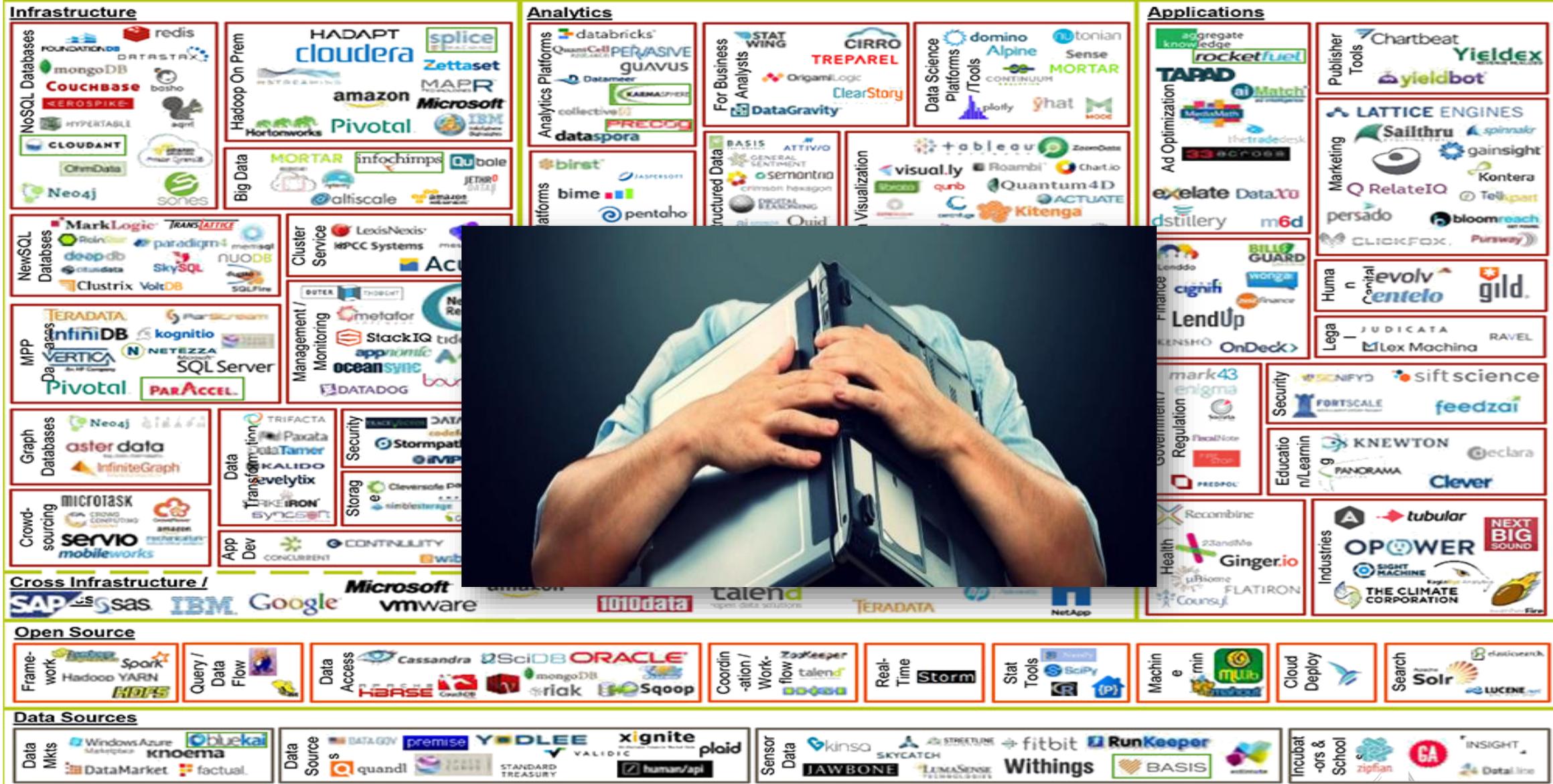
- [What is a Database?](#): a collection of data, stored in a logical and structured manner.
- **RDBMS**: Relational Database Management Systems - Microsoft Access, SQL Server, MySQL...
- **NoSQL**: refers loosely to a particular type of database model, or DBMS that doesn't adhere strictly to the relational/SQL model -MongoDB, Neo4j, Redis, Cassandra...



- Las bases del Big Data y la Inteligencia Artificial – Rafael Caballero y Enrique Martín
- Big Data Análisis De Datos En Entornos Masivos - Jordi Casas Roma

# BIG DATA LANDSCAPE, VERSION 3.0

Exited: Acquisition or IPO

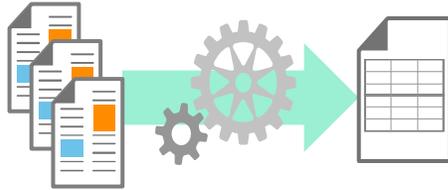


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# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

## Types of Big Data Problems (1)

Batch Processing



Execution without user supervision

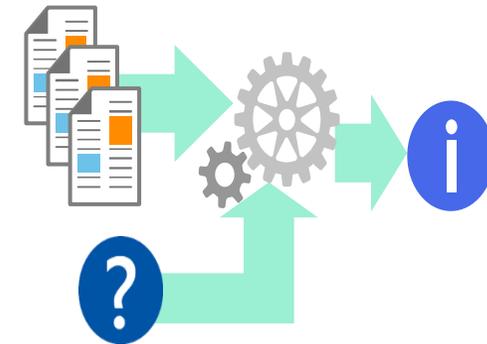
Filter, cleanse, and shape data for analysis

Real-time Processing



Capture, filter, and aggregate streams of data for low-latency querying

Predictive Analytics



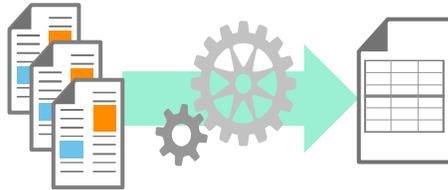
Artificial Intelligence – Data Science

Apply statistical algorithms for clustering, classification, regression, and prediction

# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

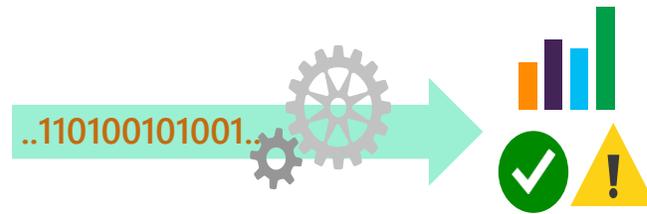
## Types of Big Data Problems (2)

### Security-by-design



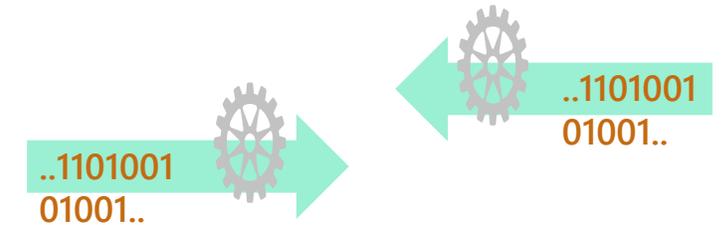
Security-by-design principle is to include the requirements related to security and privacy in the design already from the beginning, rather than implementing additional layers later.

### Selection of Architectures



Set of APIs for the development of user applications and integration of existing external systems and analysis tools in the form of microservices, consuming the data collected from the different sources and storing the analysis results in a secure and legal way.

### Software development



Agile methodology and DevOps practices. Methodologies need to cope with the fast evolution of technologies and user requirements that may quickly change

# Big Data Technology – Hadoop 2.0



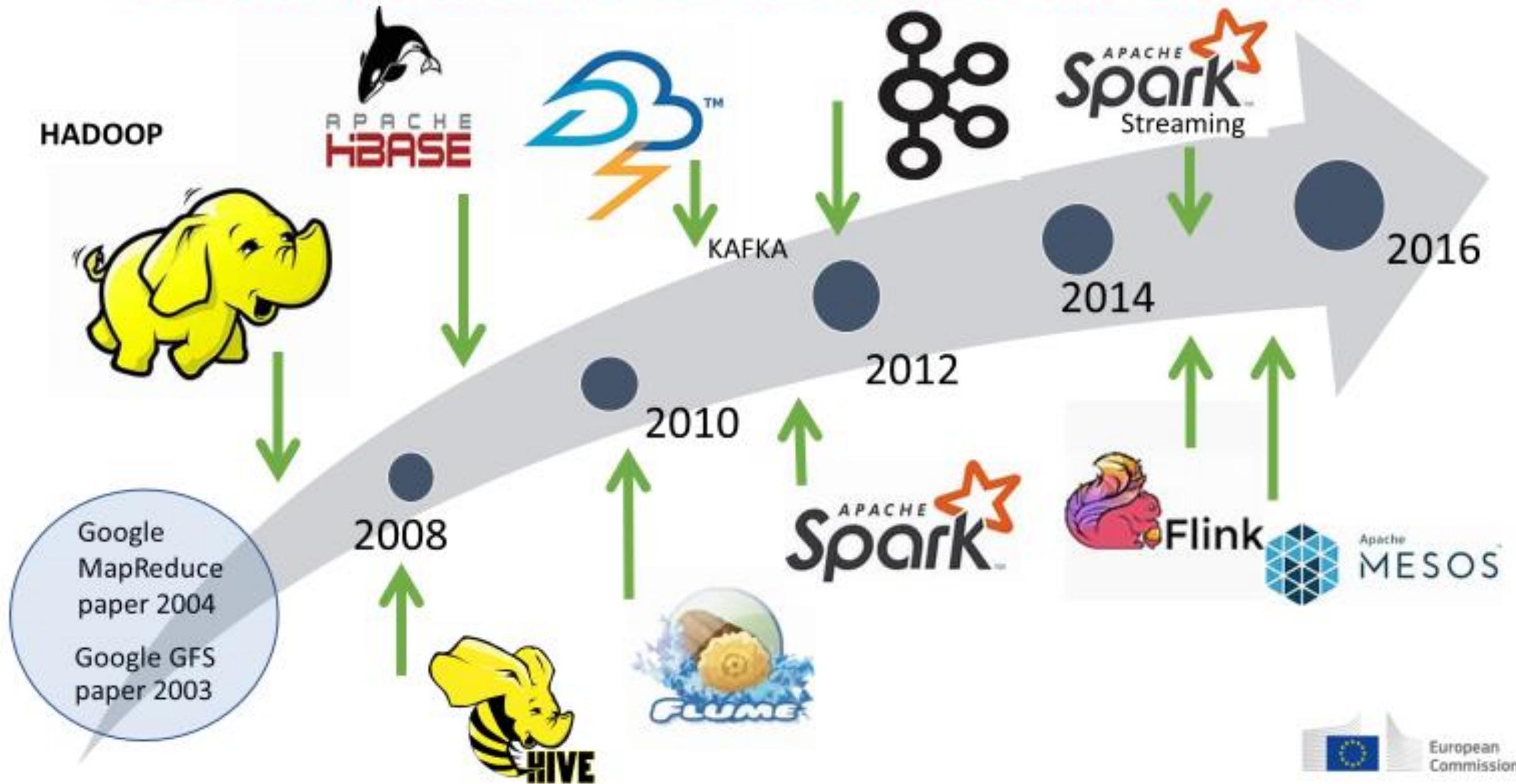
Map / Reduce

Other

YARN

Hadoop Distributed File System (HDFS)

# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION



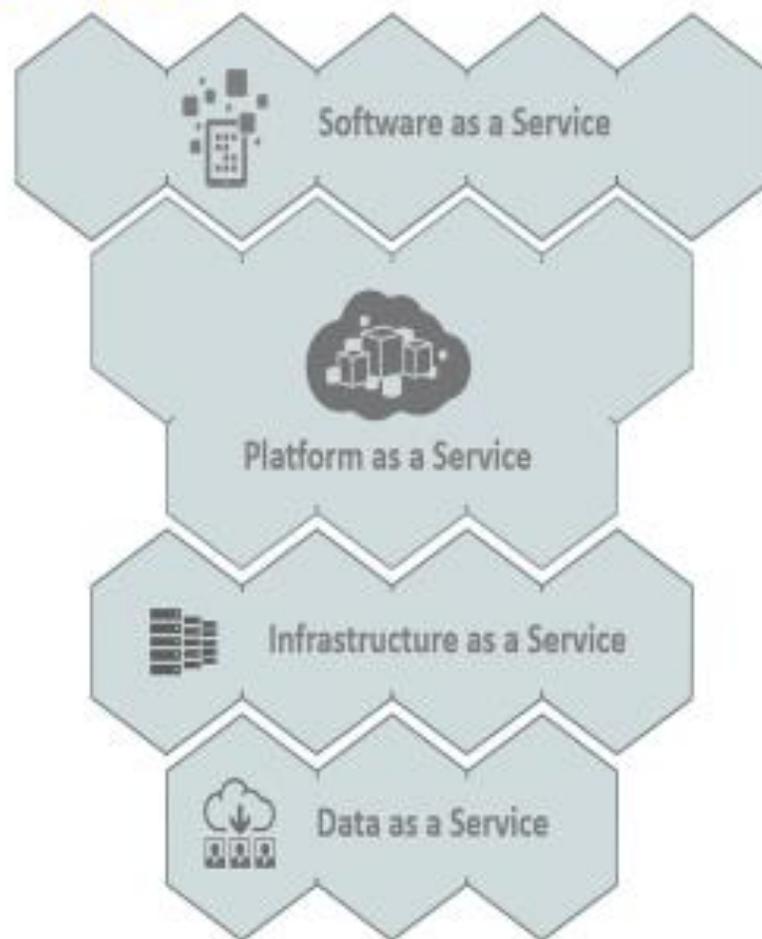
# Big Data Tools Ecosystem



# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

## To cloud or not to cloud: Everything as a service

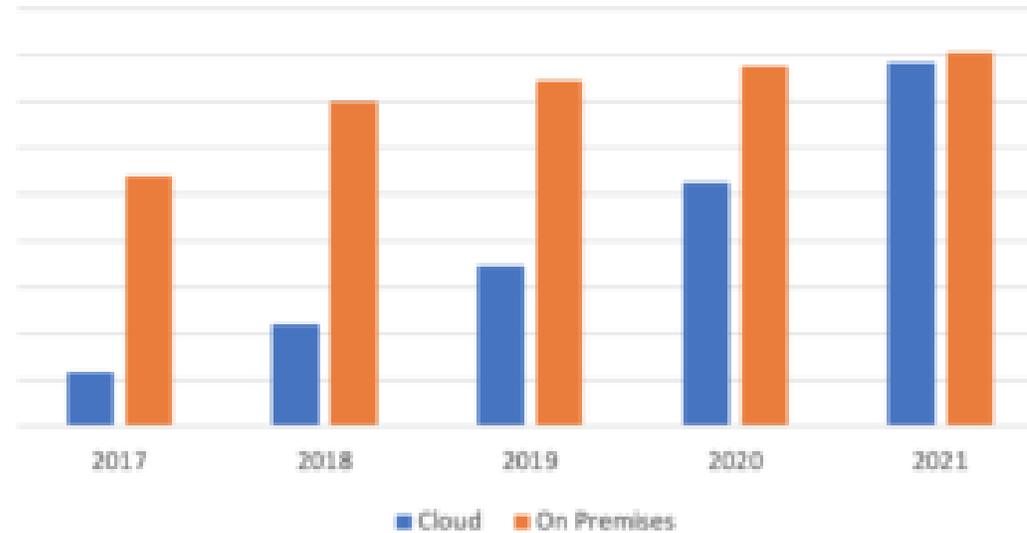
### Cloud Technologies



# BIG DATA TECHNOLOGIES AND THE DIGITAL TRANSFORMATION

## 1. [Gartner Blog Network](#)

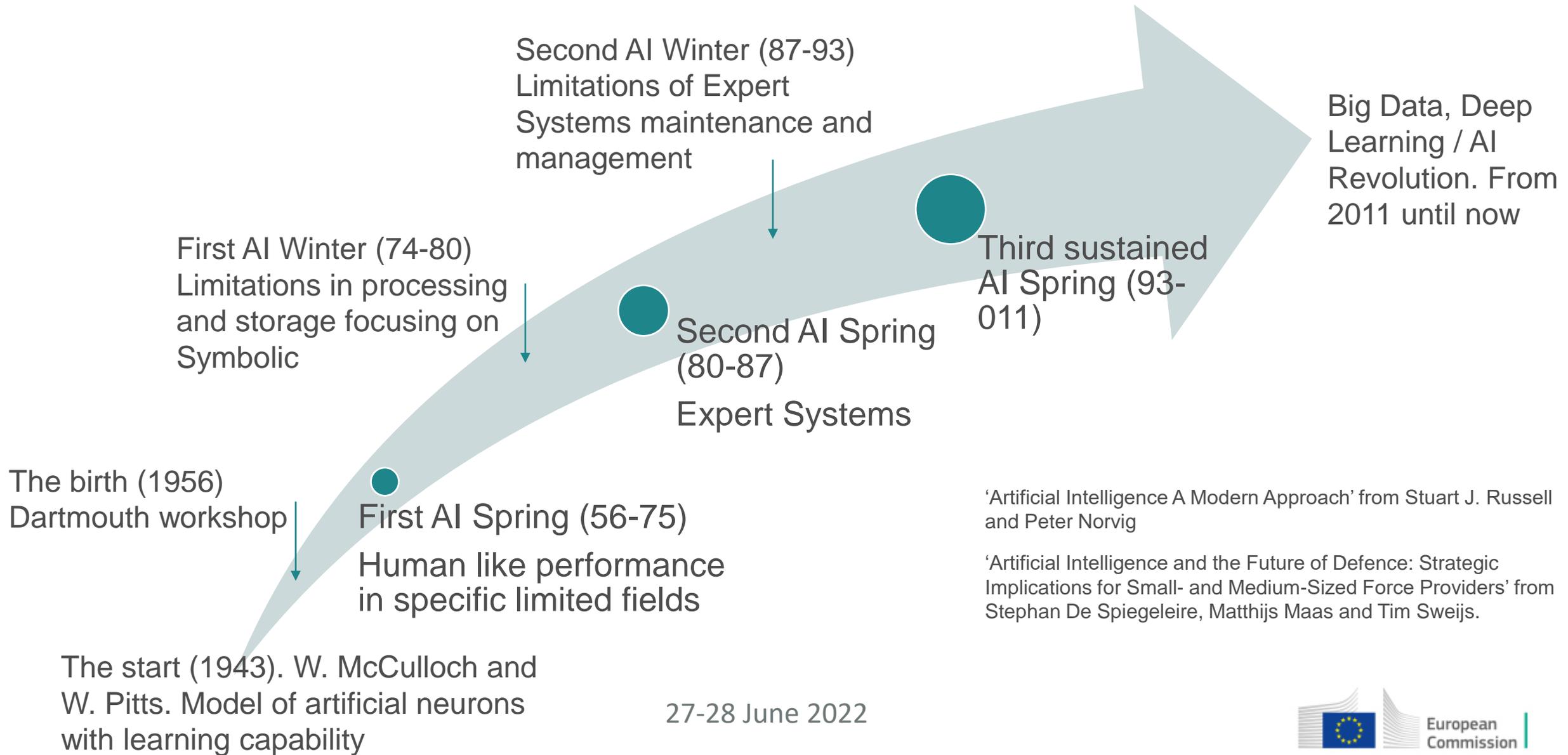
Cloud and On Premises DBMS Revenue



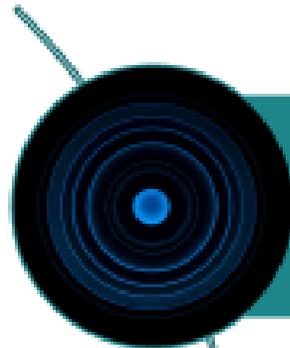
2017		2018		2019		2020		2021	
Vendor	Share								
Oracle	36.1%	Oracle	31.1%	Oracle	27.4%	Microsoft	24.3%	Microsoft	24.0%
Microsoft	21.5%	Microsoft	23.6%	Microsoft	24.7%	Oracle	23.8%	AWS	23.9%
IBM	12.7%	AWS	13.5%	AWS	17.1%	AWS	20.6%	Oracle	20.6%
AWS	9.2%	IBM	10.4%	IBM	8.8%	IBM	6.8%	Google	6.5%
SAP	7.4%	SAP	6.9%	SAP	6.5%	SAP	5.6%	IBM	5.6%

27-28 June 2022

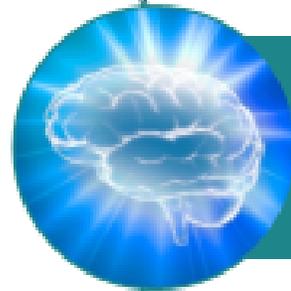
# AI TECHNOLOGIES AND THE DIGITAL TRANSFORMATION



# ARTIFICIAL INTELLIGENCE CATALIZING BIG DATA



**Symbolic, logic-based and knowledge-based**



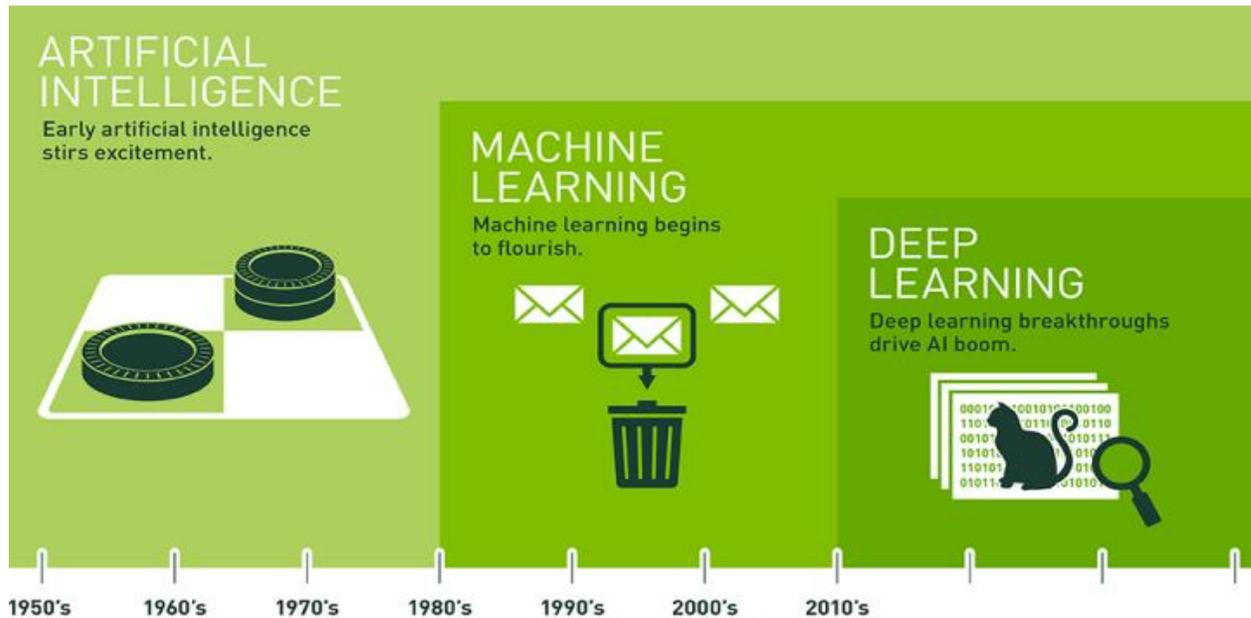
**Connectionist - Artificial Neural Networks (ANN)**



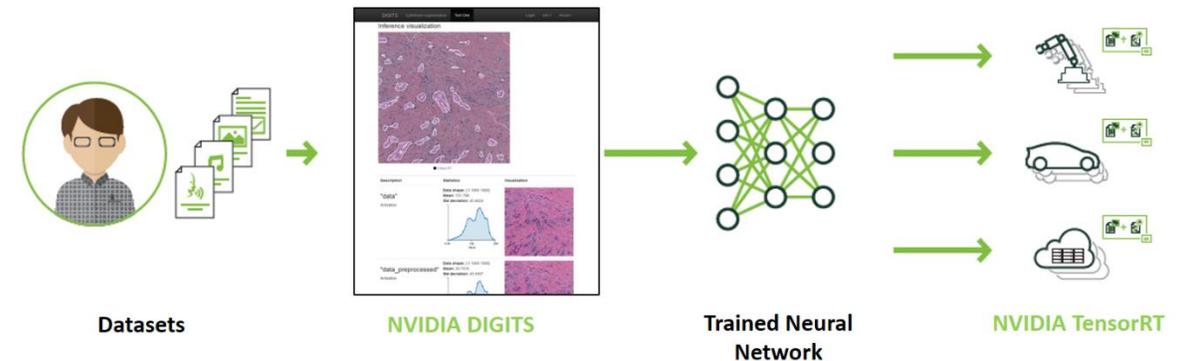
**Probabilistic, Decision Trees and Meta-Heuristics search**

# ARTIFICIAL INTELLIGENCE CATALYZING BIG DATA

## Machine Learning and Deep Learning



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.



Source : [What is Deep Learning? | Data Science | NVIDIA Glossary](#)

# Data Policies in the EU Framework

To understand the policies covering the data management in EU

# DATA POLICIES IN THE EU FRAMEWORK – THE BACKGROUND

- Since 2014 with the **General Data Protection Regulation (GDPR)** the EU created a solid framework for digital trust.
  - The upcoming review of the GDPR may provide further useful elements in this regard.
- Other initiatives underpinning the data economy are
  - the Regulation on the free flow of non-personal data (FFD)
  - the Cybersecurity Act (CSA)
  - the Open Data Directive
- The Commission had also engaged in digital diplomacy recognising 13 countries as providing adequate level of protection for personal data.

# DATA POLICIES IN THE EU FRAMEWORK – DIGITAL STRATEGY 1

1. [Regulation on a framework for the free flow of non-personal data in the EU \(14/11/2018\)](#) The EU wants to ensure a free flow of data in Europe, allowing companies and public administrations to store and process non-personal data wherever they choose.
2. [European data strategy \(19/02/2020\)](#) EC Communication aiming to make the EU a leader in a **data-driven** society
3. [European data governance act. \(25/11/2020\)](#) This regulation is aimed to boost **data sharing** across sectors and Member States.
4. [Europe's Digital Decade: digital targets for 2030 \(9/03/2021\)](#) Europe aims to empower businesses and people in a human-centred, sustainable and more prosperous digital future.
5. [Data Act.\(23/02/2022\)](#) Regulation on harmonised rules on fair access to and use of data. Key measure for making more data available for use in line with EU rules and values. Key pillar of the European strategy for data. Important contribution to the digital transformation objective of the Digital Decade.

# DATA INITIATIVES IN THE EU FRAMEWORK – DIGITAL STRATEGY 2

1. [Staff working document on data spaces \(23/02/2022\)](#) The Commission publishes an overview of the state of play of the common European data spaces developed in various fields. The creation of EU-wide common, interoperable data spaces in strategic sectors will overcome existing legal and technical barriers to data sharing and, as such, unleash the enormous potential of data-driven innovation
2. [Cloud computing.](#) The European Commission has launched a [European Alliance on Industrial Data, Edge and Cloud](#), which will feature the development of several work streams, related to key EU policy goals. EU countries have signed a joint declaration on cloud towards the creation of a European cloud.
3. [Big data:](#)
  1. [Test Infrastructure: Who is it for?](#) European public administrations that have an interest in testing analytics tools and standards to harness the potential of their data. [Big Data Test Infrastructure: Getting started](#)
  2. [Cloud stakeholder working groups start their work on cloud switching and cloud security certification](#)

# DATA INITIATIVES IN THE EU FRAMEWORK – AI

[A European approach to artificial intelligence](#) The EU's approach to artificial intelligence focuses on **excellence** and **trust**, aiming to boost research and industrial capacity and ensure fundamental rights.

The European Commission [developed an AI strategy](#) to go hand in hand with the European approach to AI. The AI strategy proposed measures to streamline research, as well as policy options for AI regulation, which fed into work on the AI package.

The Commission published its AI package in April 2021, proposing new rules and actions to turn Europe into the global hub for trustworthy AI. This package consisted of:

- [Communication on Fostering a European Approach to Artificial Intelligence](#)
- [Coordinated Plan with Member States: 2021 update](#)
- [Proposal for an AI Regulation](#) laying down harmonised rules for the EU (Artificial Intelligence Act)

# EU Research Programmes funding Big Data

To understand the efforts done by the EU to foster the applications of Big Data and allow their use in an ethical, effective and harmonized way.

Open Research Europe: <https://open-research-europe.ec.europa.eu/>.

# EU RESEARCH PROGRAMMES FUNDING BIG DATA

## EU-funded R&I projects on data: Big Data and Open Data portfolio from Horizon 2020 [Industrial Leadership - Information and Communication technologies LEIT-ICT Work Programme](#)

### H2020 ICT Work Programme 2014 - 2015

- [ICT-15-2014](#) - Big data and Open Data Innovation and take-up (13 projects) [ICT-22-2014](#) - Multimodal and Natural computer interaction (2 projects [Aria-Valuspa](#) and [KRISTINA](#)) [ICT-16-2015](#) - Big data - research (10 projects)

The **Technologies for Information Management portfolio** includes [projects from the 7th Framework Programme \(FP7\)](#) and the Competitive and Innovation programme - ICT-policy support programme. The full range of topics covered are: Online content, Interactive and Social Media; Knowledge Discovery and Management; Reasoning and Information Exploitation

### H2020 ICT Work Programme 2016 - 2017

- [ICT-14-2016-2017](#) - Big Data PPP: cross-sectorial and cross-lingual data integration and experimentation (15 projects)
- [ICT-15-2016-2017](#) - Big Data PPP: Large Scale Pilot actions in sectors best benefitting from data-driven innovation- (4 projects)
- [ICT-16-2017](#) - Big data PPP: research addressing main technology challenges of the data economy
- [ICT-17-2016-2017](#) - Big data PPP: Support, industrial skills, benchmarking and evaluation (2 project) [ICT-18-2016](#) - Big data PPP: privacy-preserving big data technologies (4 projects) [ICT-35-2016](#) - Enabling responsible ICT-related research and innovation (1 project: [K-PLEX](#))

### H2020 ICT Work Programme 2018 - 2019

- Call [ICT-12-2018-2020](#) - Big Data technologies and extreme-scale analytics (6 projects)
- Call [ICT-13-2018-2019](#) - Supporting the emergence of data markets and the data economy (13 projects)
- Call [ICT-11-2018-2019](#) - HPC and Big Data enabled Large-scale test-beds and Applications (6 projects)
- ICT-11b) Innovation Actions-targetting the development of large-scale IoT/Cloud enabled industrial pilot test-bets for big data applications - (2 projects - [IoTwin](#)s and [INFINITECH](#))
- Call [DT-ICT-11-2019](#) - Big data solutions for energy (4 Projects)

### H2020 ICT Work Programme 2020

[DT-ICT-05-2020](#) - Big Data Innovation Hubs (4 projects) / [ICT-51-2020](#) - Big Data technologies and extreme -scale analytics (6 projects) *and H2020 - Societal Challenges - Programme - 2020:*

**H2020-EU.3.1. - SOCIETAL CHALLENGES - Health, demographic change and well-being.** Call SC1-PHE-CORONAVIRUS-2020-2B - Medical technologies, Digital tools and Artificial Intelligence (AI) analytics to improve surveillance and care at high Technology Readiness Levels (TRL) - (1 project - [icovid](#))

## New European Partnerships launched to deliver on the EU's ambitions for the Digital Decade

To boost research and innovation investments in digital, the Commission has launched new European Partnerships together with industry and academia, under the Horizon Europe programme.

- 1. European Partnership for Artificial Intelligence, Data and Robotics:** A total of €2.6 billion will be dedicated to the [AI, Data and Robotics Partnership](#) with equal contributions from the EC and the private robotics community.
- 2. European Partnership for the European Open Science Cloud:** This partnership aims to deploy and consolidate by 2030 an open, trusted virtual environment to enable the estimated 2 million European researchers to store, share and reuse research data across borders and disciplines.
- 3. European Partnership for High Performance Computing:** to develop, deploy, extend and maintain a world leading federated and hyper-connected supercomputing, quantum computing, service and data infrastructure ecosystem in the EU

# DATA INITIATIVES IN THE EU FRAMEWORK – DIGITAL STRATEGY (2)

**4. European Partnership for Key Digital Technologies (KDT):** Electronic and photonic (light based technologies) components, and the software that defines how they work as part of a system, are the Key Digital Technologies. The overarching objective of the KDT partnership is to support the digital transformation of all sectors of the economy and society, make it work for Europe and address the European Green Deal.

**5. European Partnership for Smart Networks and Services:** The partnership aims to support technological sovereignty concerning smart networks and services in line with the EU industrial strategy and the 5G cyber-security toolbox. It will contribute to enabling the digital and green transitions, address the coronavirus crisis both in terms of technologies for health crisis response and of economic recovery.

It will enable European players to develop the technology capacities for 6G systems as the basis for future digital services towards 2030. It will also allow that lead markets for 5G infrastructure and services can develop in Europe by coordinating 5G deployment with CEF2 Digital.

# EUROPEAN DEFENCE AGENCY

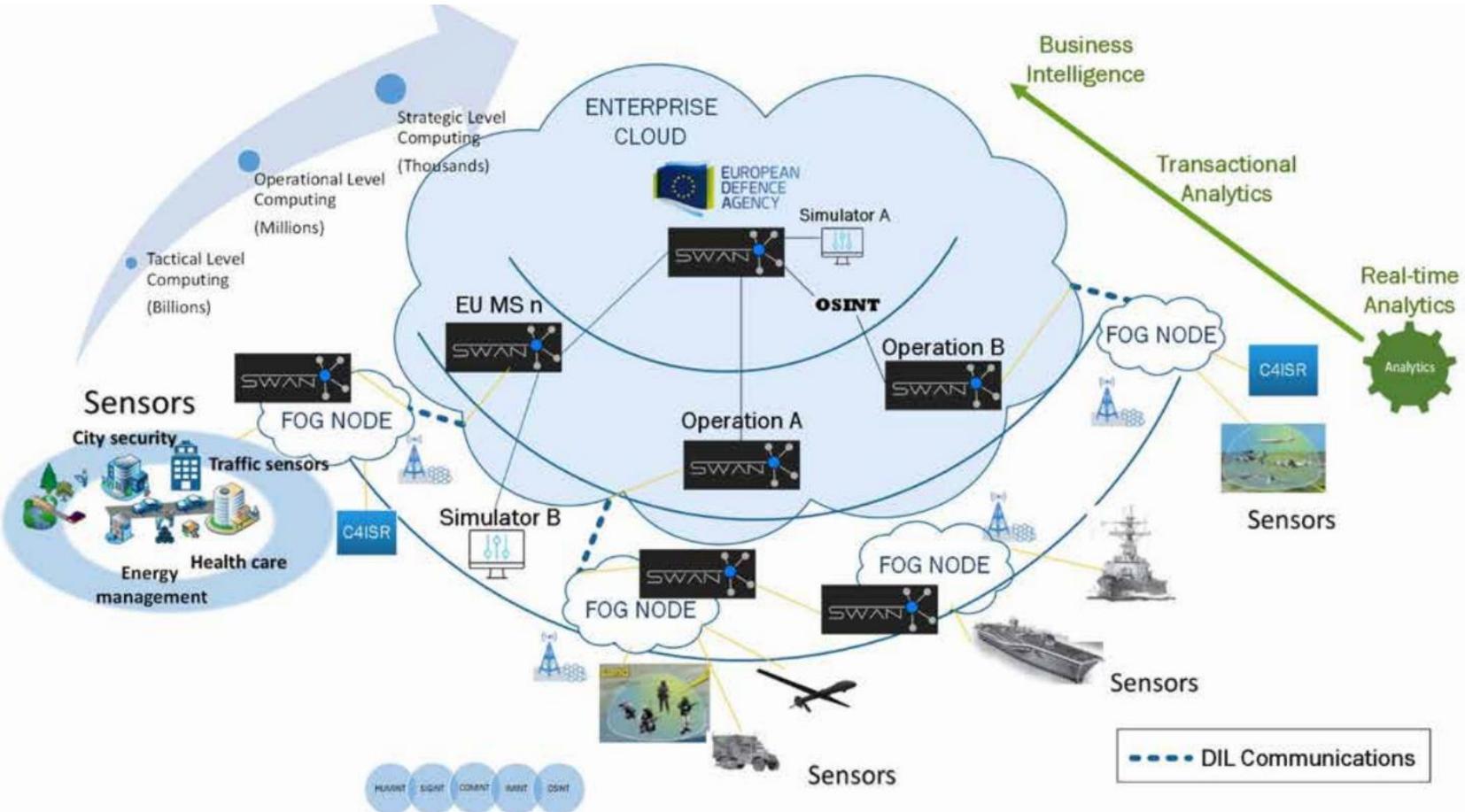
## CLAUDIA: Cloud Intelligence for Decision Support and Analysis

EDA Framework Contract 2019 - 2023

- Application of the cloud concept to provide Information Superiority to the European armed forces outsourcing IT services like
  - Computing capabilities
  - Data storage
  - Software tools

- Operational advantages related to
- Efficiency in implementation and use
  - Freeing organizations from infrastructure maintenance costs
  - Flexibility offered by virtualization
  - Capacity of sharing and working with Big Data together with the frameworks and tools of AI and Data Science provided by this model.
  - Connectivity ubiquity
  - Inherent interoperability provided by the cloud.

Concerns regarding security and dependence from service providers



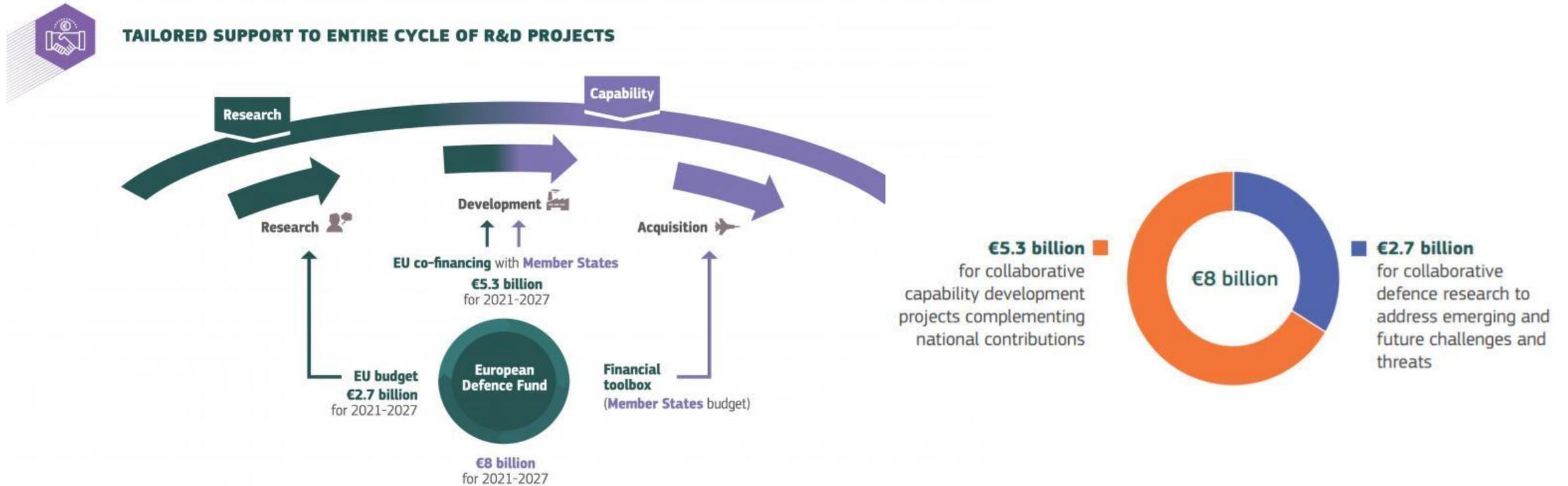
*This is a study funded from EDA Operational Budget. OB-Studies contracted by EDA are preparatory activities to catalyse pMS investments in related defence R&T.*

Consortia/Organization



# EUROPEAN DEFENCE FUND

The European Defence Fund (EDF) is the Commission's initiative to support collaborative defence research and development, and to foster an innovative and competitive defence industrial base.



# EUROPEAN DEFENCE FUND

The European Defence Fund (EDF) is the Commission's initiative to support collaborative defence research and development, and to foster an innovative and competitive defence industrial base.

## Calls on disruptive technologies

- Technological developments with the potential to lead to radical changes in defence like cryptography, radar and space-based positioning systems.
- **Big data and artificial intelligence can now be considered disruptive.**
- Quantum and other emerging technologies may also be in the future.
- It is important to identify such disruptive technologies early on and to support their development in a smart manner in order to exploit their operational advantages and be prepared for the changes.
- Industrial and economic benefits.
- 8% of the total budget is dedicated to support disruptive, high-risk defence innovation projects.

[Military multi-domain operations cloud](#) EDF-2021-DIGIT-D-MDOC

Call [Cloud technologies \(EDF-2021-DIGIT-D\) Budget 40 000 000](#)

[Frugal learning for rapid adaptation of AI systems](#) EDF-2021-DIGIT-R-FL

Call [Artificial intelligence \(EDF-2021-DIGIT-R\) Budget 18 500 000](#)

# EUROPEAN DEFENCE FUND

## Military multi-domain operations cloud EDF-2021-DIGIT-D-MDOC

- Development of a common shared Information Space with a “**Cloud of Clouds**” approach, leading to a **Multi-Domain Operations Cloud (MDOC)**.
- To combine existing and future systems into a **federated network and collaborative services** to enable and support **Command and Control** for multi-domain warfare.
- **Data collected across domains** will open up future opportunities to develop AI-enabled solutions for defence.
- Specific challenge (from the long text from the call):
  - **Information** transcends operational domains and multiplies the size of effects in combat.
  - **Lack of information sharing** and coordination across all military domains
  - **Digitization** progressively introduces creation of increasing amounts of data to be distributed and shared
  - Specific **constraints in the military** such as: high mobility with no reliance on support infrastructures, transmission security and electromagnetic contested environment, limits in networks data rate and availability, limits in local computer and storage resources, disconnected modes, environment and hardening constraints...
  - Operational users request specific **applications and services to be shared** for a real federated multi-domain cooperation like C2 services, ISR services, tactical situation or logistics, training and exercises.

MDOC must include three major components:

- 1) European virtual or digital **platform**
- 2) **Catalogue** of end-user products and services
- 3) **Tools, interfaces and APIs**

# EUROPEAN DEFENCE FUND

## Frugal learning for rapid adaptation of AI systems EDF-2021-DIGIT-R-FL

In times of real-time information availability and exchange, and increasing complexity of situations, AI has become an essential driver for new competitive system solutions. Future military capabilities will include a significant share of systems that will make massive use of AI techniques.

The aim is to tackle the problem of robustness and frugality in military AI software components to facilitate the development of new systems and their adaptation to the evolution of their environment, including from user supervision, for a reasonable cost, with minimal intervention from expert developers, and without regression.

State-of-the-art research on transfer learning, zero- or few-shot learning, active learning, domain adaptation, hybrid AI and other relevant topics should be leveraged for new methods to improve AI-based ones, preserving high performance.

- Design of relevant military use cases where trustworthy and frugal AI algorithms are needed for which representative data can be collected and performance can be measured in an objective way.
- Development of new methods for reducing the need for data and supervision to train and adapt AI systems
- Development of new methods for improving robustness guarantees by design

Implementation of benchmarking experiments on the use cases to demonstrate the advantages and drawbacks of the proposed methods.

The expected impacts are to: - Accelerate the introduction of robust AI in military systems; - Increase trust of experts and end users in AI systems; - Increase system performance and resilience; - Enhance technological autonomy

# Examples of H2020 Projects in Border Management using Big Data Analysis

*Overview of specific examples of projects in the domain of border management and how they are using Big Data Technologies for analysis and predictions*

# ITFLOWS

## IT Tools and Methods for Managing Migration Flows - ITFLOWS

The purpose of ITFLOWS is to provide accurate predictions and adequate management solutions of migration flows in the European Union in the phases of reception, relocation, settlement and integration of migration, according to a wide range of human factors and using multiple sources of information.

These insights will be provided by an evidence-based ICT enabled solution (the EUMigraTool) and precise models.

All solutions will have fitness for purpose continually validated by policy-makers and practitioners in cooperation with civil-society organisations in a dynamic and iterative process.



# ITFLOWS

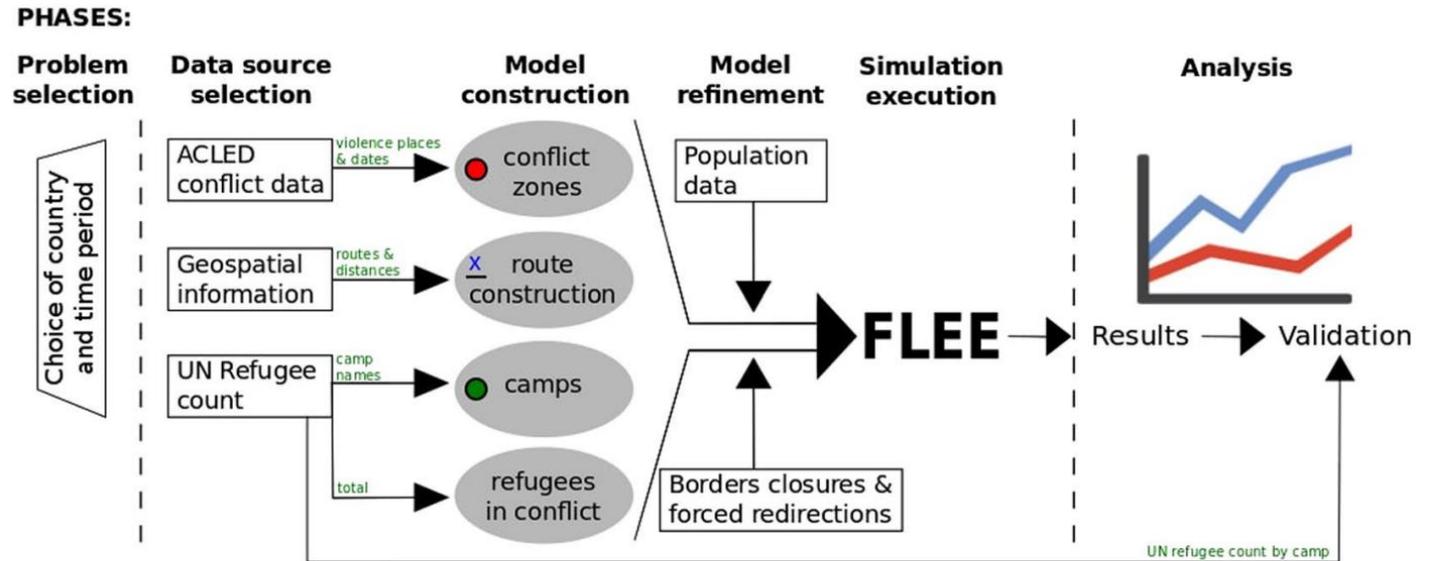
## IT Tools and Methods for Managing Migration Flows - ITFLOWS

[A generalized simulation development approach for predicting refugee destinations \(itflows.eu\)](http://itflows.eu)

The **backend of EMT** comprises two complementary approaches to:

⇒ **SIMULATION**: based on **agent-based modelling**

⇒ **FORECASTING**: relies on **deep learning architectures** based on recent bibliography that enable the extraction of semantic information for several sources of information. This translates into the creation of joint probability distribution models of the events driving migration with the input signals from the information sources.

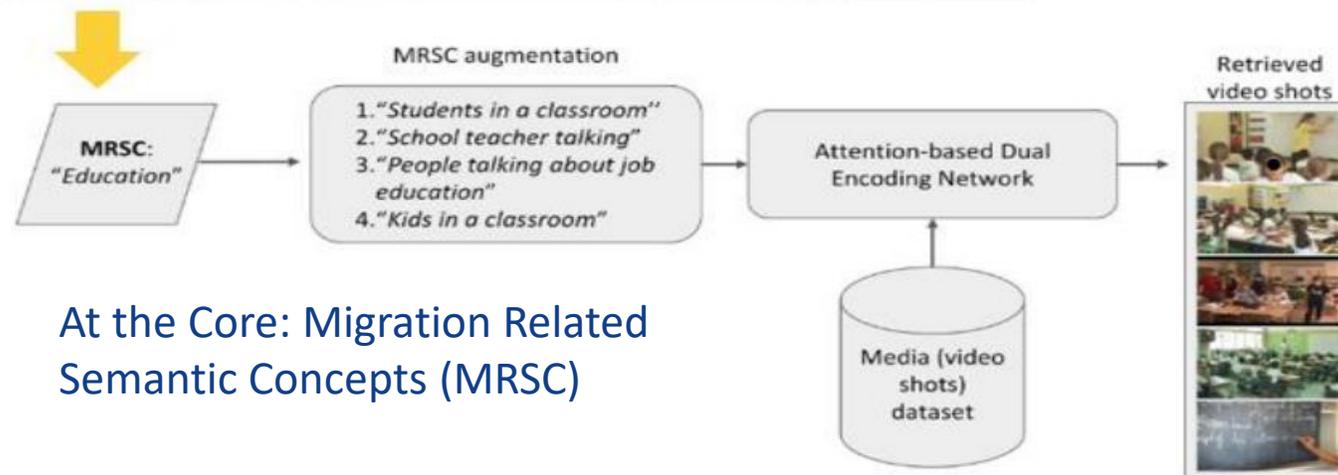
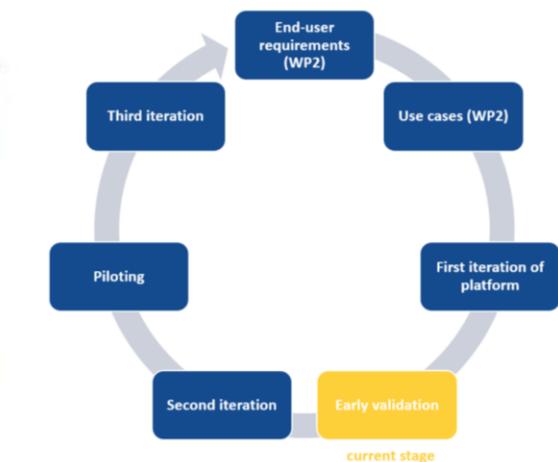


**Figure 1.** Simulation development approach for predicting the distribution of refugee arrivals across camps.

The EUMigraTool includes **analysis of media content from TV-news** (video content), **web-news** and **social media** (text content) using deep learning and proposing novel deep architectures in generative modelling and forecasting using sequential data. Predictions incorporate algorithms that consider the two key challenges associated with prediction of migration: (a) **Adequate selection of relevant data sources**, and (b) correct selection of the **potential drivers** to be monitored and to the warning thresholds to be set.

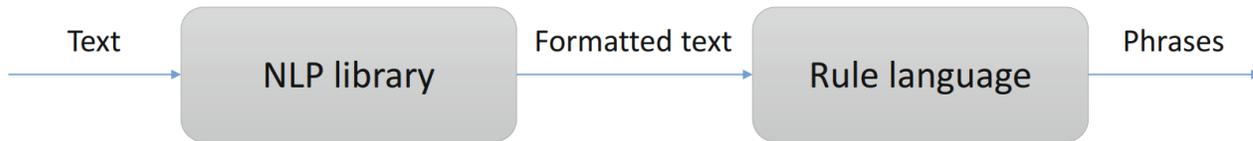
MIRROR aims to generate a better understanding of how people (from outside the EU) perceive Europe as a destination for migration.

- It will develop an integrated platform, a set of tools, as well as a systematic methodology for the comprehensive inter-media analysis of the perception of Europe, the identification of discrepancies between perception of and reality in Europe, and the creation of awareness for the impact of potential misconceptions.
- The results of the project will form the basis for policy recommendations and the development of the MIRROR platform and toolset for effective cross-media perception analysis



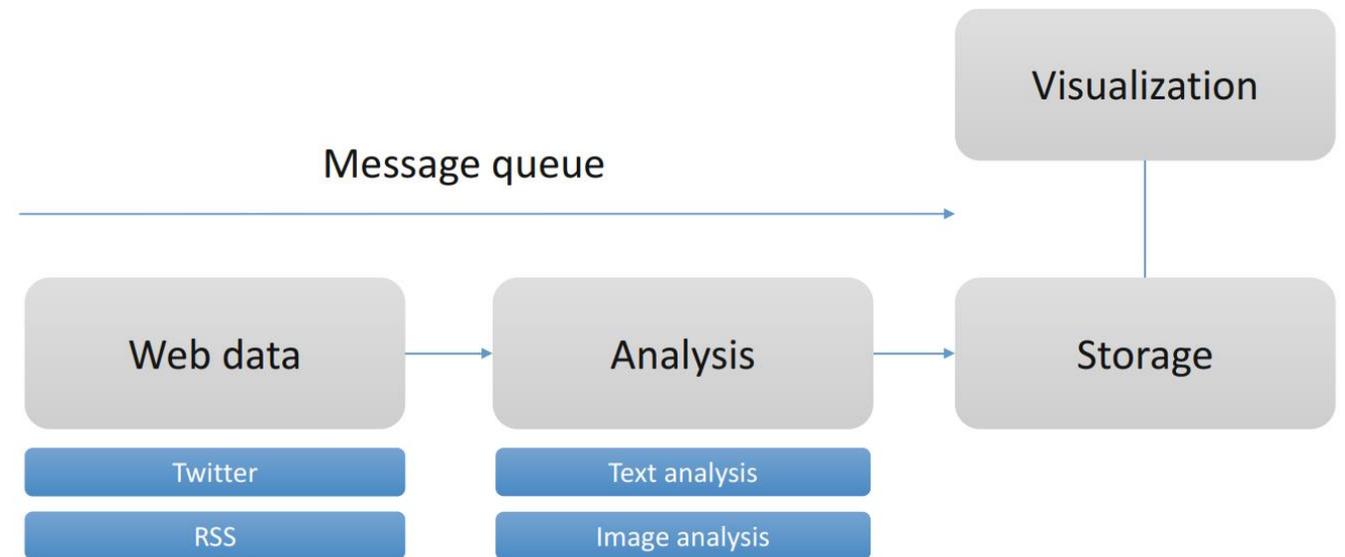
At the Core: Migration Related Semantic Concepts (MRSC)

**Example Paper: Automated Text Analysis for Intelligence Purposes: A Psychological Operations Case Study. Stefan Varga , Joel Brynielsson , Andreas Horndahl and Magnus Rosell**



PhraseBrowser is continuously developed at the Swedish Defence Research Agency (FOI)

- Data is downloaded in real time using the **Twitter Streaming API and/or RSS feeds**.
- The data is continuously processed by several analysis components and stored in an **Elasticsearch** database search engine.
- The system architecture and construction is scalable and adapted to parallelization, using **Docker** for packaging of subsystems and **Kafka** for distributing data between the subsystems

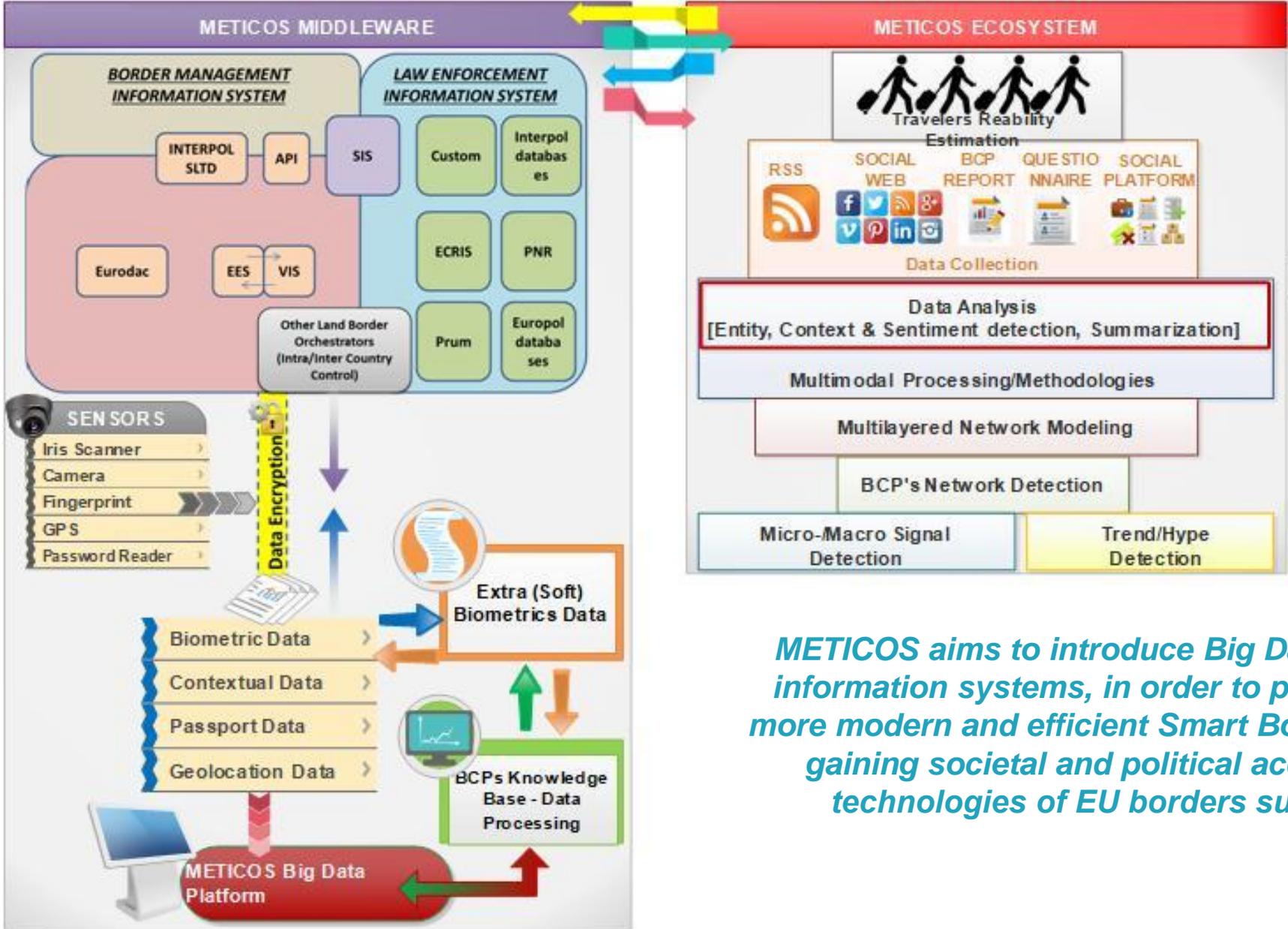


**Fig. 1** PhraseBrowser system sketch. The prototype tool can handle Twitter and RSS data, and analyzes both text and images

# METICOS



[Meticos-Project](#)



*METICOS aims to introduce Big Data Analysis of border control information systems, in order to provide a step-change towards more modern and efficient Smart Border management and towards gaining societal and political acceptance of modern control technologies of EU borders such as “no gate solutions”*

- A **real-time decision-support system** to ensure user acceptance, secure positive societal impact and maximize border control process efficiency.
- A Platform development that integrates information systems & networks of data sources for the validation the efficiency & users' acceptance of border control technologies
- The platform will provide metrics & KPIs to authorities & decision makers
- **METICOS** will join the EU Initiative for Smart Borders & will contribute to the cross-border and cross-cultural Big Data Analysis & decision support systems that feature harvesting of multi-lingual and cross-sectorial data from heterogeneous sources, different analytics approaches and risk assessment methods.
- **METICOS** will be demonstrated & validated under real operating conditions.
- **METICOS** ecosystem will work closely with other border control research initiatives to demonstrate its operational performance improvements by means of combined validation with these solutions.



# PROFILE

## Innovative Data Analytics, Data Sources, and Architecture for European Customs Risk Management

Customs risk management project solutions to help customs to:

- target and control high-risk cross-border movements more accurately and effectively
- upgrade customs' data analytics capabilities
- redefine the way how customs use information to identify risks.

Solutions build on **machine learning, graph-based analytics, and natural language processing.**

Customs practitioners able to collect and organize unstructured data, mine large datasets, make better use of control feedback and inspection outcomes, and visualize complex datasets.

Experiments with new data sources that could prove useful for customs risk assessment purposes in the future like various industry platforms, private reference databases, movement tracking services and the open internet.

### PROFILE:

- Strengthens cooperation and data exchange among customs and other competent authorities.
- Enables systematic customs-to-customs sharing of risk-relevant information through EU.
- Risk Data Sharing Architecture.



**DATA FOR POLICY .ORG**

# Data for Policy Conference 2022

## Call for Papers

Brussels/ Online - 13th December 2022  
Data & Policy Journal, Cambridge University Press

### Border External Security (BES) Cluster of H2020 Projects

Special Track 5: *"The future of border and external security: From Data to Policies"*

**Deadline: 1st June 2022**



Distinct geopolitical and virtual-physical ecosystems are emerging as everyday operations and important socio-economic decisions are increasingly outsourced to digital systems.

The developmental trajectory for these ecosystems will shape future governance models, democratic values, and the provision of citizen services.

In an envisioned 'metaverse' future, boundaries between physical and virtual spaces will become even more blurred, further underlining the need to scrutinise and challenge the various systems of governance.

**Date:** 13th of December 2022 | **Location:** Brussels & Virtually.



# Conclusions

What are we doing and what the future may bring?

# CONCLUSIONS

- Currently ubiquitous Big Data technologies underpin the digital transformation of societies, business, infrastructures and economies. The cloud paradigm is allowing to use them with several advantages without the need of significant investments and expertise.
- Big Data is inherently intertwined with Artificial Intelligence and Data Science in the form of ecosystems that should be consistently and overall assessed together. Cloud – XaaS is fostering its adoption and spreading its use by many more easily.
- There are several projects related to Big Data funded by the Commission to foster developments through programs in several fields and applications to different domains.
- In civil security, ethics and data privacy considerations are essential and part of every research project. The means to access relevant data for research must be considered.
- Peculiarities to be considered in Defence. The EDF is tackling the issue of MultiCloud capabilities and AI to shorten the dependence of Big Data. Further initiatives to come.

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