

# **IoT and Far Edge**

## **Future Directions for Industrial Systems**



Rolf Riemenschneider

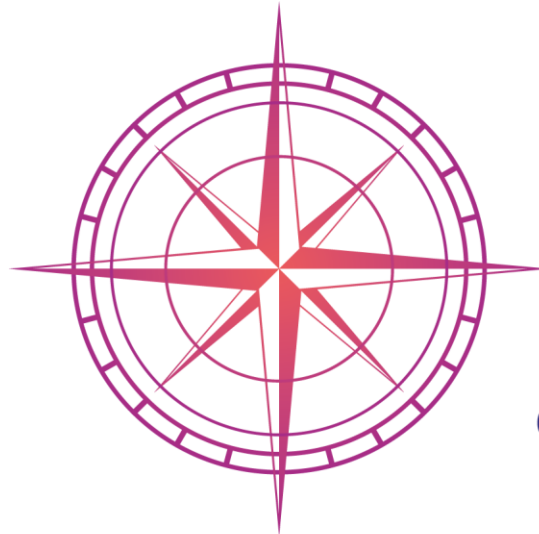
European Commission - DG CONNECT

# Digital Decade: a Compass and Common Targets

## Skills

**ICT Specialists:** 20 millions + Gender convergence

**Basic Digital Skills:** min 80% of population



## Government

**Key Public Services:** 100% online

**e-Health:** 100% availability medical records

**Digital Identity:** 80% citizens using digital ID

## Infrastructures

**Connectivity:** Gigabit for everyone, 5G everywhere

**Cutting edge Semiconductors:** double

EU share in global production

**Data – Edge & Cloud:** 10,000 climate

neutral highly secure edge nodes

**Computing:** first computer with quantum acceleration

## Business

**Tech up-take:** 75% of EU companies using Cloud/AI/Big Data

**Innovators:** grow scale ups & finance to double EU Unicorns

**Late adopters:** more than 90% of European SMEs reach

at least a basic level of digital intensity

# Trend towards the Edge and Far Edge

## ■ Strong growth of DATA forecasted

- Through Industrial IoT + Cyber Physical Systems connecting local automation islands
- Central cloud storage raising energy profile and demands for transport networks

## ■ Growing need for **COMPUTATION** close to the data:

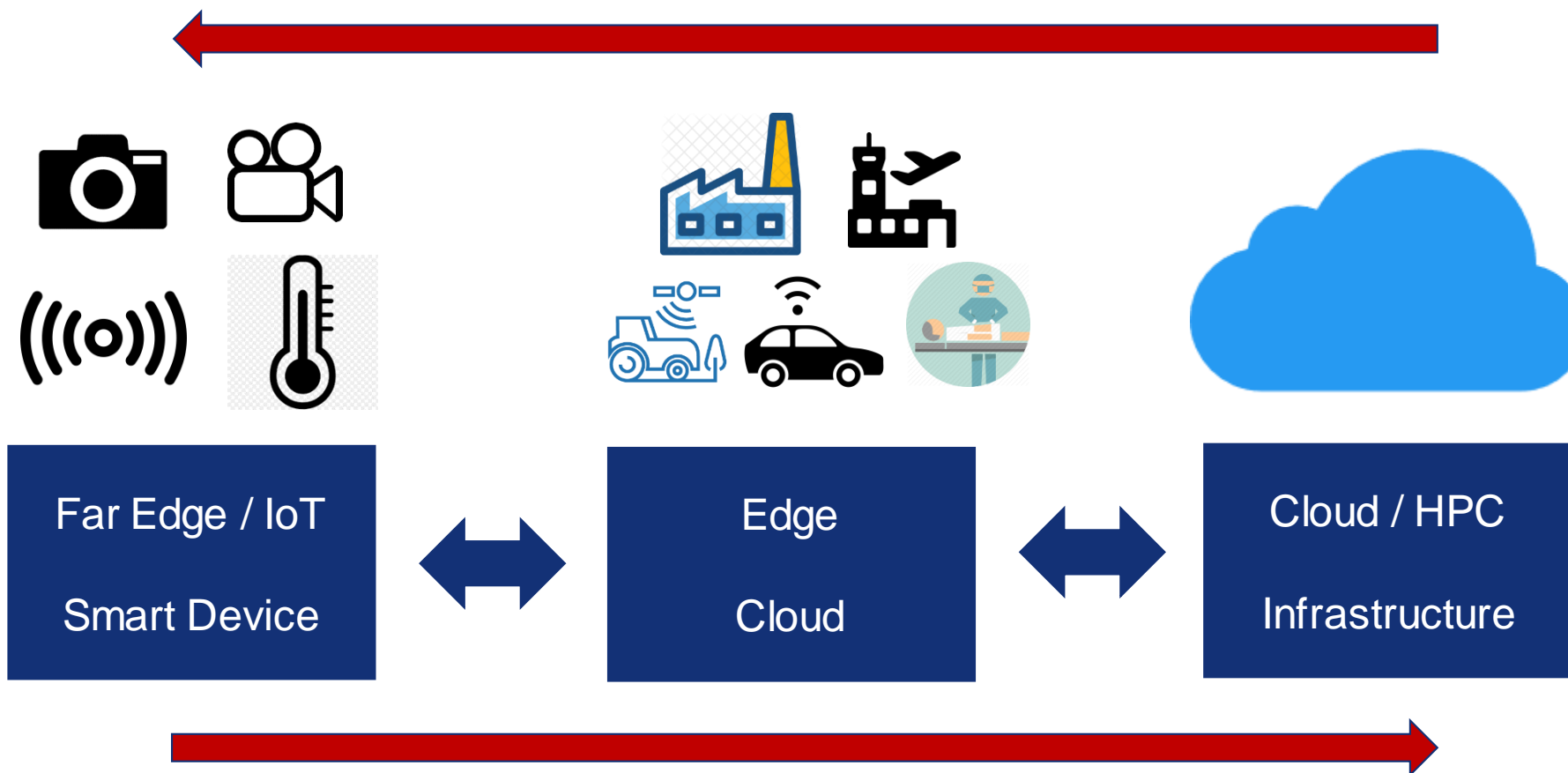
- Real-time / safety for **deterministic and highly reliable automation** + control processes
- **Data security / privacy** through reducing the attack surface
- **Energy efficiency** / carbon footprint / environmental footprint
- Data Aggregation and analytics along the **Computing Continuum**

## ■ Data Processing in 5 years: 20% Cloud – 80% Edge

- A Decentralised Approach with distributed and embedded intelligence
- A (private) Campus 5G network for mobile automation, AGVs and integrated logistics

# Paradigm Shift: Cloud – Edge - IoT

Trend/Paradigm Shift: from Cloud to Edge  
Bringing compute resources closer to the data



Federating far edge resources ad hoc via 5G  
to provide edge-cloud resources close to the edge

# A 5-yr innovation perspective: Building the Foundation for the next generation of Cloud-Edge-IoT Orchestration

- **Beyond cloud-edge service provisioning:**
  - *incorporating the power of the IoT* and its far edge devices and system in a compute continuum
  - bringing computing power to where the data is
  - (Artificial) Intelligence at the edge and far edge
  - enabling real-time processing: convergence IoT and cyber-physical systems
- Exploiting EU Strengths – application and system engineering competences
  - Cloud computing services: largely general purpose and application agnostic
  - Edge and Far Edge computing must be strongly customised towards the application
- **A new opportunity/challenge for European industry:**
  - next generation of IoT and edge computing VISION
  - SYSTEM INTEGRATION and lifecycle management
  - next generation of INDUSTRIAL PLATFORMS + ECOSYSTEMS



# Messages from the FIRESIDE Chat

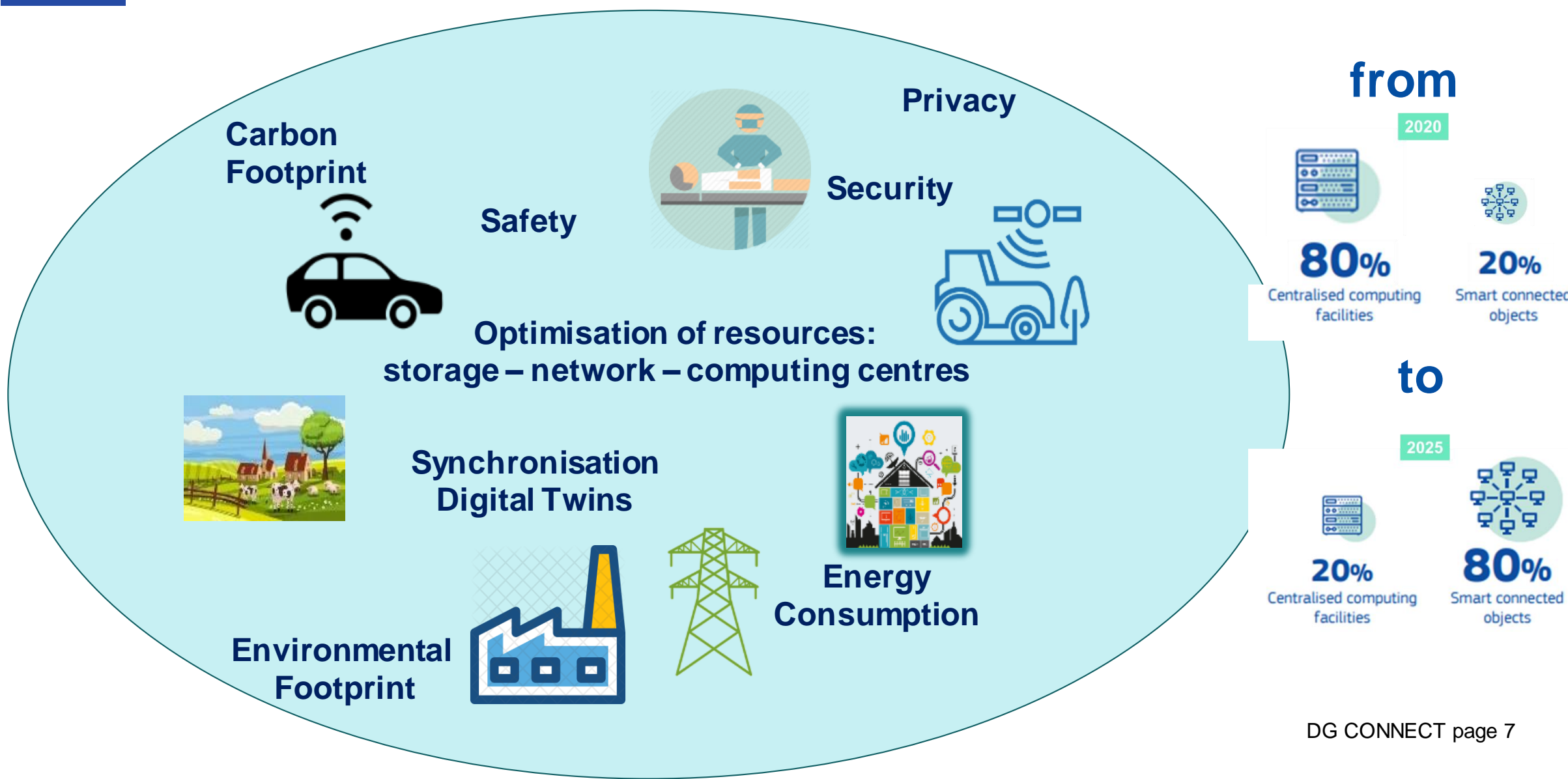
## A European Strategy to seize opportunities

- The opportunity for Europe is at the intersection of the Cloud **IT world** and the **OT world**
- The **Edge Cloud game is changing**: The winner will be the one understanding sectoral requirements
- Partnerships with leading Hyperscalers are a fact – but need to **define a EU Level-Playing Field**
- A bottom-up research programme needs to have top-down governance to become strategic

## Platforms, market places, Ecosystems

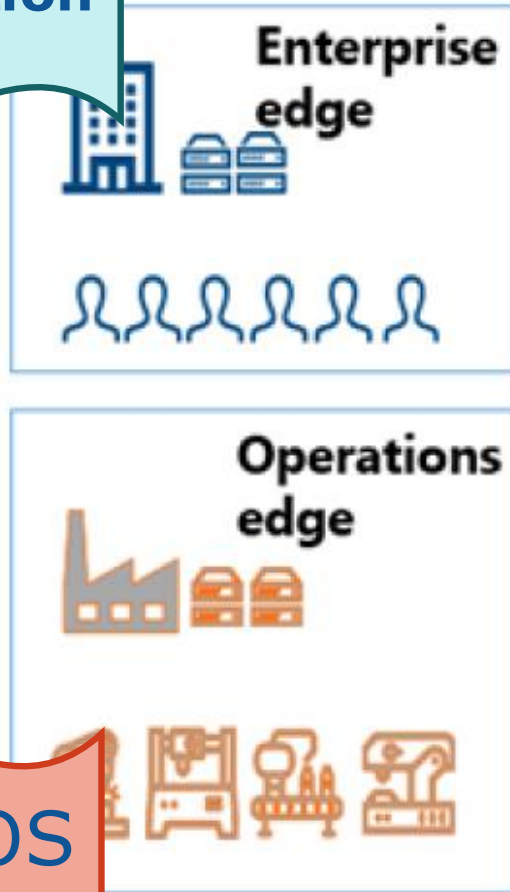
- EU Partnerships are needed to develop **trusted, open multi-vendor System Integration Platforms**
- **B2B Platforms for industrial and business IoT** and edge computing are central to Digitalisation
- Convergence at the shopfloor requires standards for interoperability, data & communication  
**digital sovereignty, open APIs** are needed to avoid lock-in and lock-out effects
- A challenge is to get large industry, SMEs and innovators to cooperate in a segmented industrial environments and nurture a vibrant ecosystem.

# Use cases underpinning the trend towards the edge and the far edge



# Taxonomy for the Edge

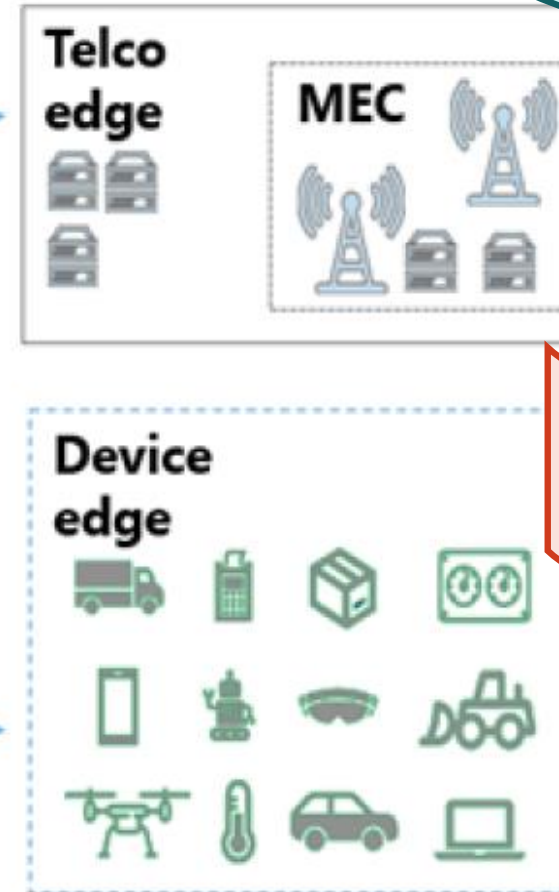
Integration  
IT - OT



Meta OS

Source: IDC, 2020

5G  
Campus



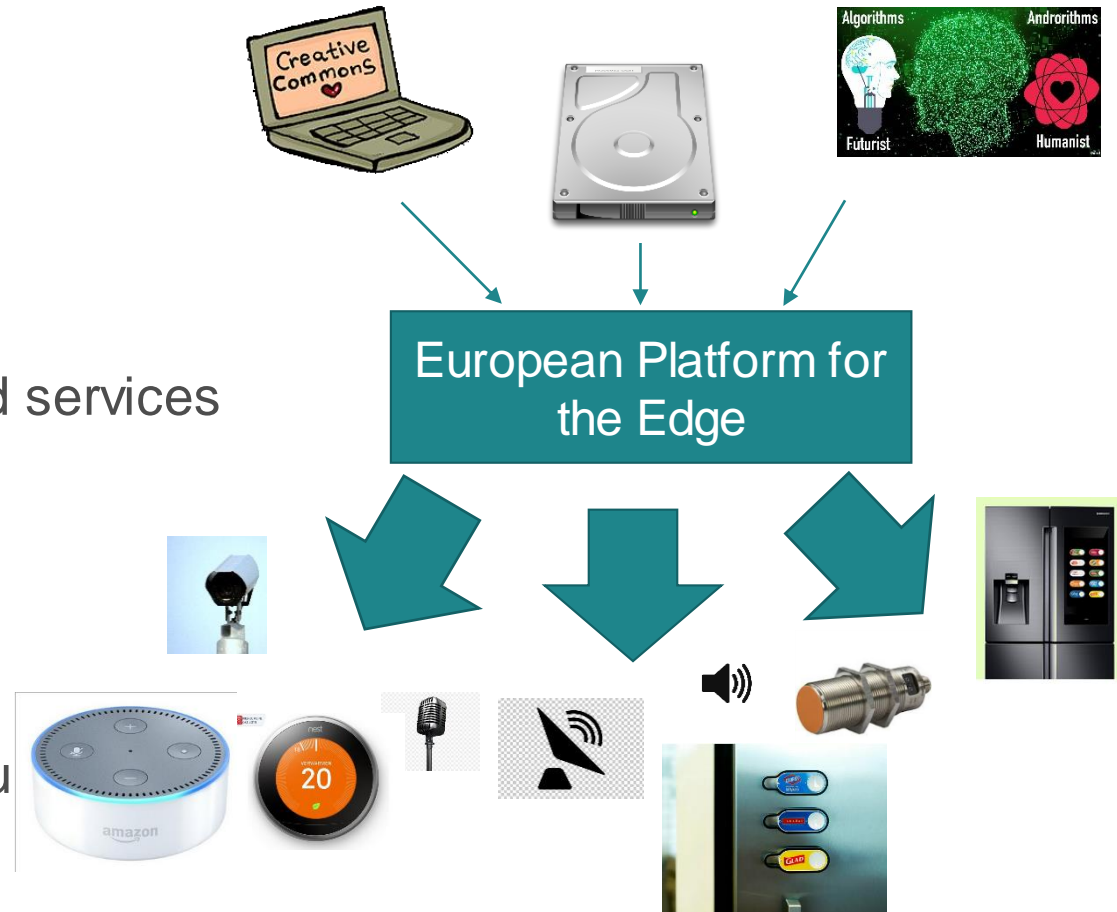
Embedded  
AI



## From Cloud to Edge to IoT:

### ➤ **European platform for the Edge**

- Improve end-to-end response time
- Optimize operation of IoT systems and services
- Meta-Operating System for the Edge
- Reduce energy consumption
- Orchestration across device-edge-cloud



## **Pre-Publication WP2021-22**

<https://sciencebusiness.net/framework-programmes/news/horizon-europe-draft-work-programmes-leak-online>

# THANK YOU

## Useful links:

- **European Data Strategy:**

<https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy>

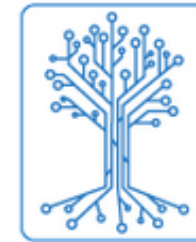
- **ARTEMIS White Paper: From IoT to SoS:**

<https://artemis-ia.eu/news/whitepaper-from-iot-to-sos.html>



- **GAIA-X Initiative:**

<https://www.data-infrastructure.eu/GAIA-X/>



GAIA-X

- **The Alliance AIOTI: IoT + Edge Computing Convergence**

<https://aioti.eu/news/>



- **NGIOT CSA Workshop EDGE on 22/04/20201:**

→ [www.NGiot.eu](http://www.NGiot.eu)

