

"Delivering innovation through standards"

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## Industrial Internet of Things: the strategic picture for Europe

### **Next-generation IoT**

Power to the edge, where the data is Seamless connectivity



Next-generation operating systems

Decentralised/swarm intelligence

Cognitive computing continuum

powering intelligence at the edge

Next-generation chips

Low energy semiconductor

Standardisation, interoperability





Vertical, horizontal, x-sector integration

# **Common Open Digital Platforms & Ecosystem**

Competition law, geopolitics





Strategic autonomy

## chips - made in Europe

#### **The EU Policy Context:**

- NextGenerationEU
- REPowerEU

Chips

- Twin Transition:
  - Digital Compass
  - Green: Fit for 55

Transition pathways towards resilient, innovative, sustainable & digital ecosystems



Open, dynamic ecosystems for EU tech businesses

## **New Industrial Strategy**

Investment in Data Spaces

EU 5G & cloud-edge infrastructure/services





Data

Strategy

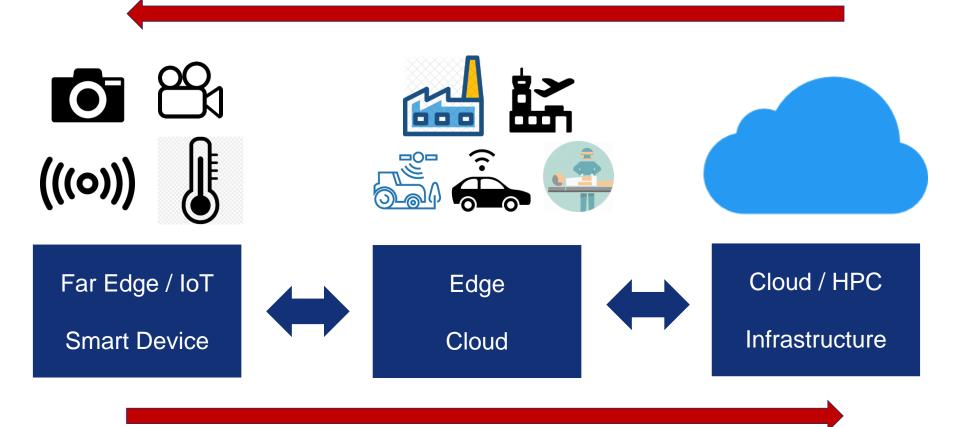
#### Data legislation:

- Data Act: access & fairness on data market
- Data Governance Act: foster trust in data sharing & intermediarires



# 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



## Cloud-Edge-IoT Policies & Standards

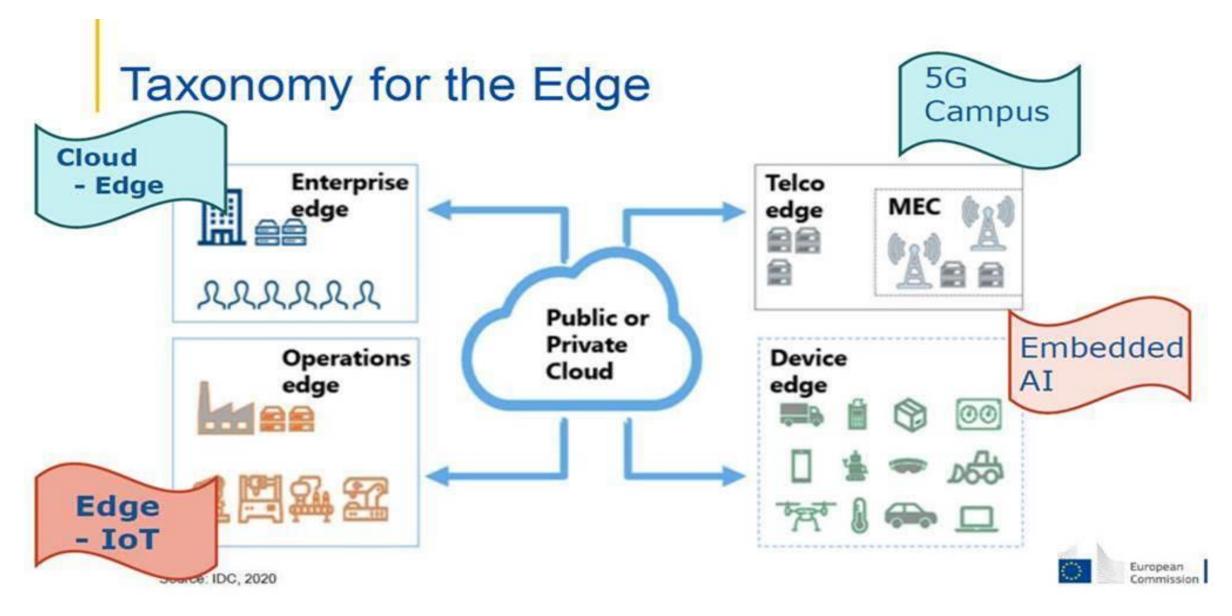
Computing: Distributed, swarm

 AI & Cognitive Clouds AI/ML as gatekeeper for sensitive data Al@the Edge Management of the Computing Continuum Cloud to Edge Orchestration Data Spaces Data Compliance (security, privacy, trust) **Continuum-native Industries** Cloud-Edge **Edge and Decentralised Intelligence Edge MetaOS (energy, car)** 

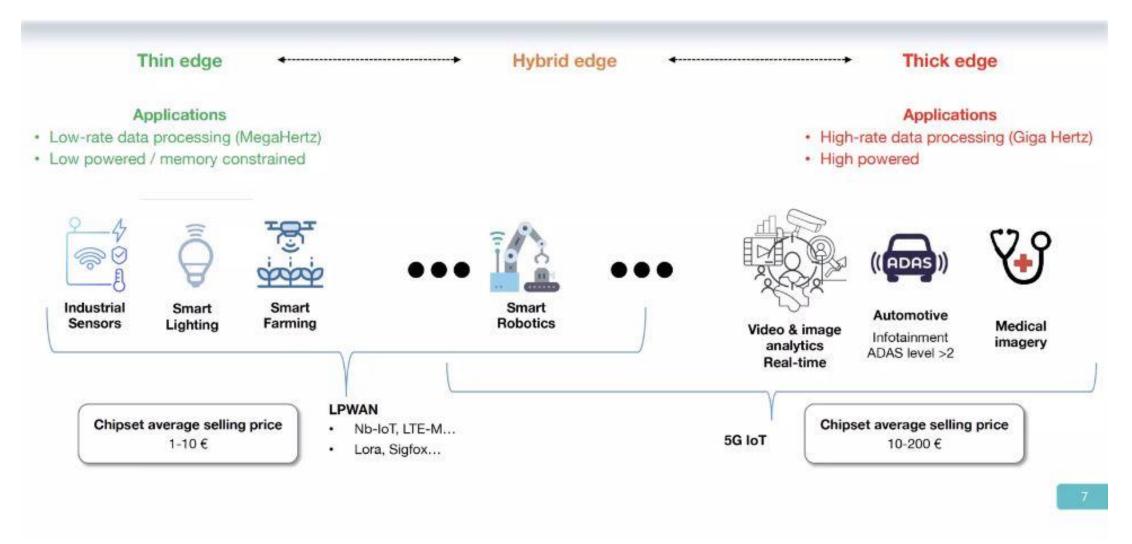
Horizon Europe DIGITAL Europe Al Act / **DATA Act Data Spaces IPCEI Cloud Chips Act** 



## **Need of Reference Architecture Models**



## Leverage emerging computing paradigms



→ From embedded computing towards distributed computing, Swarm intelligence, AI @the edge ..

## **Use cases**



## Manufacturing:

**Data-Driven Cognitive** Production Lines (Manufacturing Autonomy Level 4 – MAL4)







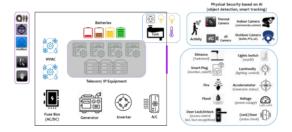
#### Renewable

energy: Containerised Edge Computing near Renewable Energy



## **Smart Buildings:**

Energy Efficient, Health Safe & Sustainable Smart Buildings







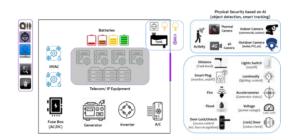
Cloud/Edge for secure and sustainable solutions

Flexiblity adapted to consumer needs





Hyper-distributed Apps across logistics, agriculture, energy



**NEBULOUS** 

## Cloud - Edge - IoT: Horizon Europe Work Programme 2023/24

**CSAs: Co-ordination and roadmapping** 

DATA-2021-01-07 / DATA-2021-01-08

**Destination 4** 2022-DIGITAL-EMERGING-01-26

2021/22

2023/24

Open Source for Cloud based services

**Destination 4** 2022-DIGITAL-**EMERGING-01-26** 

Open Source for Cloud based services

DATA-2022-01-03

**Environments & tools** for **Decentralised Intelligence** at edge

**Destination 3** 

DATA-2021-01-05

Future European Platforms for the Edge: Meta OS

DATA-2022-01-02

**Cognitive Cloud** Framework: Al-enabled Computing Continuum

**Open Source for Cloud/** edge Digital Autonomy:

- · Open architectures for Cloud/Edge processing
- · Complementing on SW-level EU semiconductor projects
- edge data-centre use
- communities
- Increase strategic autonomy

**Fundamentals for SW Engineering:** Research TRL 2-5

Increase strategic autonomy

**Piloting emerging Smart IoT** Platforms and decentraised **intelligence:** Innovation TRL 4-7

- · Mature and customise emerging smart IoT technologies
- Validate reference architectures and open platforms in application context
- Foster innovation scenarios of ubiquitous data and computation in the computing continuum
- · Consensus and ecosystem building in and across verticals
- Bridging between research & adoption through piloting in/across verticals

Key Input: Cloud-Edge-IoT Strategy Forum

**Cognitive Computing Continuum: Intelligence** & automation for more efficient data processing: Research TRL 2-5

- Management of the computing continuum
- Swarm computing and decentralised intelligence
- End-to-end security and identity management across the continuum
- "Green" optimisation of data processing across the continuum

Key Input: Industria Edge Technology Roadinap

Commission

Key Input: Industrial Cloud / Edge Technology Roadmap

Enabling EU HW for Cloud/

Stimulating open source

## Conclusions

- Open platforms are important for spurring innovation across our economies
- Platforms are crucial for mastering complexity & focusing on strengths and roles
- European industry must become drivers of the Edge platforms of tomorrow
- Key elements of open platforms for the Edge
  - A common definition of edge topology
  - Key use cases for Edge Computing
  - Open APIs and standardisation as an element for edge platforms
  - Use of open source



# THANK YOU



#### **Useful links:**

- HIPEAC Vision on Continuum of Computing:
  - https://www.hipeac.net
- Project, Open calls, Events the European Cloud Edge IoT Continuum

  → <a href="https://www.eucloudedgeiot.ou/">https://www.eucloudedgeiot.ou/</a>
- GAIA-X Initiative:

https://www.data-infrastructure.eu/GAIAX/:



• The Alliance AIOTI: **IoT + Edge Computing Convergence** https://aioti.eu/news/



