



HORIZON EUROPE

HORIZON-CL4-2021-DATA-01:
**WORLD LEADING DATA AND
COMPUTING TECHNOLOGIES**

2021 – 2027

ROLF RIEMENSCHNEIDER

Head of Sector IoT
DG CONNECT/E4



From Cloud to Edge to IoT For European Data



A European Data Strategy

EU Data Strategy

Cloud actions:

- Cloud Rulebook
- Co-Investments in cloud-to-edge services, cloud federation and marketplaces.

Data actions:

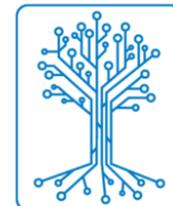
- New legislation (Data Governance Act & Data Act)
- Co-investments in EU data spaces

DEP



Coordination

Federation & interoperability standards

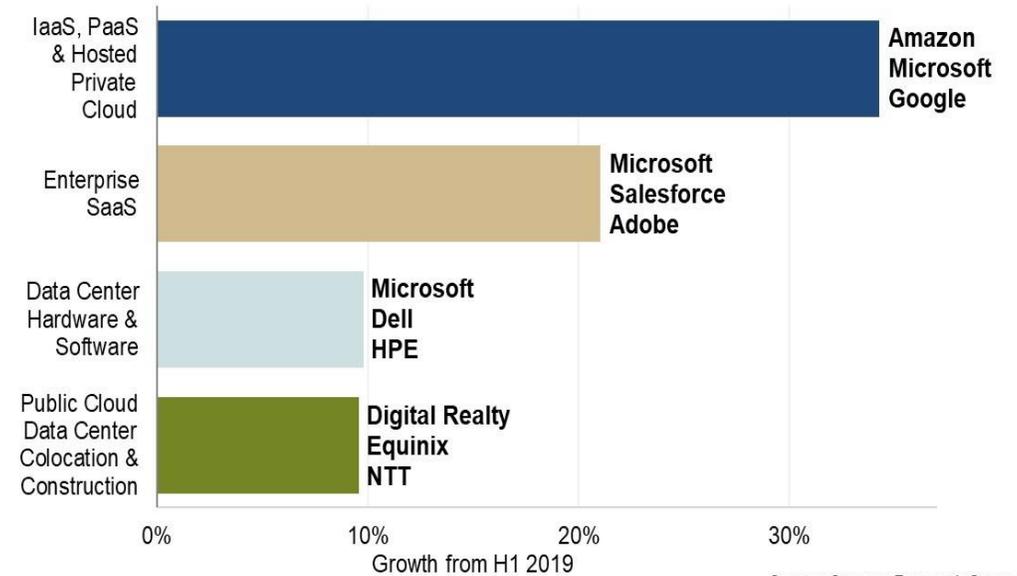


Use cases; technical architecture

Cloud Market Reality

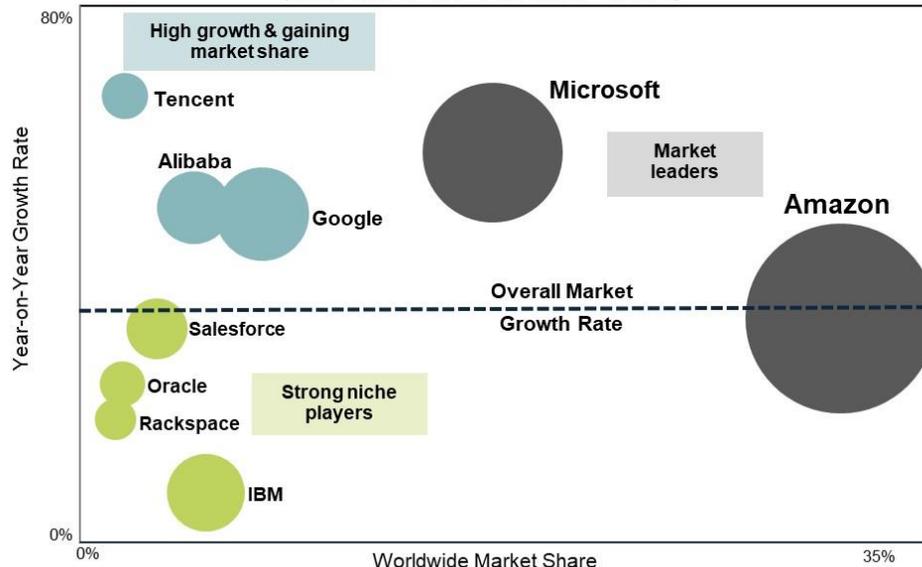
- Generated revenues for the first half of 2020 were \$187 billion. **A 20% increase year on year (YoY).**
- Biggest revenue growth is in IaaS, PaaS and hosted private cloud services** (with 34% increase YoY). **Enterprise SaaS revenue is second with increase by 21% YoY.**

Cloud Market Growth & Segment Leaders - H1 2020



Cloud Provider Competitive Positioning

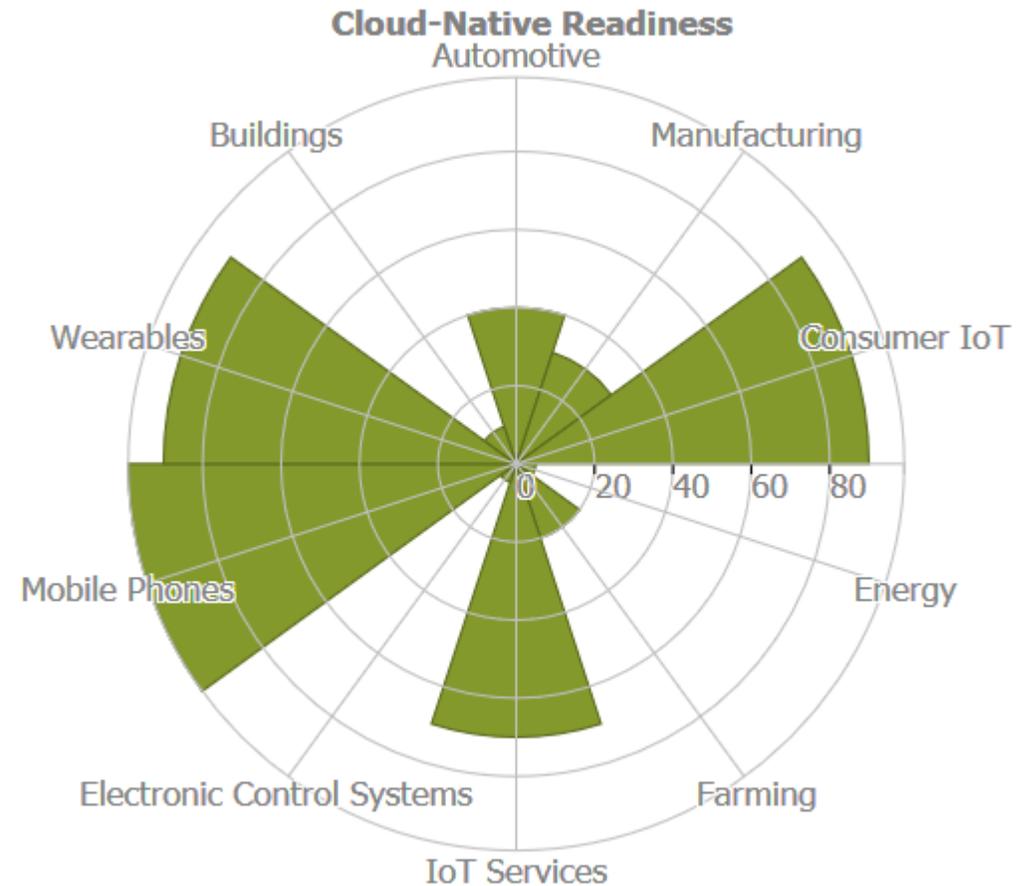
(IaaS, PaaS, Hosted Private Cloud - Q4 2019)



- More than 75%** of the global public cloud market is dominated by five key main players.
- AWS is the market leader with 33%** of market shares followed by Microsoft with 18%.
- Google, Alibaba and Tencent** are gaining market share with a 50% revenue increase more year on year.
- No European Cloud Providers** feature globally in the the top 10.

Cloud-Edge-IoT Paradigm Shift

- 70% of IOT revenues are cloud-centric
- Consumer markets dominated by the cloud
- Low adoption rate of cloud in key industrial sectors



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:

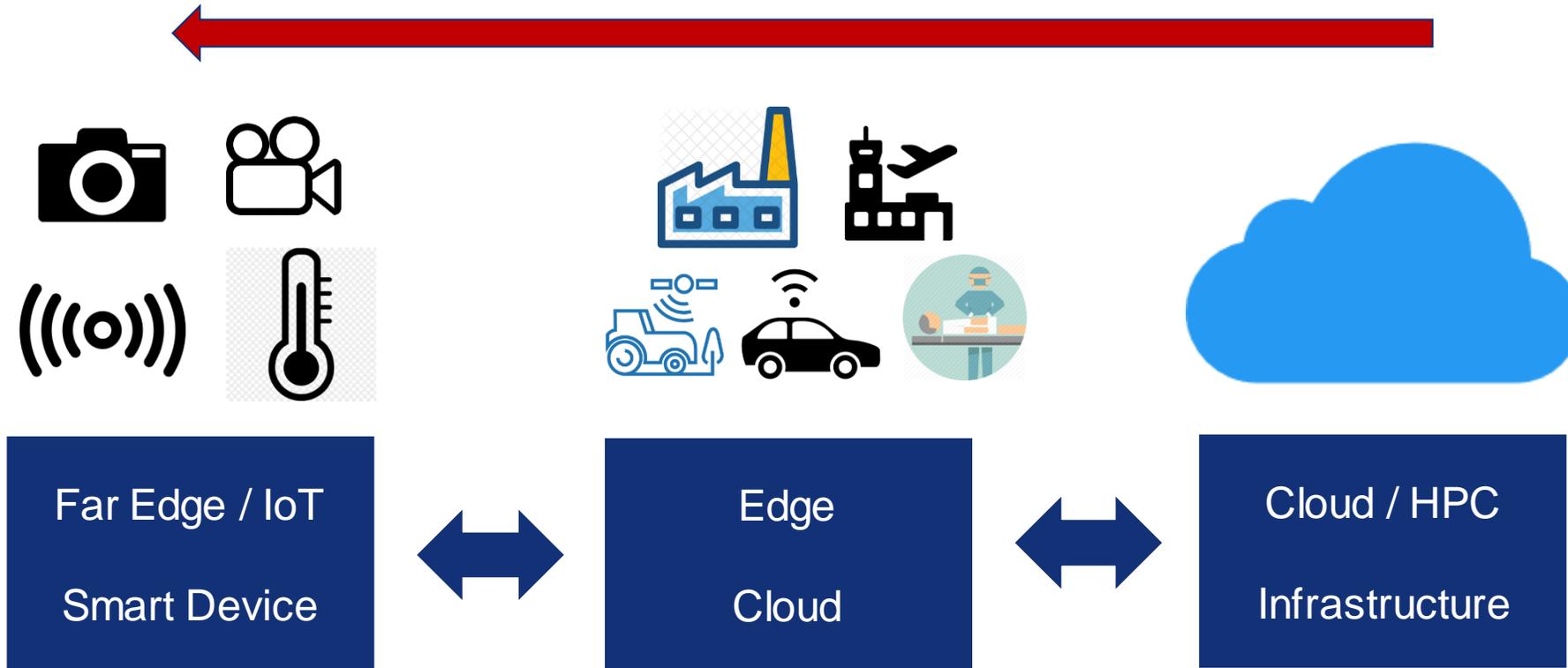
- Real-time / safety for **deterministic and highly reliable automation** + control processes
- **Data security / privacy** through reducing the exposure surface
- **Energy efficiency** / carbon footprint / environmental footprint
- Data Aggregation and analytics along the **Computing Continuum**

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

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

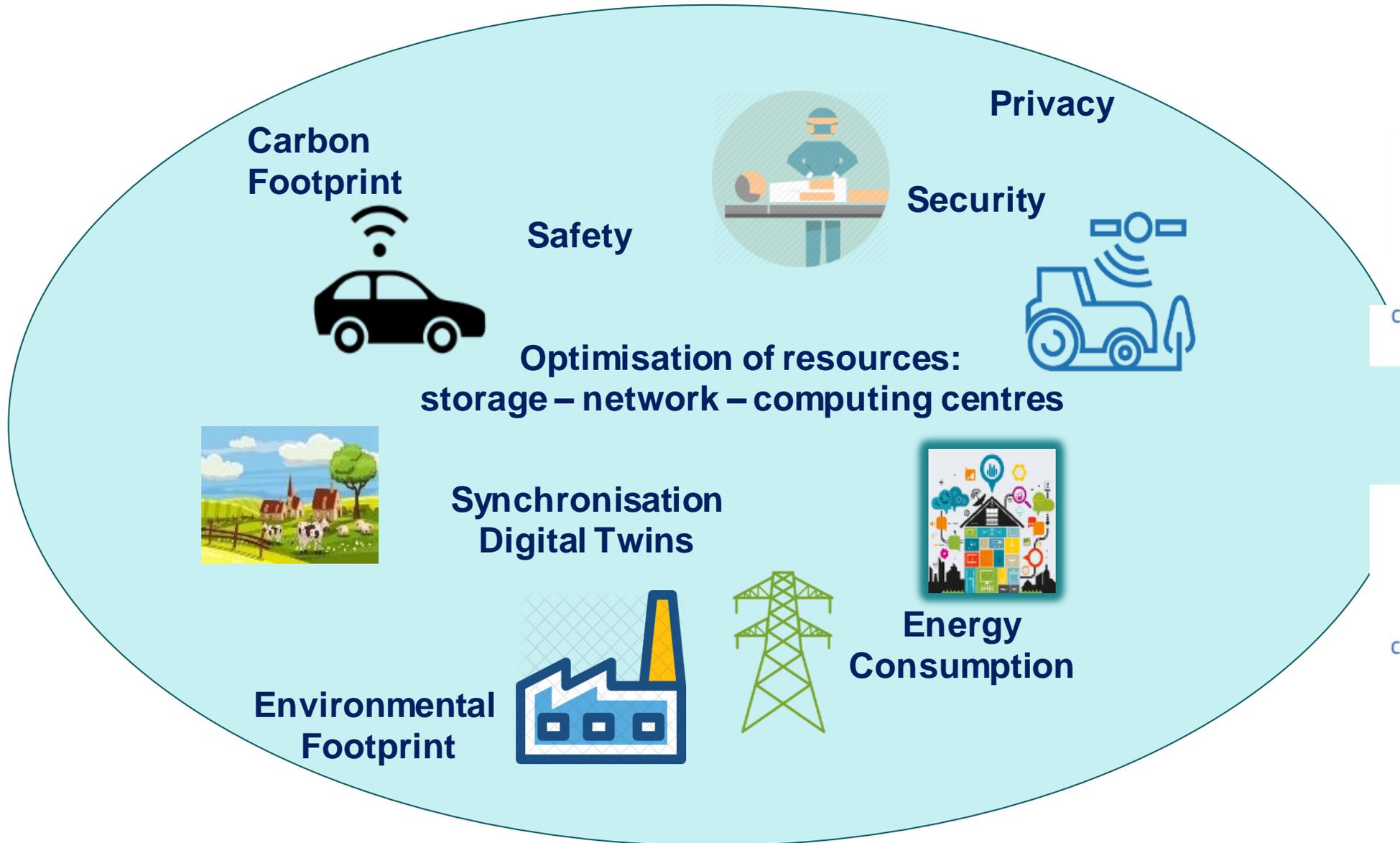
Cloud-Edge-IoT Orchestration

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



Federating far edge resources ad hoc via wireless (5G, mesh)
to provide cloud resources close to the edge

Use Cases underpinning the trend Cloud-Edge-IOT



from

2020



80%

Centralised computing facilities



20%

Smart connected objects

to

2025



20%

Centralised computing facilities



80%

Smart connected objects



European Commission

Technology Drivers

Reasoning on the go
(Edge and Core)



Enhanced Secure Edge



Real-time response

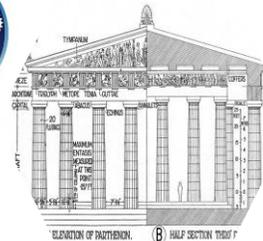


Green solutions



Cloud-edge-IoT
Orchestration

Seamless Service Architecture



Section: From Cloud to Edge to IoT for European Data

RIA:

- **DATA-2021-01-05:** Edge Operating System
- **DATA-2022-01-03:** Programming Environments and Tools for Decentralised Intelligence
- **DATA-2022-01-02:** Cognitive Cloud: AI-enabled computing continuum

CSA:

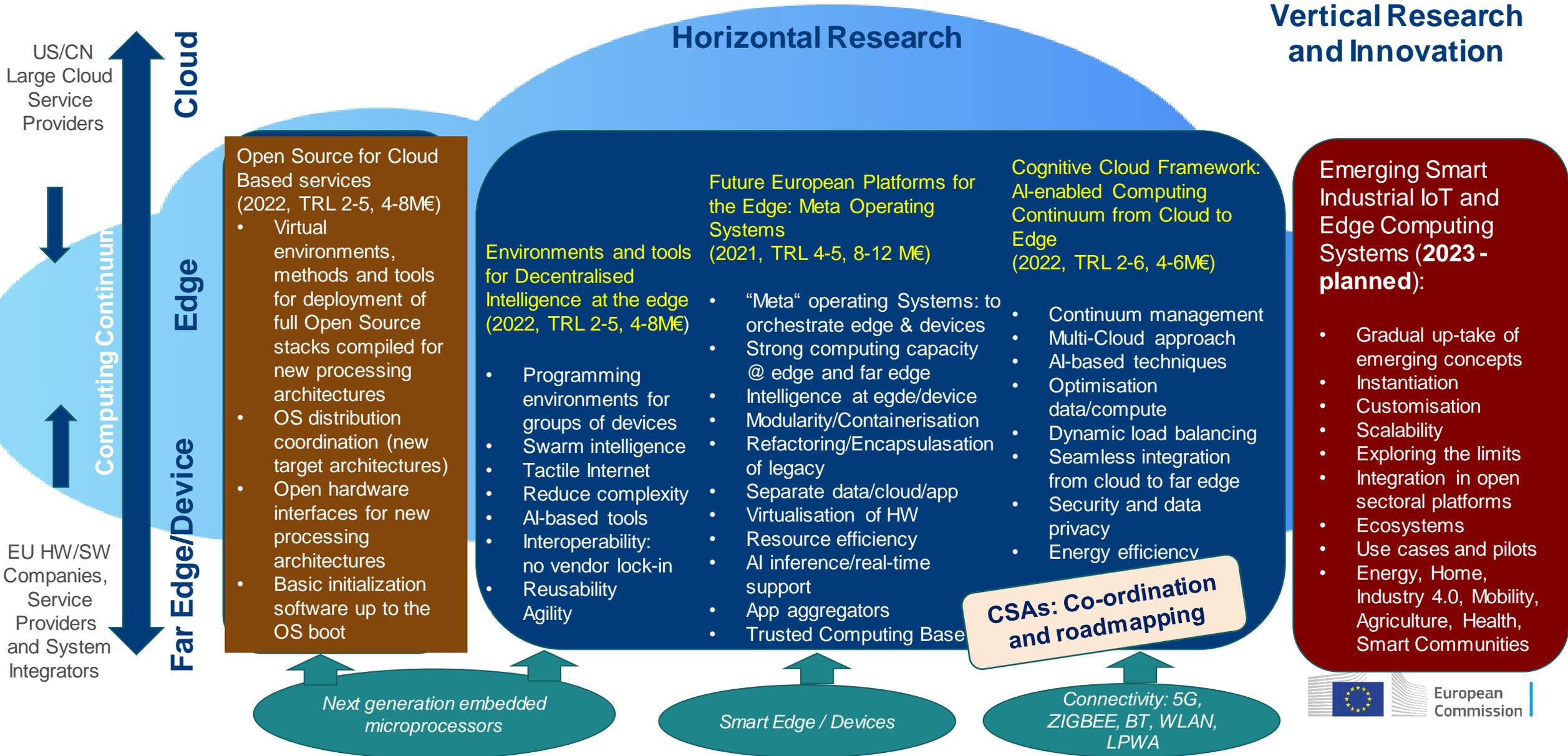
- **DATA-2021-01-07:** Coordination and Support of the 'Cloud-Edge-IoT' domain
- **DATA-2021-01-08:** Roadmap for next generation computing and systems

RIA:

- **2022-DIGITAL-EMERGING-01-26:** Open source for cloud-based services

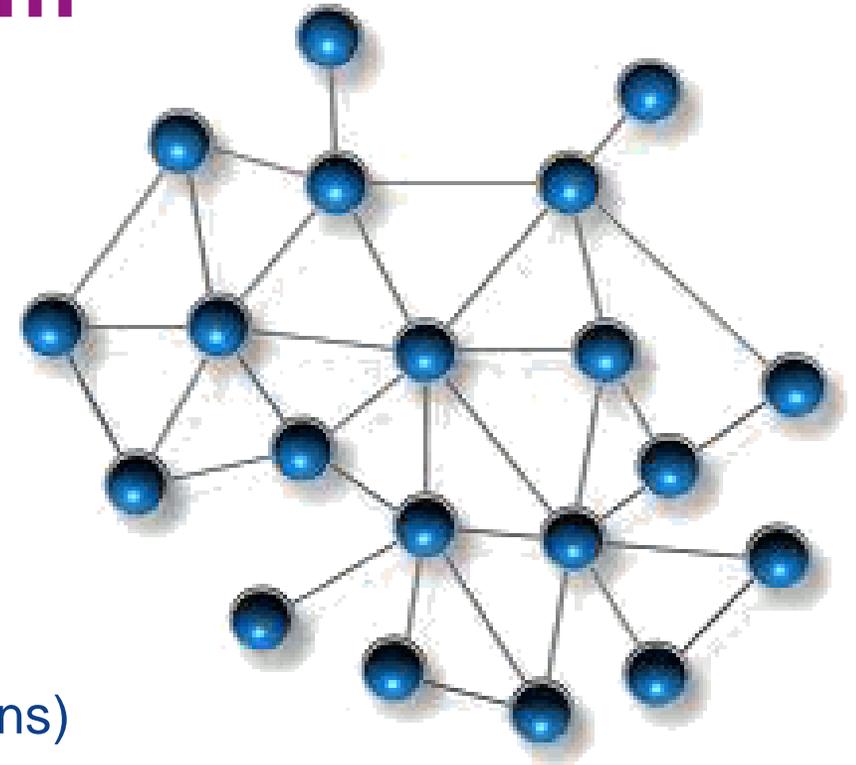
2021

A Strategic Approach for Cloud-Edge-IoT



Lessons learned Strategic Forum

- **Computing Continuum:**
 - **Cloud – EDGE – 5G/IoT – HW Devices**
- **Partnering to grow the opportunity, Accelerate adoption**
 - Fierce competition from Internet giants
 - Multivendor partnerships, alliances
- **System Integration Platforms**
 - a must for interoperability and open standards
 - avoiding fragmentation (e.g. data flow, vertical value chains)



System Platforms
Reference Architecture Cloud-Native Systems A Meta OS SW Over The Air ...

Ecosystem & Alliances
Open Standards & APIs Open Source like Eclipse, Linux, etc. Trust & Trustworthiness ...

Visionary Concepts
Decentralised Intelligence Distributed Computing Swarm Intelligence Virtualisation ...

Relevant Information

- **European Data Strategy:**
<https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy>
- **Fireside Chat on Next Generation IoT and Edge Computing**, Meeting of 11 high level experts, 9 Mar 2021 – [Fireside report published](#).
- **Next Next Generation IoT and Edge Computing Strategy Forum**, Public open virtual meeting, 22 April 2021 – www.ngiot.eu
- [HORIZON Europe InfoDays Cluster 4 on 29-30 June 2021](#)
→ **Topics recordings:** [From Cloud to Edge to IoT](#)
- **HE Calls 2021 Closing** 21 October 2021

