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MINISTÈRE DE L'ÉCONOMIE DES FINANCES ET DE LA RELANCE
Liberté Égalité Fraternité

Federal Ministry for Economic Affairs and Climate Action

MINISTRY FOR INNOVATION AND TECHNOLOGY

Ministero delle Imprese e del Made in Italy

Ministry of Economics
Republic of Latvia

LE GOUVERNEMENT DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

Ministry of Economic Affairs and Climate Policy

KANCELARIA PREZESA RADY MINISTRÓW

REPUBLIC OF SLOVENIA
MINISTRY OF ECONOMIC DEVELOPMENT AND TECHNOLOGY
REPUBLIC OF SLOVENIA
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GOBIERNO DE ESPAÑA · MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL

The new €3B IPCEI Cloud

Building a Sovereign Edge Cloud based on European technologies

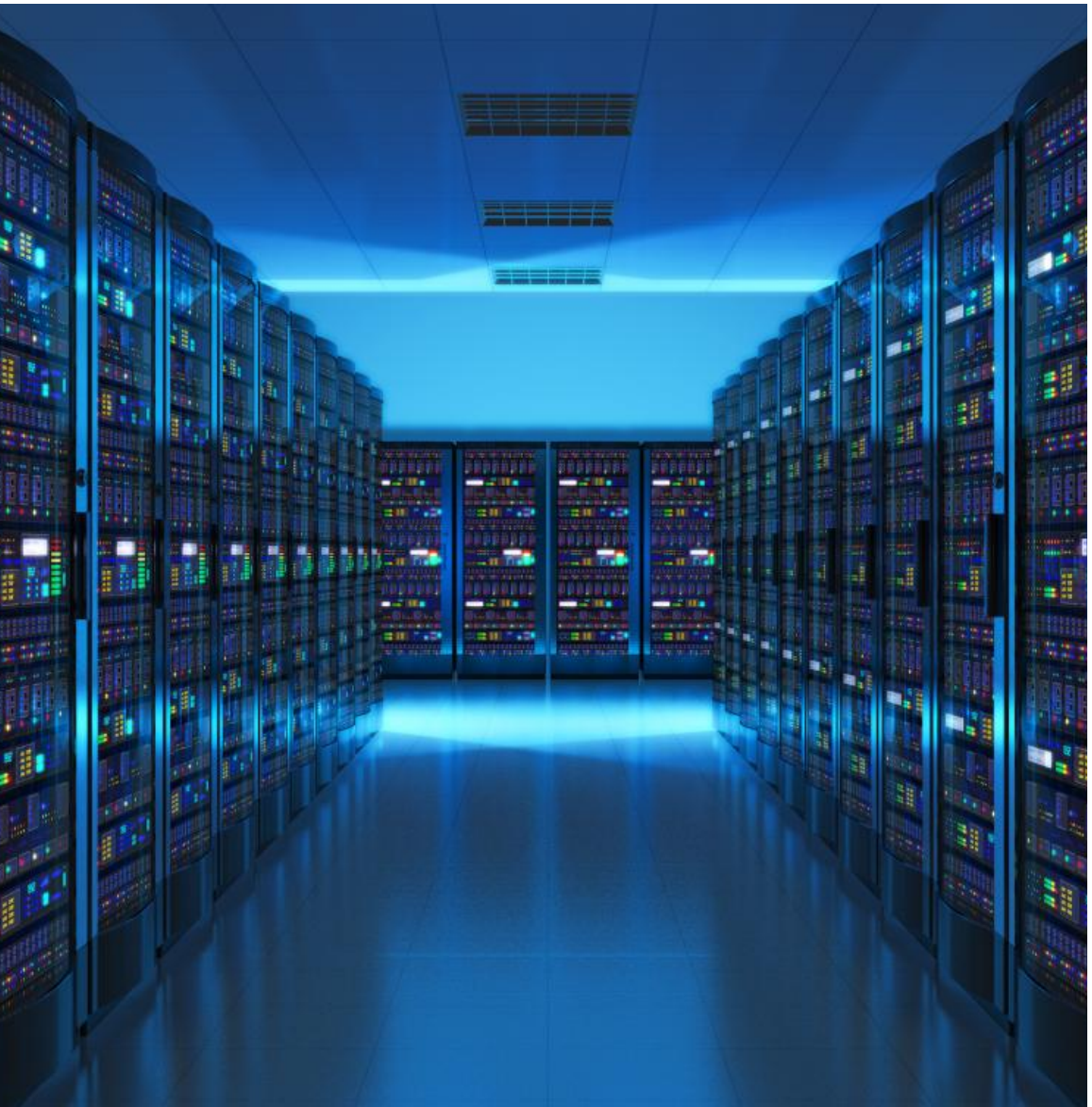
Dr Alberto P. Martí

VP of Open Source Innovation @ OpenNebula Systems

Chair of the Industry Facilitation Group @ IPCEI Cloud

OpenNebula · Nexus FORUM.EU

OpenNebula Systems



- The European **open source company** behind OpenNebula.
- HQ in **Madrid** (Spain), with offices in Brussels (BE), Brno (CZ) & USA.
- The only European open source **IaaS** solution, born in **2008**.
- A success story emerged from **EU innovation** programmes.
- Chairing the Cloud/Edge WG of the EC-sponsored **EU Cloud Alliance**.

LINUX FOUNDATION SILVER MEMBER

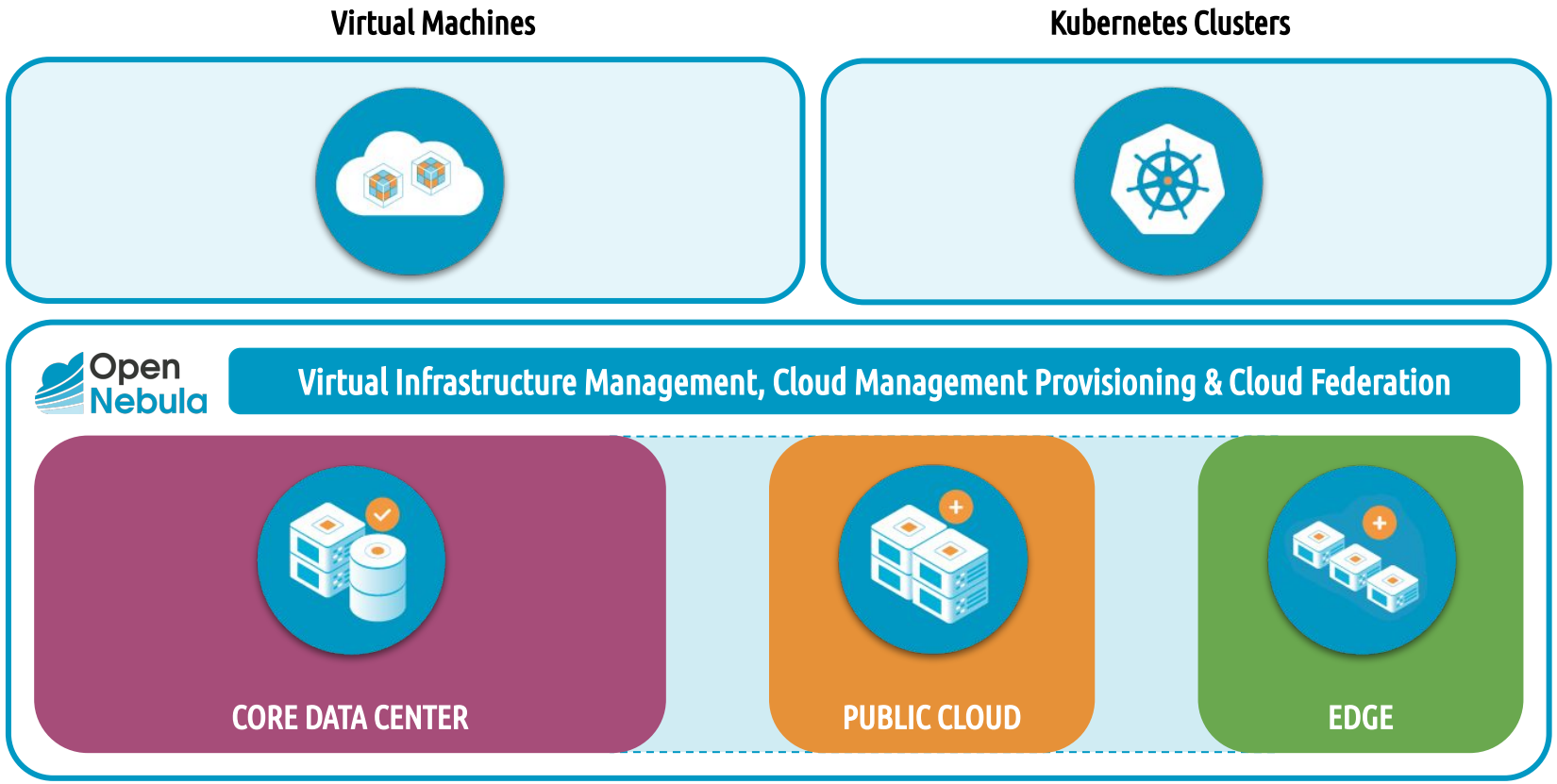
CLOUD NATIVE COMPUTING FOUNDATION SILVER MEMBER

LF EDGE GENERAL MEMBER

gaia-x

What is OpenNebula?

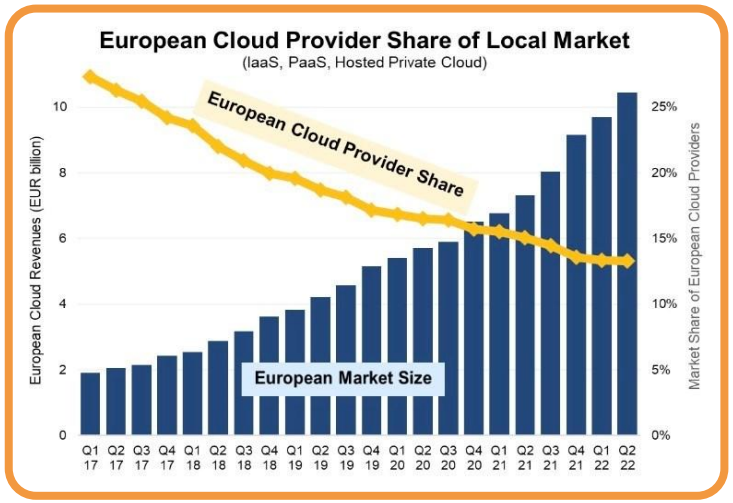
The Only European Open Source Cloud & Edge Computing Platform



- ✓ Multi-Tenancy
- ✓ Self-Service
- ✓ High Availability
- ✓ Federation
- ✓ Multi-Tier Apps
- ✓ Elasticity
- ✓ Automation
- ✓ Multi-Cloud
- ✓ VMs + Kubernetes

IPCEI Cloud – *Fixing the EU Cloud Market*

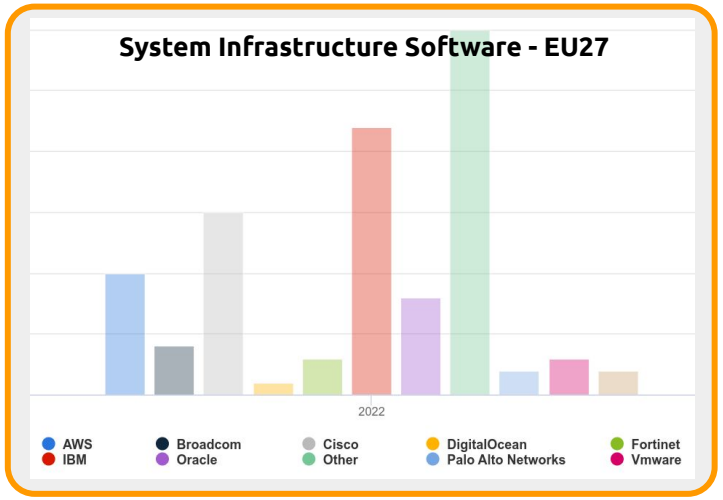
Cloud Services



Source: Synergy Research Group (September 2022)

Share of EU CSPs has declined
(From 26% to <13%)

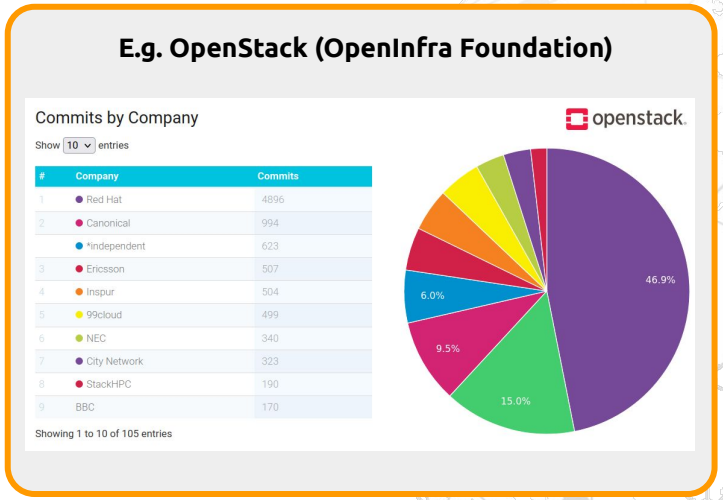
SysInfra SW Market



Source: Statista (October 2022)

No top competitor from the EU
(All of them are US companies)

Open Source SW



Source: Stackalytics (January 2023)

Marginal (<5%) role of EU code
(Dominated by US organisations)

IPCEI Cloud – *Fixing the EU Cloud Market*

Feb 2020

European Strategy for Data aims to build a single market for data

May 2020

Recovery and Resilience Facility 20% Digital EU Flagship "Scale-up"

Oct 2020

Member States Declaration for next generation European cloud

Mar 2021

Digital Decade Strategy sets targets on edge and cloud for 2030

May 2021

Updated EU Industrial Strategy evidences strategic dependencies

digital-strategy.ec.europa.eu/en/news/towards-next-generation-cloud-europe

IPCEI Cloud – *Fixing the EU Cloud Market*

In October 2020, all 27 EU Member States signed a joint declaration on "**Building the next generation cloud for businesses and the public sector in the EU**":

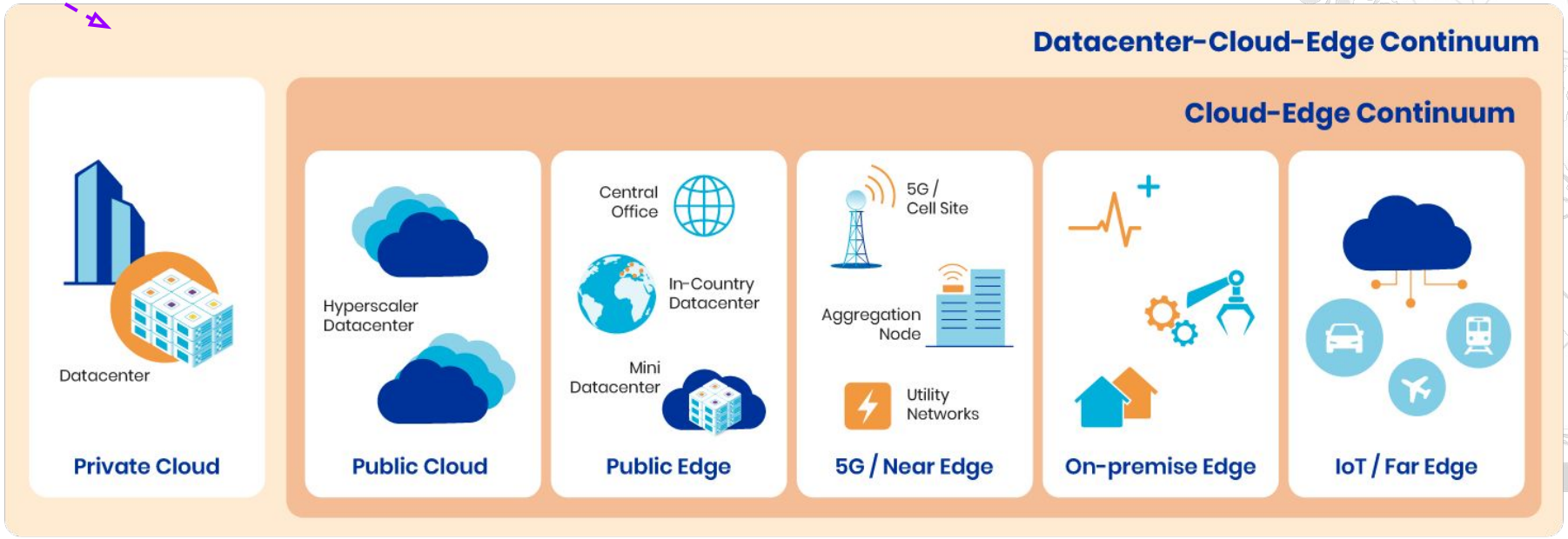
- "*The EU has a unique opportunity to address the need for more data sharing and decentralised data processing, closer to the user (at the edge)*".
- "*Completely interoperable, **open**, multi-vendor cloud platforms and services, based on European, international or **open source standards**, will enable users to migrate effectively to the cloud (...)*".

The Signatories agreed on an ambitious investment plan gathering private, national and EU efforts and leading to the next generation of EU cloud and edge services…

IPCEI Cloud – *Fixing the EU Cloud Market*

- ✓ *Enable Multi-Provider Cloud-Edge Continuum*
- ✓ *Strengthening of EU Digital Industry*
- ✓ *Development of European Open Source Technologies*

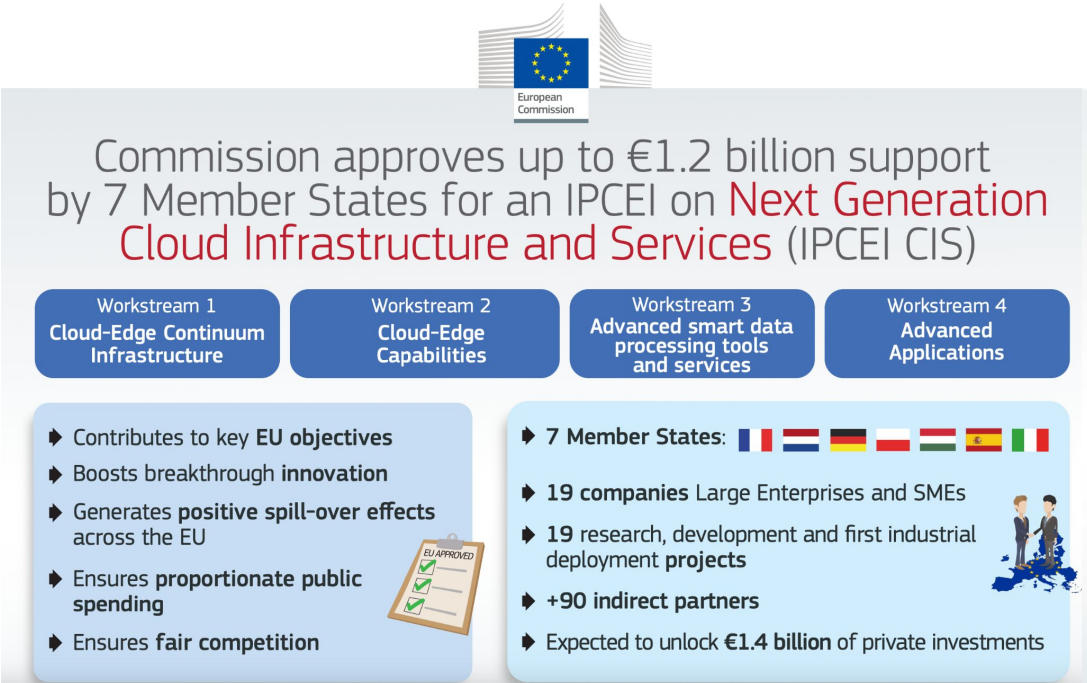
IPCEI-CIS.eu

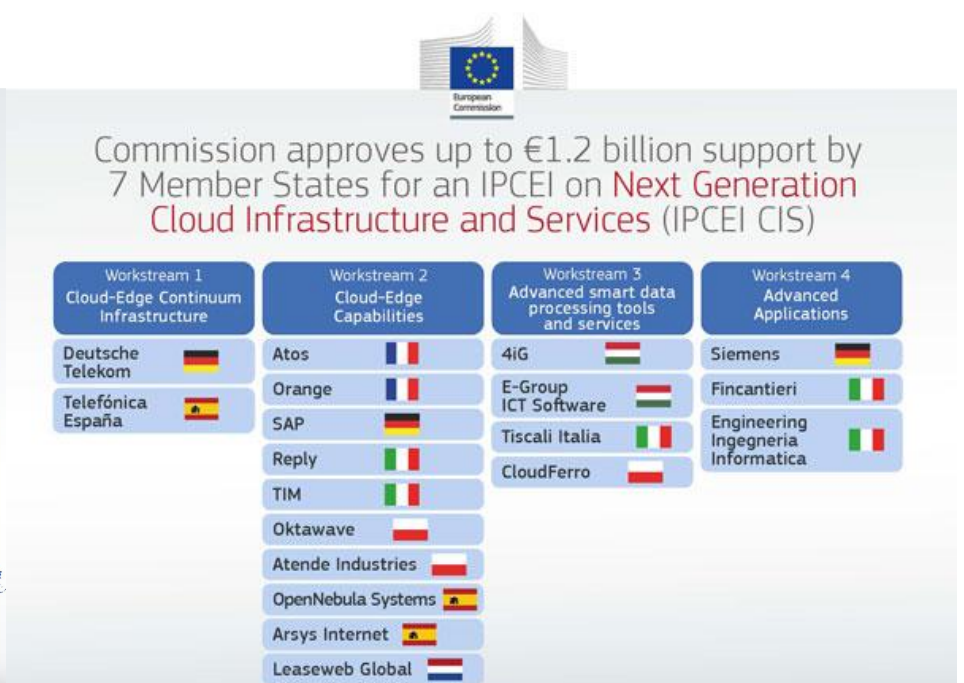


IPCEI Cloud – *General Overview*

Say *'hello'* to the largest open source project in EU history! 👋

- ★ **Strategic co-investment programme approved by the EC in December 2023:**
  - **1,200 million EUR in State Aid + 1,400 million EUR in private funds.**
  - **Expected to create more than 1000 highly-qualified jobs across the EU.**
- ★ **~100 European companies from 12 Member States.**





IPCEI Cloud – *General Overview*

Industry Facilitation Group

Chair

Open Nebula

Vice-Chair

SAP

Supervisory Board (MS + EC)

ENGINEERING	SIEMENS	**WS4**
CloudFerro	E-GROUP SOFTWARE & BEYOND	**WS3**
Open Nebula	SAP	**WS2**
Telefónica	Deutsche Telekom	**WS1**

Wider IPCEI CIS Ecosystem

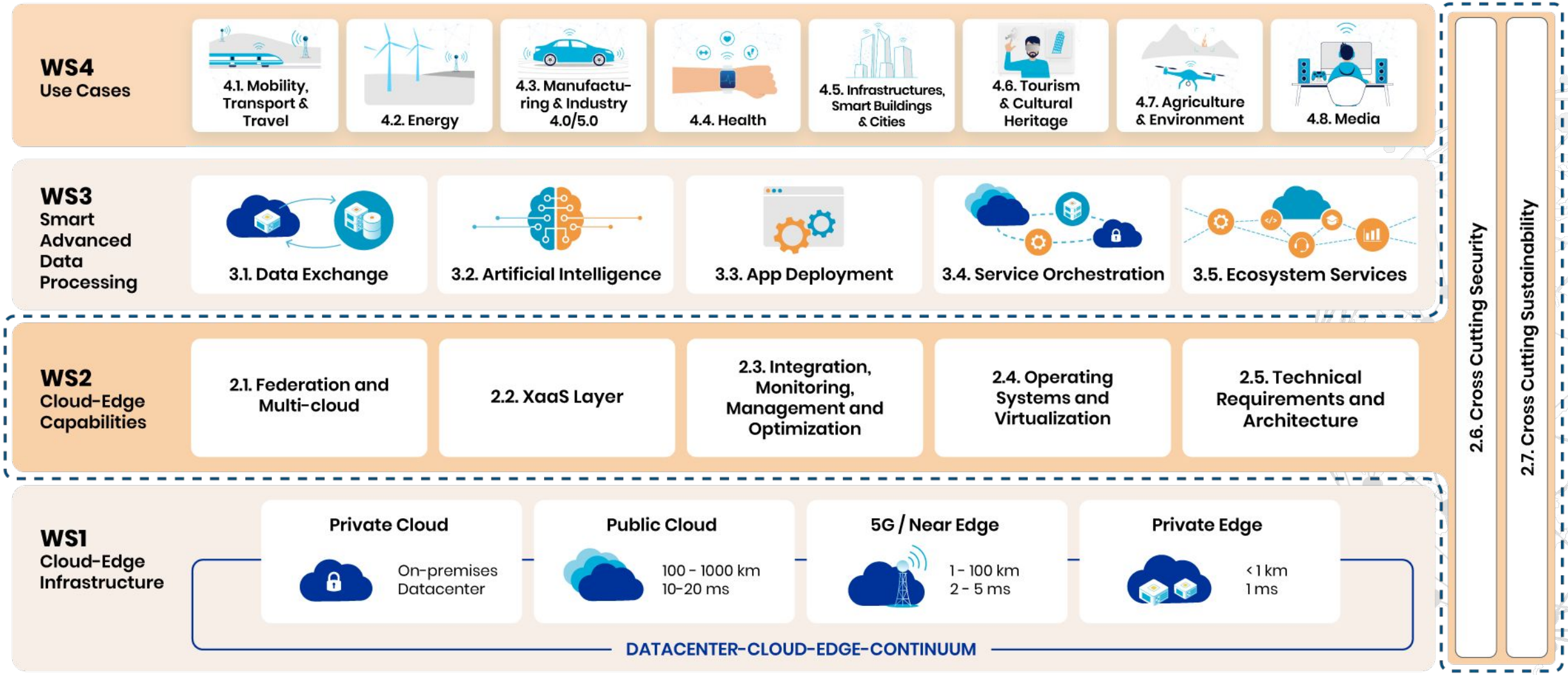
Direct Participants

4iG · Arsys Internet · Atende Industries · Atos · CloudFerro · Deutsche Telekom · E-Group ICT Software · Engineering Ingegneria Informatica · Fincantieri · Leaseweb Global · Oktawave · OpenNebula Systems · Orange · Reply · SAP · Siemens · Telefónica España · TIM · Tiscali

Indirect Partners

ADVA Optical Networking · Aecorsis · Airbus Operations · Amadeus · Amiral Technologies · Amsterdam Internet Exchange · Armadillo · Aspired · Bass · BetterBe · BIT · Capital Energy Service · CGI France · CNRS IRISA · CNRS LAAS · CNRS UGA ERODS · CNRS UT 3 IRIT SEPIA · DataVaccinator · DATI Group · DB Netz · DE-CIX Management · Deerns Nederland · Diehl Aerospace · e-BO Enterprises · elevait · ENEA · Engie Laborelec · Ericsson · Eurofiber Nederland · Excellium Services · Fachhochschule Dortmund · Fondazione Bruno Kessler · Gdańsk University of Tech · Gigas Hosting · H1 Systems · Hashnet · i3d.net · Igea · Indra Soluciones Tecnológicas de la Información · Infobip · Info Support · Infrachain · INRIA LILLE - Nord Europe · INRIA Nancy- GRAND EST · Institut Imagine · Internet Institute · Ionos · Iskra · itrust consulting · Kontron · Lacroix Electronics Cesson · Lacroix Sofrel · Limebird · Lindner · Luxembourg House of Cybersecurity · Mondragon Corporación · Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek (TNO) · N+P Informationssysteme · Ningaloo · No Blue Screen System · Operator Chmury Krajowej · Phoenix Systems · Pro-bit · Provenrun · Proximus · Recog. AI · Result · RHEA Group · Rheinmetall Technology Center · Robert Bosch · RYAX Technologies · Secunet Security Networks · Stichting Nationale Beheersorganisatie Internet Providers · SYSGO · Telemach · ThreeFold Tech · Tilde · United Biometrics · Universite Bretagne Sud · Universite Caen Basse Normandie · Universite de Lille · Universite de Versailles Saind-Quentin-en-Yvelines · Universiteit Twente · Universiteit van Amsterdam · University of Latvia (IMCS) · Ventspils High Ventspils Technology Park · WestfalenWIND IT · Zejn

IPCEI Cloud – *General Overview*



IPCEI Cloud – *General Overview*

STATE OF THE ART

Cloud-Edge Hybrid Architectures

- Mostly based on **proprietary**, **complex** technologies, leading to **vendor lock-in**.
- **Centralized cloud structures** that assume highly **homogeneous** datacenters.

Multi-provider Interoperability and Portability

- **Low adoption of standards**, with **abstraction layers** based on containers with **reduced security** (i.e. K8s).
- Storage and network model **not well suited for the highly distributed** cloud-edge continuum.
- **Partial use of automation techniques** (e.g. IaC) for infrastructure provisioning automation.
- **Lack of specific edge node architectures** able to meet the needs of HPC and 5G/telco environments.

Multicloud Management and Orchestration

- Lack of **AI used to optimize and automate** cloud/edge infrastructure management.
- Centralized control planes that **do not allow the federation** of cloud and edge infrastructures.
- Limited support for **optimized orchestration**, **energy efficiency,** and enforcement of **security policies**.

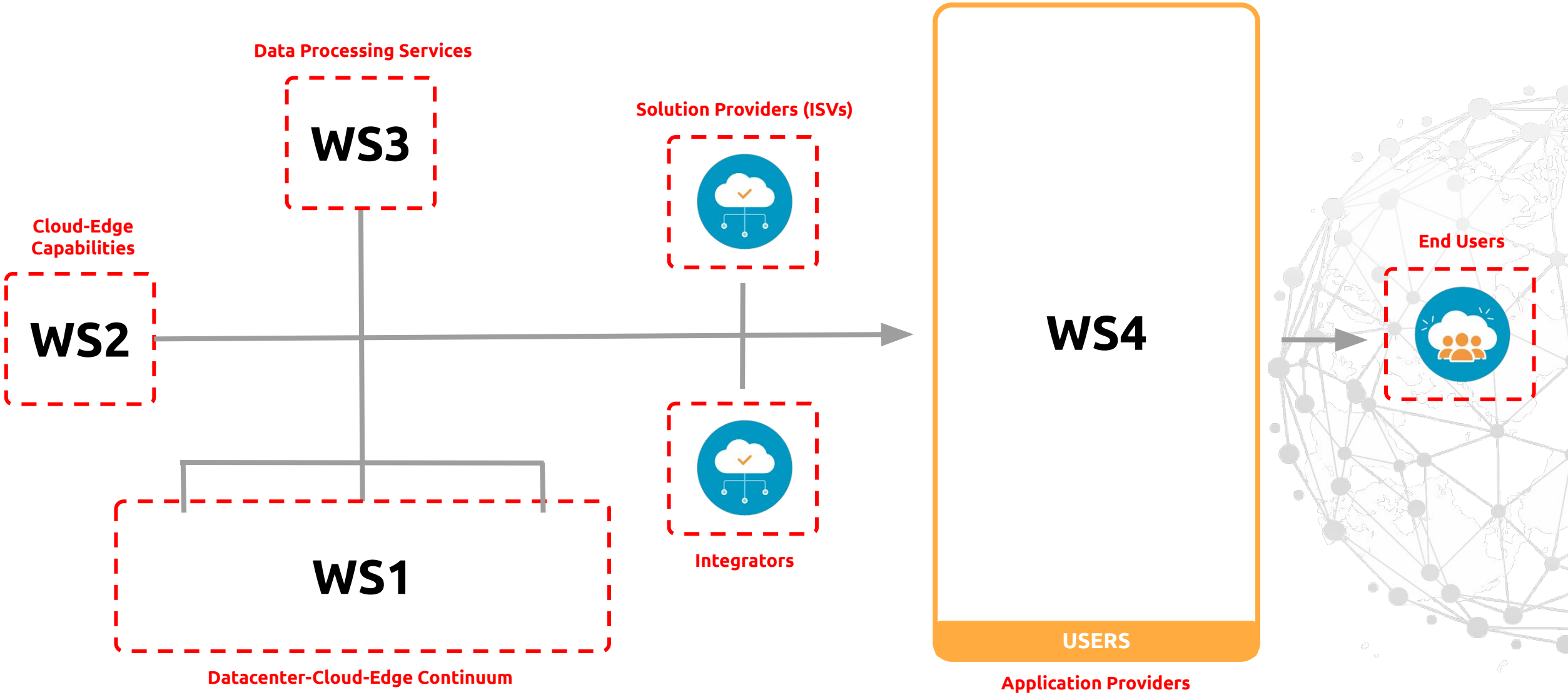
Use Cases

- Deployed as **static solutions** on a **case-by-case basis,** lacking automation, interoperability and portability.
- Creating **silos in strategic sectors** based on different technological stacks and ad hoc implementations.
- **Jeopardizes the consolidation of a cloud-edge continuum** and an associated industry ecosystem.

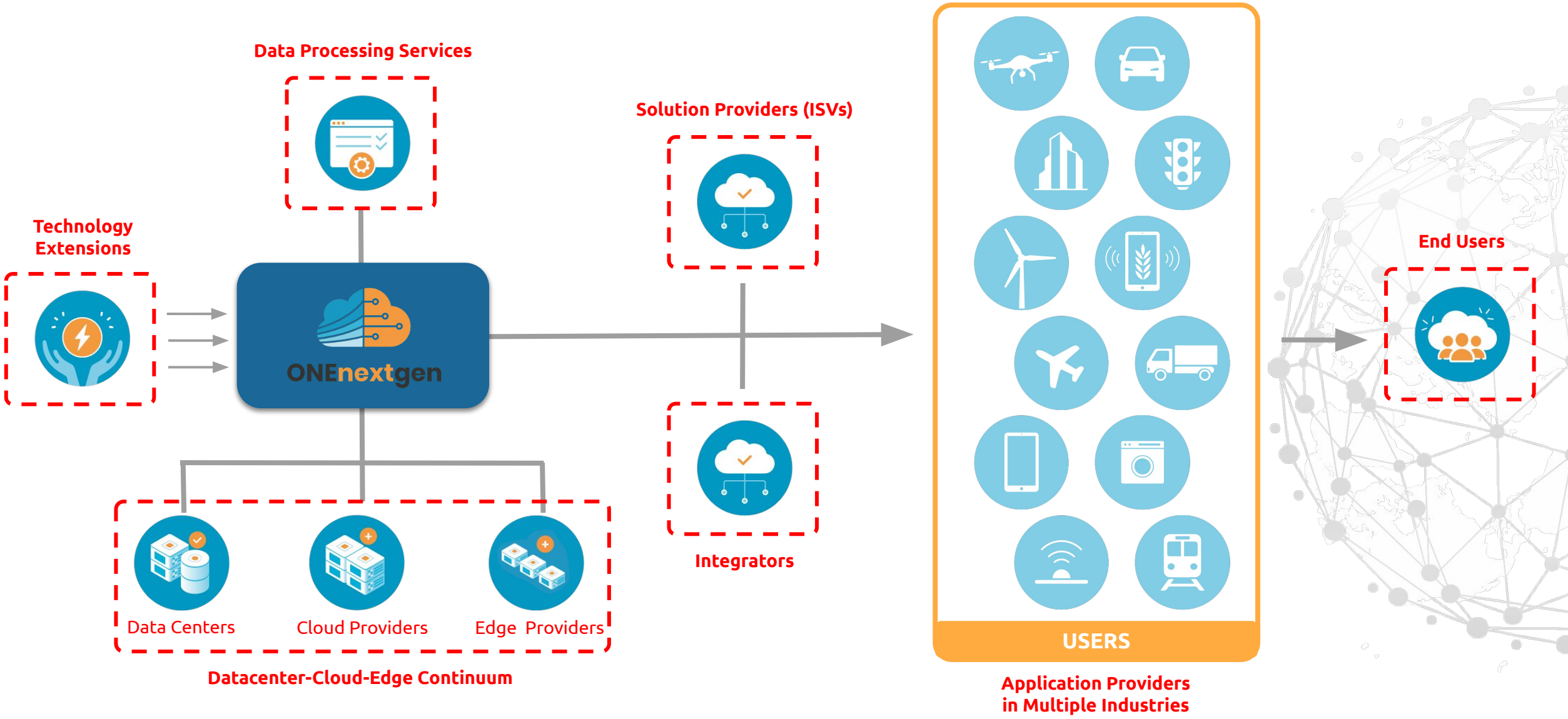
FUTURE CHALLENGES

- Increasing number of **edge providers** in the market.
- Emergence of **tens of thousands** of geographically distributed edge nodes.
- Need for complete **automation** of cloud edge operations.
- New **security threats** and larger impact of vulnerabilities.
- Preference for **energy-efficient** nodes.
- Tendency to platform **heterogeneity**.
- Infrastructure **dynamicity** and **volatile** devices.
- Dependency on **general-purpose**, **public** networks.
- Widely **distributed** environments.

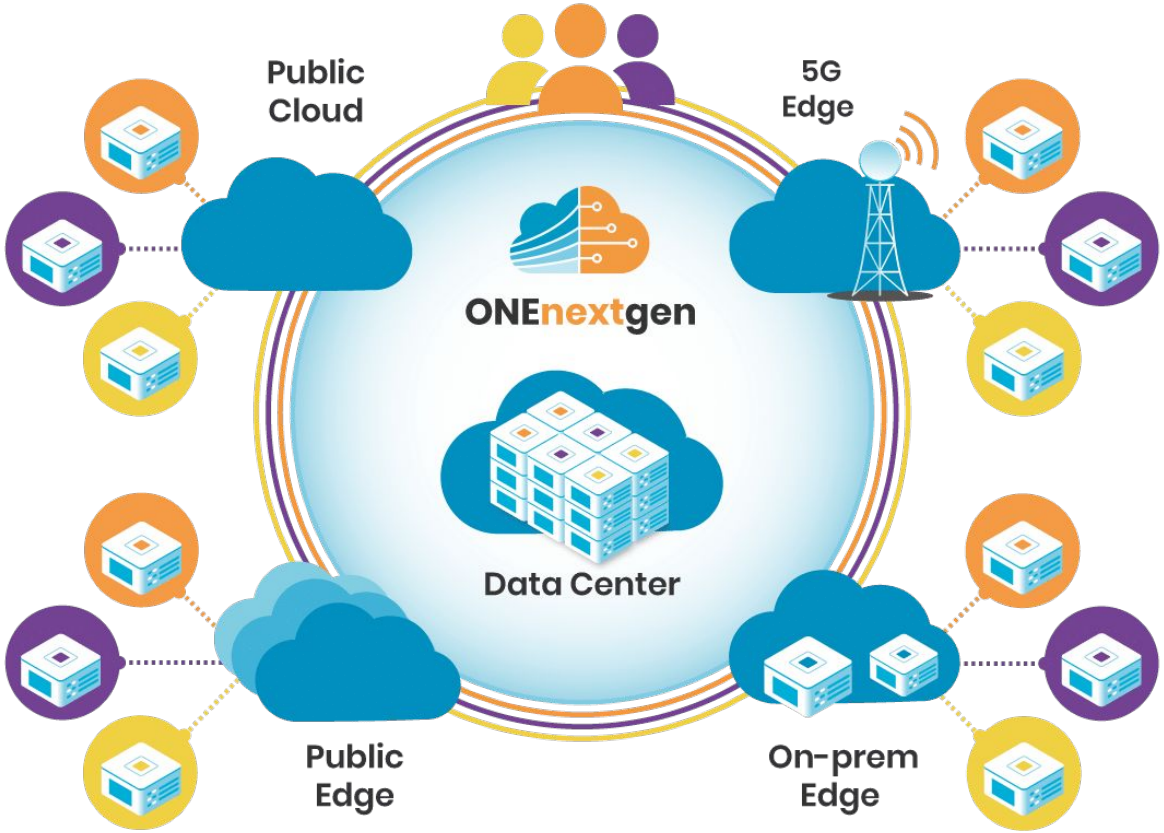
IPCEI Cloud – *Integrating the Whole EU Cloud-Edge Ecosystem*



IPCEI Cloud – *Example of Individual Project: ONEnextgen*



IPCEI Cloud – *Example of Individual Project: ONEnextgen*



Funded by the European Union NextGenerationEU

Plan de Recuperación, Transformación y Resiliencia

OpenNebula.io/IPCEI-CIS

MAIN GEO-STRATEGIC CHALLENGES:

Coordination Failure

Lack of **coordination to deliver a suitable edge** computing offering

Concentrated Market Power

Market structure dominated by a few **non-EU providers**

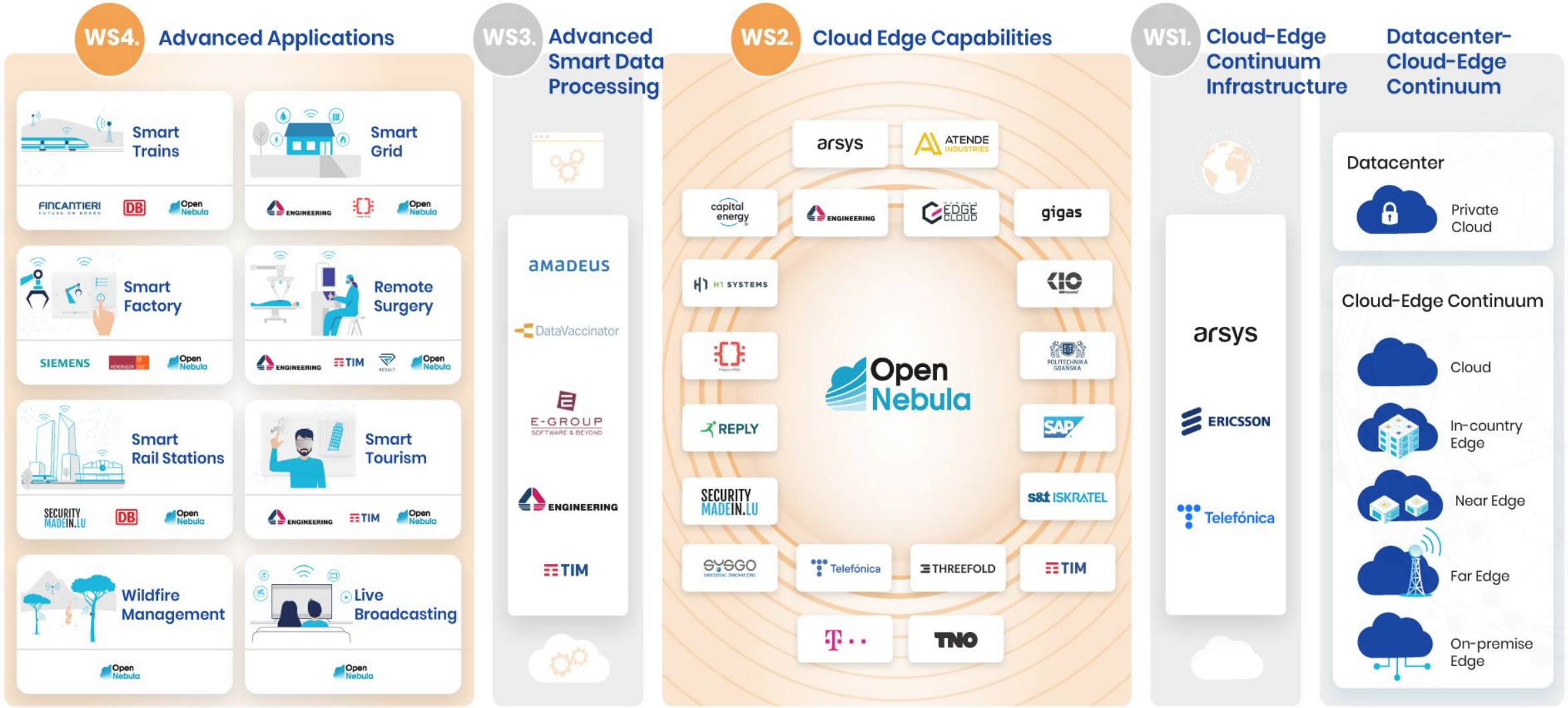
Vendor **lock-in** practices

High barriers to entry for new cloud and edge providers

Negative Externality

Excessive **energy consumption and pollution** from rapidly-expanding cloud infrastructure

IPCEI Cloud – *Example of Individual Project: ONEnextgen*



IPCEI Cloud – *Building a real "Sovereign Cloud" for Europe*

"Strategic autonomy is not a question of isolating ourselves and trying to produce everything in Europe, but of giving ourselves the means to discuss from a position of strength with our foreign partners".

Josep Borrell

Quo Vadis Europa? (29/08/2022)

"When it comes to digital, Europe's resilience will depend on our ability to develop the next generation of cloud and edge capacities and invest massively in developing European alternatives to reduce our current dependencies".

Thierry Breton

A European Sovereignty Fund for an industry "Made in Europe" (15/09/2022)

NexusForum2024 Summit – *19 & 20 September @ Brussels*

The event series bringing together the whole EU cloud & edge innovation ecosystem

Event organised by the CSA NexusForum.EU—***Consolidating Research and Policy along the Cognitive Computing Continuum***—under the European Union's Horizon Europe research & innovation programme (Grant Agreement 101135632)

Thank you... and see you soon!

innovation@opennebula.io

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