



This Communication is part of a project that has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N°101069732



Pitch

EU CEI Concertation Meeting

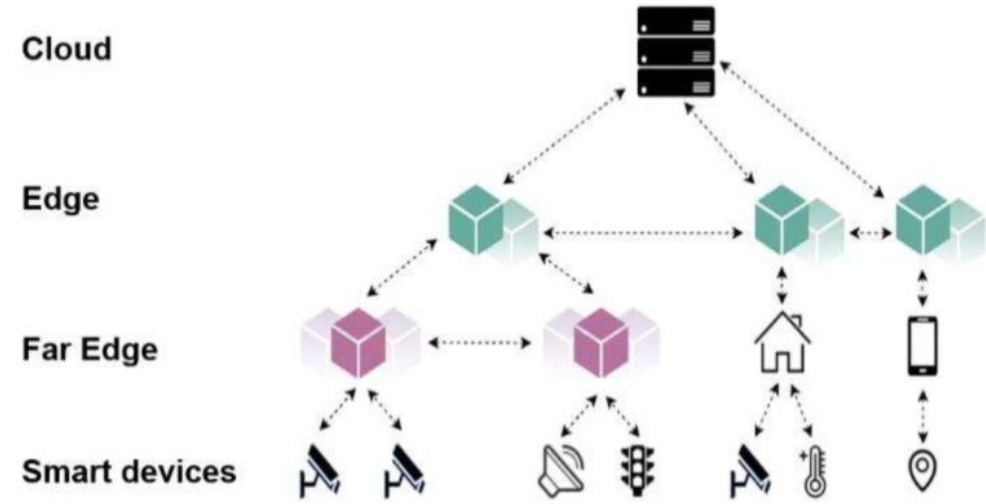
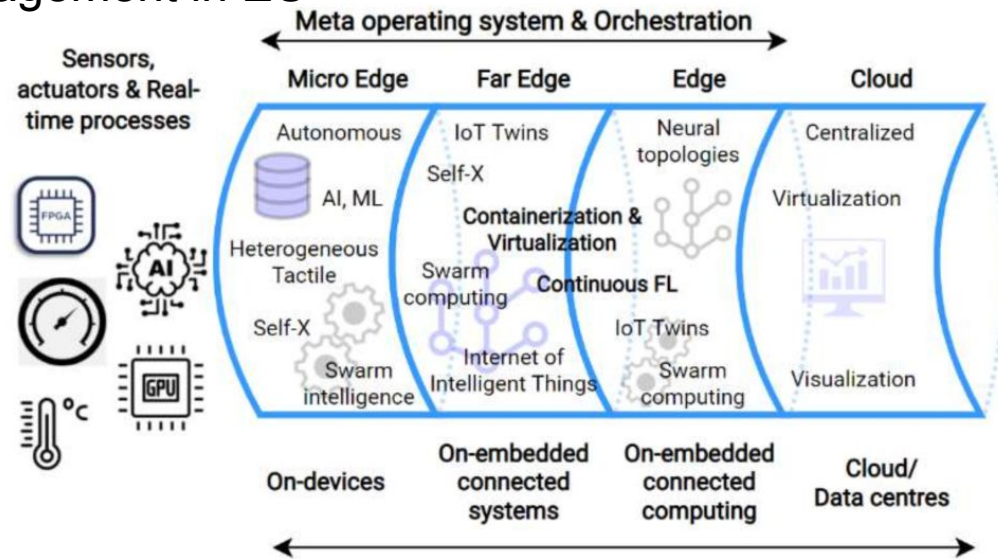
Brussels, May 10th, 2023

Prof. Carlos E. Palau (UPV) – Project Coordinator



CONTEXT AND ORIGINS

The **unprecedented data explosion** and the evolving capabilities of **virtual infrastructures**, set the scene for developing a **new paradigm** for **data** and **compute resource** management in EU



Processing needs to be performed **closer to the data sources** (often smart devices), in an effort to minimise latency, save bandwidth, improve security, guarantee privacy and increase autonomy

ISSUE S

- Wide variety of deployment models and open standards
- Existing legacy investments



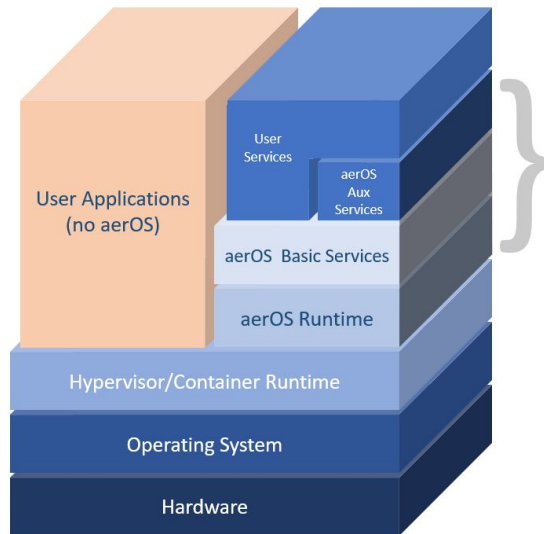
The challenge of seamlessly integrating various edge technologies into a homogeneous “continuum” remains open

- Cloud centricity and cost
- Network management
- All-around virtualisation
- Security & trust



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GOAL, ARCHITECTURE AND USE CASES



- ...using context-awareness to distribute software task (application) execution requests
- ...supporting intelligence as close to the events as possible
- ...supporting execution of services using “abstract resources” (e.g., virtual machines, containers) connected through a smart network infrastructure
- ...allocating and orchestrating abstract resources, responsible for executing service chain(s)
- ...supporting scalable data autonomy

aerOS overarching goal is to design and build a virtualised, platform-agnostic **meta operating system for the IoT edge-cloud continuum**. As a solution, to be executed on any Infrastructure Element within the IoT edge-cloud continuum – hence, independent from underlying hardware and operating system(s)

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

Renewable energy: Containerised Edge Computing near Renewable Energy Sources

Machinery: High Performance Computing Platform for Connected and Cooperative Agricultural Mobile Machinery to Enable CO2 Neutral Farming (HPCP-F)

Maritime ports: Smart edge services for the Port Continuum

Smart Buildings: Energy Efficient, Health Safe & Sustainable Smart Buildings





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THANK YOU!

Prof. Carlos E. Palau

📞 +34 96 387 73 01

✉️ cpalau@dcom.upv.es

🌐 www.satrd.es

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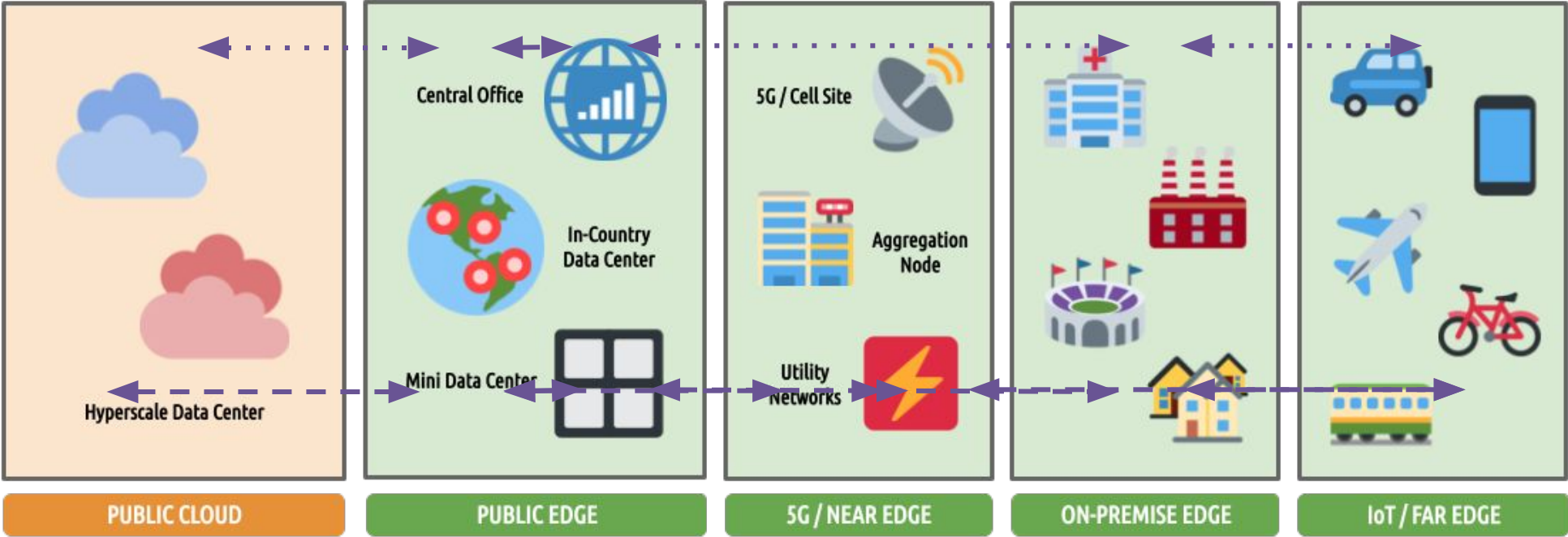
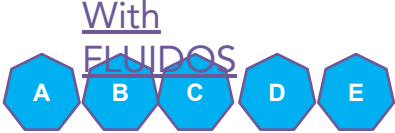
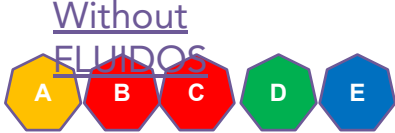


Flexible, scaLable, secUre, and decentraliseD Operating System

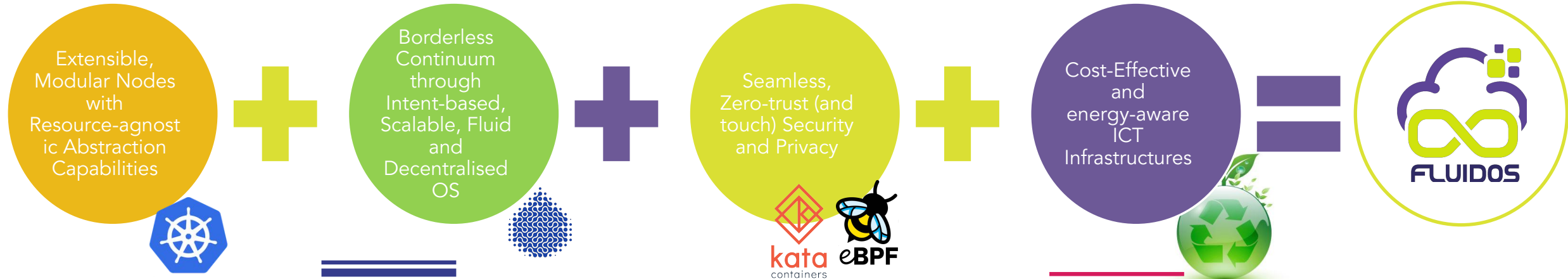
F. Riso, Politecnico di Torino (Italy) – Technical coordinator



Is the Edge-to-Cloud continuum already here?



Approach



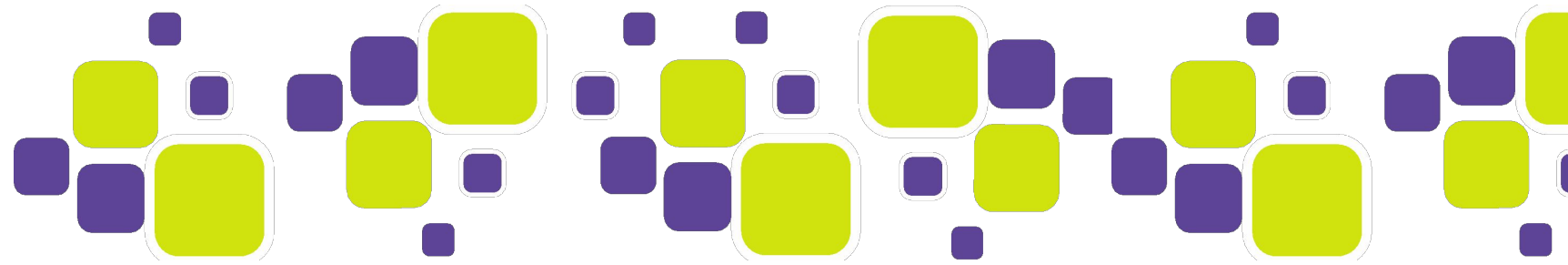
- Reduced costs
- Increased agility in software development and deployment
- Reduced energy consumption and more effective ICT infrastructures
- New business pathways



Public implementation of FLUIDOS influencing key open-source communities in the area

A vibrant community of early adopters, embracing new paradigms toward edge-native computing





Politecnico di Torino





ICOS

Towards a functional continuum operating system

IoT2Cloud Operating System

Project overview

Francesco D'Andria (ATOS)
10/05/2023 Concertation event



Funded by
the European Union

ICOS in a nutshell

Administrative data

Name: Towards a functional continuum operating system
Horizon Europe call: Horizon-CL4- 2021-DATA-01-05
Coordinator: ATOS
Technical coordinator: UPC
Duration: 36 months
Starting date: 01 September 2022
EU contribution: 10,997,675 €
Cascade funding: 1,900,000 €

Use cases



In-car Advanced Infotainment and Multimedia Management system



Agriculture Operational Robotic Platform



Railway Structural Alert Monitoring system



Energy Management and Decision Support system



Consortium

IoT2Cloud Operating System

Technical Impact

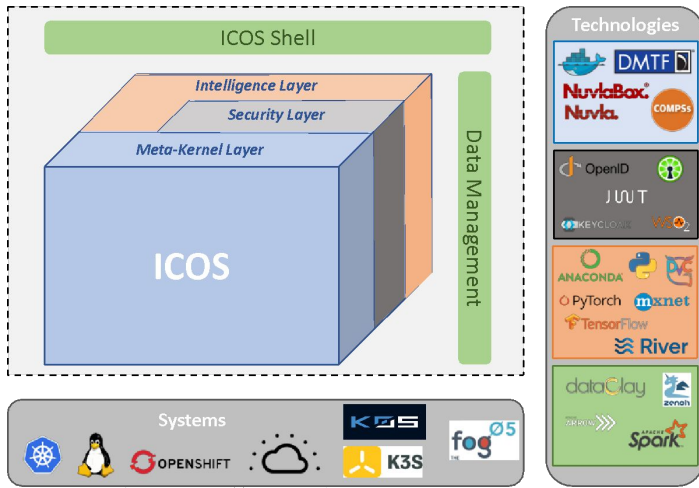
Design of an innovative, beyond SOTA ICOS ecosystem, providing a secure (common standards), smart (AI-assisted), efficient (green) and integrated (modular) platform for managing applications lifecycle across the continuum

1. Modeling strategy for proactive continuum management (dynamic deployment, configuration, migration, anomalies detection, SLA deviations, etc.)

2. Decentralized AI-assisted approach (online training under changing conditions, FL for privacy, etc.)

Key Innovation

6. Layered architecture managing the whole continuum (IoT to cloud)



5. Transparent deployment on top of native OSs

4. Open and unified programming model

3. Dynamic and flexible data federation between devices



Economic Impact

Feasibility demonstrated through the ICOS micro analysis, according to UCs KPIs and open call winners' specifications

EU Competitiveness

The ICOS ecosystem to contribute to the creation of a globally attractive, secure and dynamic data-agile economy, supporting the market to move beyond a simple send-data-to-the-cloud, offering new opportunities to European actors to establish market and services increasing EU's autonomy and performance in the data economy



Towards a functional continuum operating system

For more information please contact:
francesco.dandria@atos.net

ICOS project has received funding from the European Union's Horizon Europe Framework Programme under the Grant Agreement N° 101070177. Views and opinions expressed in this presentation are however those of the ICOS Consortium only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them



**Funded by
the European Union**



Vision of the project

NebulOuS

NebulOuS will develop a novel Meta Operating System and platform for enabling transient fog brokerage ecosystems that seamlessly exploit edge and fog nodes, in conjunction with multi-cloud resources, to cope with the requirements posed by low latency applications.

It will accomplish substantial research contributions in the realms of cloud and fog computing brokerage by introducing advanced methods and tools for enabling secure and optimal application provisioning and reconfiguration over the cloud computing continuum.

www.nebulouscloud.eu

NebulOuS and EU-CEI

NebulOuS
Contributions

Technical contributions

- Resource brokerage
- Application optimisation
- Data communication overlay

Application domains

- Agriculture of tomorrow
- Energy and utilities
- Logistics and transportation
- *Crisis management*

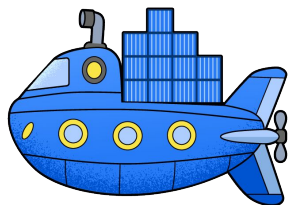
Collaboration
among projects

Open Solutions Registry

- Documentation
- Packaged solutions
- Interoperable interfaces
- Experience registry
- Meeting the community

Application forum

- Requirements gathering
- Experience exchange
- Adoption of foreign solutions
- Projects adopting foreign applications
- Joint marketing efforts



NEMO

NExt Generation Meta Operating System

PROJECT OVERVIEW

EC Cluster 4

**Concertation and Consultation on
Computing Continuum**

Brussels, 10-11 May 2023

Harry Skianis, PhD

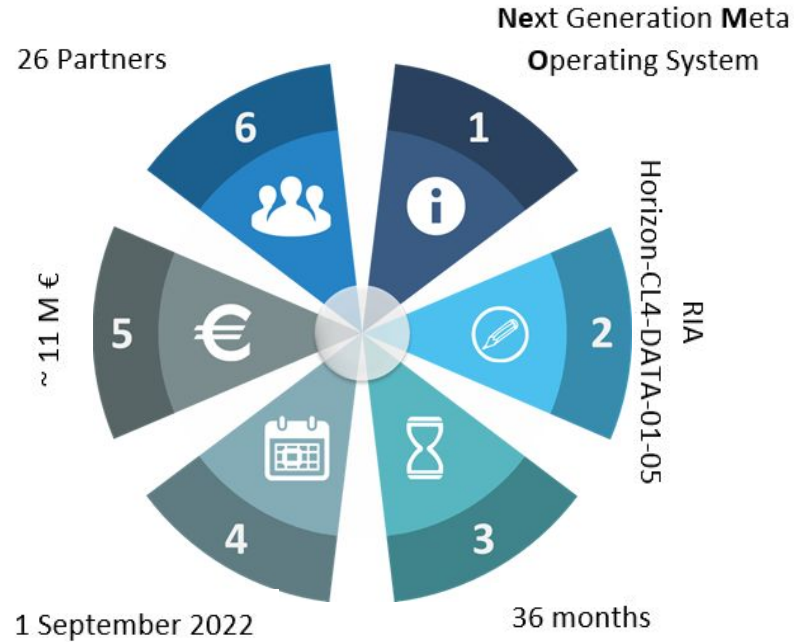
TM, Synelixis Solutions SA



NEMO receives funding from the EU Horizon Europe research and innovation Programme under Grant Agreement No. 101070118

NEMO Identity Card

Title: Next Generation Meta Operating System
 Grant agreement ID: 101070118
 H2020 Call: Horizon-CL4-2021-DATA-01-05
 Funding Instrument: RIA (Research and Innovation Action)
 Coordinator ATOS – Technical Coordinator SYNELIXIS
 Duration: 36 months – Starting Date: 1st September 2022
 EU Contribution: 10.5 MEuros – Cascading Funding: 1.8 MEuros
 26 Partners – 9 Countries
 8 Use Cases – 5+1 Living Labs/Pilots



Large Industries



Living Labs



Telecoms



SMEs



Research

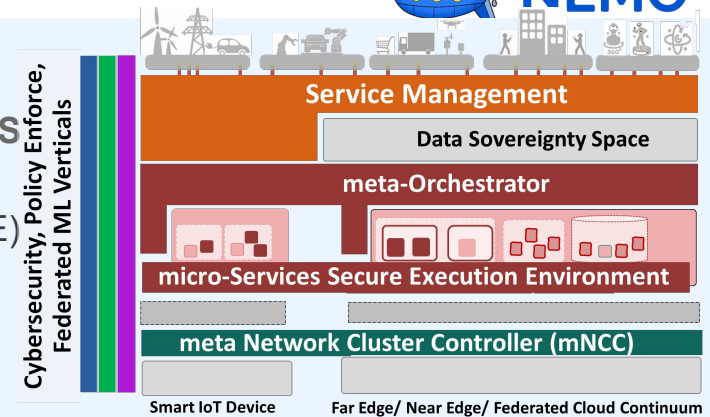


NEMO: Next Generation Meta Operating System



1) Technological Innovations

- ✓ Full stack, fully configurable, cloud-native, data aware meta-OS
- ✓ *Bring intelligence closer to data/make AI integral part of meta-OS*
 - Self-Organized/Healing Network Clusters/5G/6G Integration
 - Cybersecure micro-Service Secure Execution Environment (mSEE)
 - SLO/EE based self-optimized meta-Orchestrator
 - ZeroOps Plug-in mechanism
- ✓ **Cybersecurity, Privacy Compliance & Federated ML verticals**



2) Strengthening the EU competitiveness

- ✓ Fully compatible with DataSpace evolution/standards
- ✓ Pre-commercial exploitation components (MOCA)
- ✓ FAIR datasets/Smart-X Labs (Farm, Energy, Mobility, Industry, Media)
- ✓ *Widespread penetration / Open X Access, Source, Standards, Calls*
- ✓ 1.8M€ for testing and adoption via 2 Open Calls

3) Expected (Technical, Economical, Environmental, Social) Impact

- ✓ Novel components, tools, methods
- ✓ Dataspace & IoT-Edge continuum integration in reality
- ✓ New paradigms in Smart-X Apps delivery
- ✓ Push processing to cloud => directly reduce CO2
- ✓ Smart Agriculture: reduce pesticides/spraying/soil erosion....
- ✓ Closing the digital gap by enabling Smart-X Edge processing
- ✓ Reinforcing competitiveness via open-source & Open Calls



Thank you for your attention!

Harry Skianis, SYNELIXIS

cskianis@synelixis.com



nephele

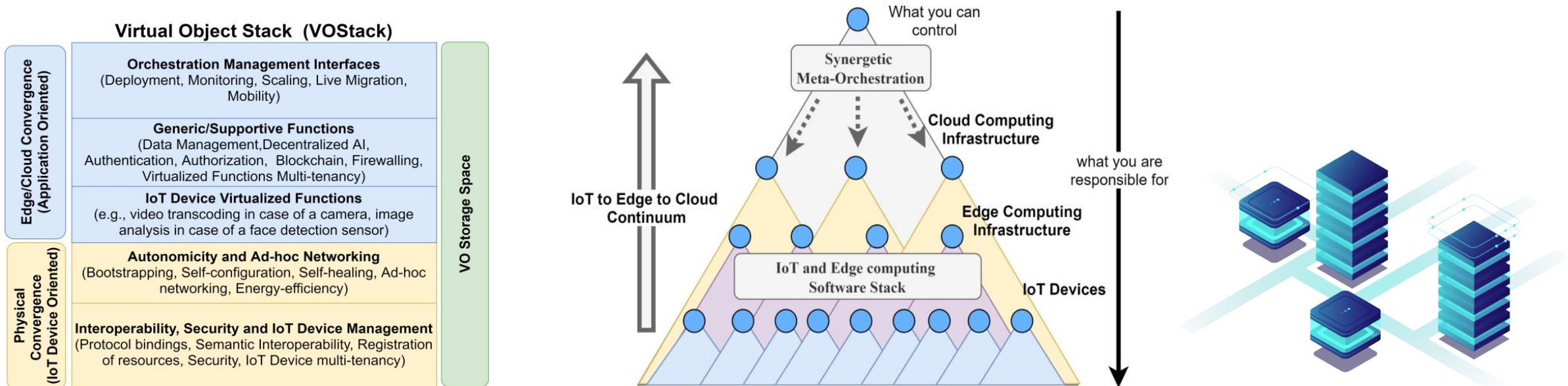
A lightweight software stack and synergetic meta-orchestration framework for the next generation compute continuum

Anastasios Zafeiropoulos,
National Technical University of Athens
tzafeir@cn.ntua.gr

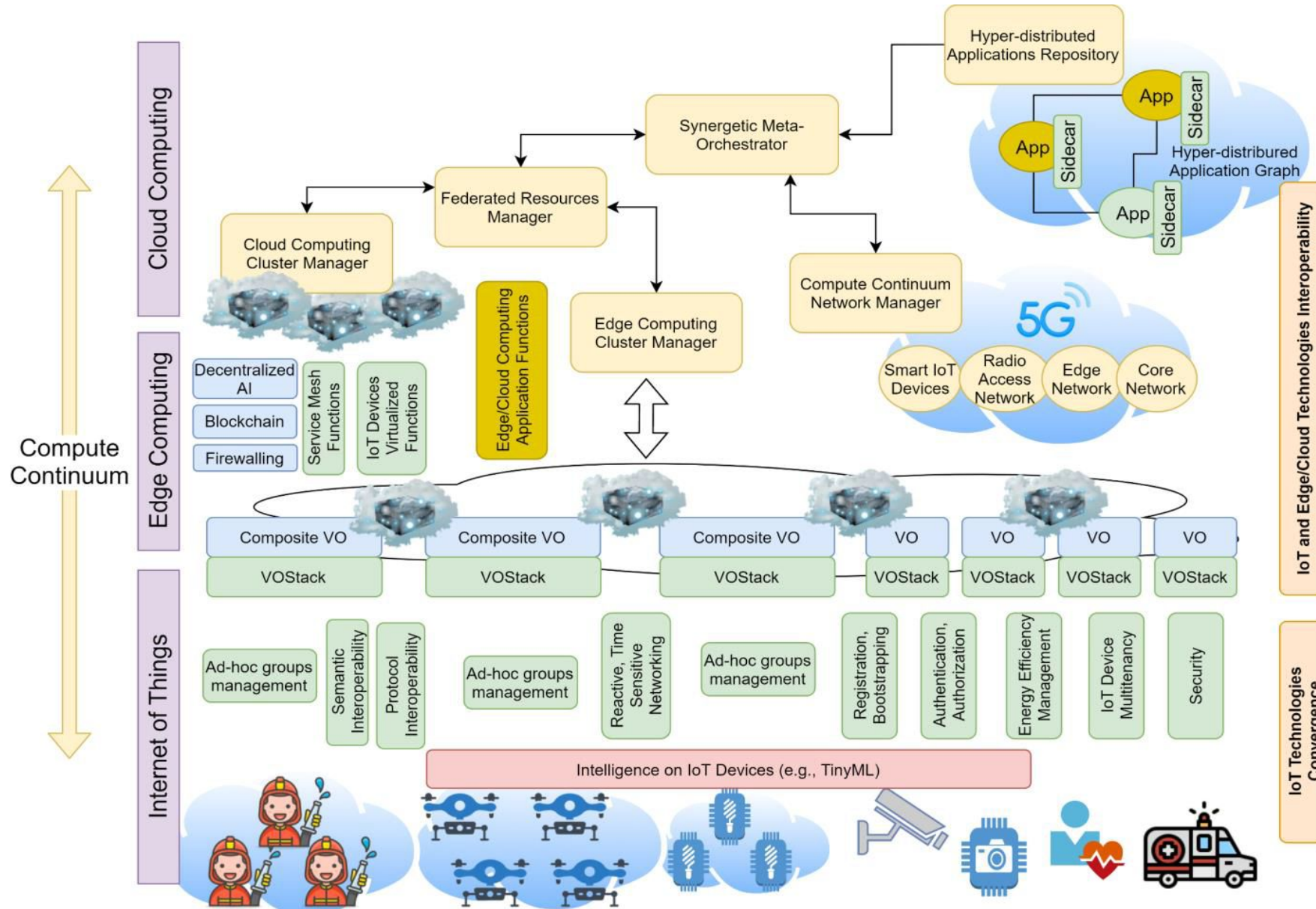
Concertation and Consultation on Computing Continuum: From Cloud to Edge to IoT
Brussels, 10-11/04/2023

Main Innovations

- an **IoT and edge computing software stack** for leveraging virtualization of IoT devices at the edge part of the infrastructure and supporting openness and interoperability aspects in a device-independent way.
- a **synergetic meta-orchestration framework** for managing the coordination between cloud and edge computing orchestration platforms, through high-level scheduling supervision and definition, based on the adoption of a “system of systems” approach



Synergetic Orchestration Mechanisms





nephele

Thank you!