13:30 Pitch Sessions: HORIZON EUROPE PROJECTS

Danijel Pavlica
EU Projects Manager, F6S

AC3
Sara Madariaga, *Arsys*

aerOS
Ignacio Lacalle, *Universitat Politecnica de Valencia*

FluiDOS
Stefano Galantino, *Politecnico di Torino*

SovereignEdge.COGNIT
Idoia de la Iglesia, *IKERLAN*

OASEES
Akis Kourtis, *NCSR Demokritos*

INPACE
Giacomo Inches, *Martel Innovate*

TaRDIS
João Leitão, *NOVA University of Lisbon*

MYRTUS
Alessandra Bagnato, *Softeam Group*

EMPYREAN
Aristotelis Kretsis, *National Technical University of Athens*

CoGNETs
Georgios Spanos, *Centre for Research & Technology Hellas (CERTH)*

Vitamin-V
Ramon Canal, *Universitat Politècnica de Catalunya (UPC)*

Agile and Cognitive Cloud-edge Continuum management (AC^3)

NexusForum 2024

Sara Madariaga

Brussels, 20th September 2024

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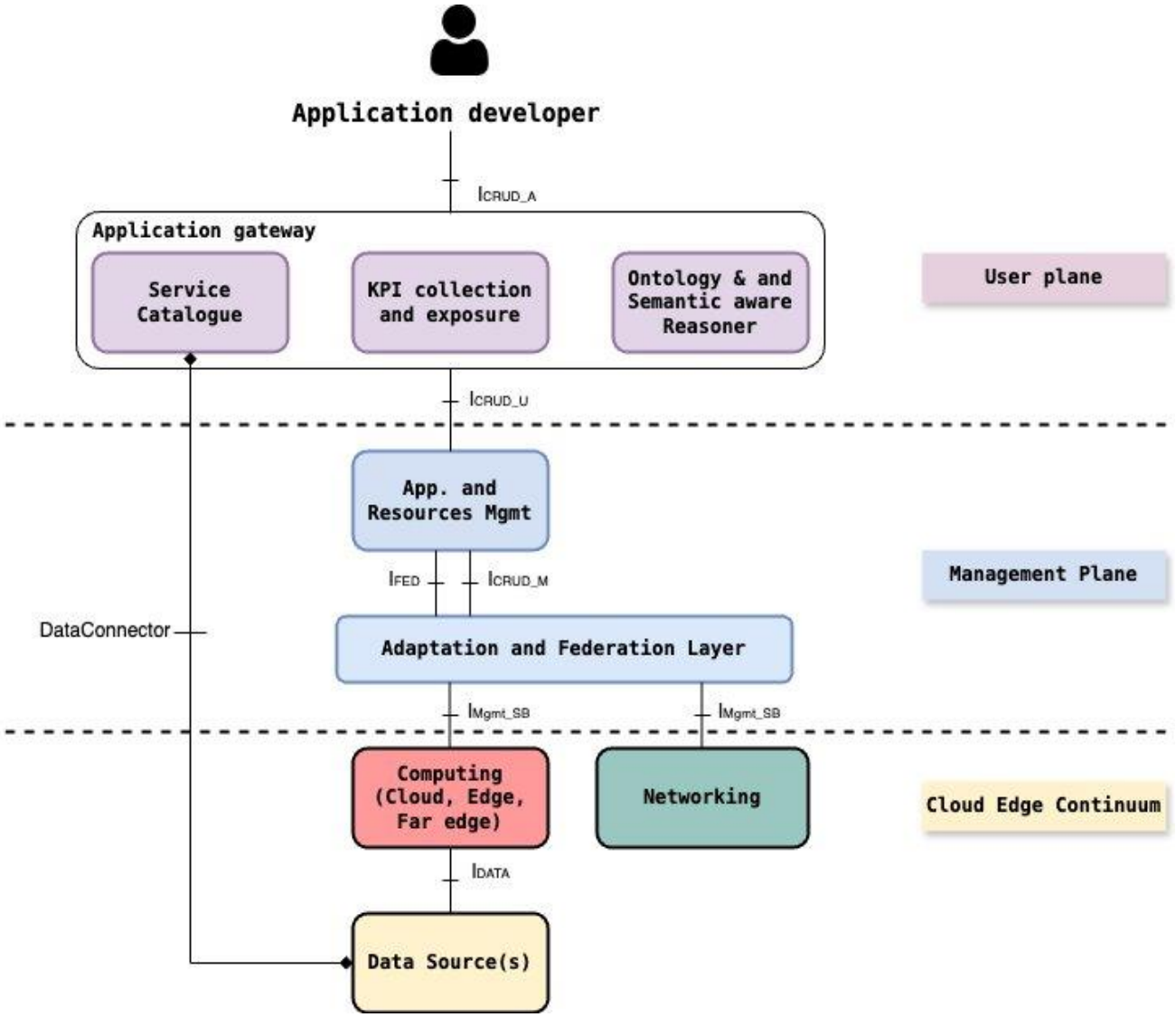
Project goal

Design, develop, and evaluate a Cloud Edge Continuum Computing Manager (CECCM) featuring AI/ML and XAI to:

- Handle Life Cycle Management of new application models (micro-service-based) by redefining SLA, predicting application profile, and describing micro-services using a semantic-aware solution, while guaranteeing the application's SLA.
- Handle Cloud Edge Continuum (CEC) infrastructure, including far-edge resources, by defining novel stateful service migration, resource scaling, and energy consumption optimization, while guaranteeing balance between resource infrastructure and application SLA.
- Use a programmable network connecting the CEC computing nodes to enforce intra-micro-service communication Quality of Service (QoS).

Architecture and work done



- Architecture based on 3 planes.
- OSR to describe the micro-service-based applications considering inputs from the developer.
- AI/ML-based algorithms to handle the LCM of applications: application profiles, stateful container migration, XAI-based resource management.
- Programmable SD-WAN to interconnect computing nodes from different regions and operators.
- Data management PaaS based on Gaia-X and IDS approaches using connectors (EDC) and catalog (Piveau).
- Enablers such as monitoring, resource discovery and exposure, GUI for the application developer.
- Trust framework at resource federation level based on smart contracts to guarantee SLA.
- Security based on zero-trust, even between the components of the CECCM.

Use cases

IoT and data

- Showcase an IoT-based, self-operating, smart sensing and monitoring framework based on AC^3.
- Optimize data processing locations dynamically, balancing edge response and cloud computational power.
- Deployment comprised of different sensors (CO_2, air quality, human presence) and Raspberry Pi devices.
- Data to train custom ML models used for forecasting data trends and detecting anomalies.

UAV Monitoring System

- Real-time monitoring and generation of actionable insights from video streams and environmental sensor data.
- Demonstrate the CECCM flexibility to change application behaviour (object tracking, movement prediction, surveillance, unusual activity detection).
- Demonstrate the CECCM capability to deploy and run micro-services on far edge (UAV), anticipate node unavailability and migrate micro-services accordingly.

Deciphering the universe

- Showcase the adequacy of the CECCM to process hundreds of TBs of astronomy data (3D datacubes).
- Develop a microservice-based application to distribute software and data across the federated infrastructure.
- Optimize the execution of data intensive applications through the federation layer.
- Maximize the use of local bandwidth, reducing end-to-end execution times.

Thank You!!!

Sara Madariaga

Arsys

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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

aerOS
EUROPEAN IOT-EDGE-CLOUD

aerOS
EUROPEAN IOT-EDGE-CLOUD

aerOS

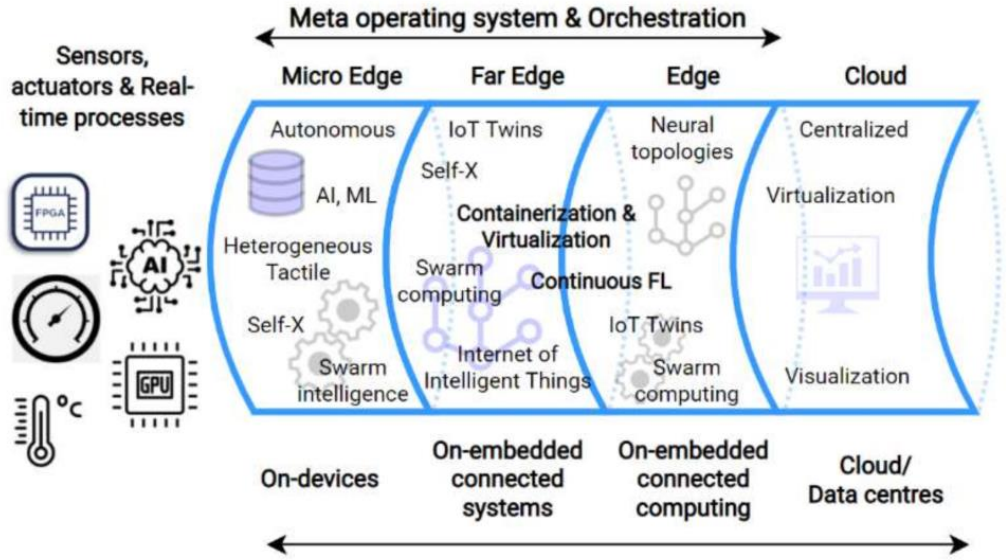
aerOS Slides

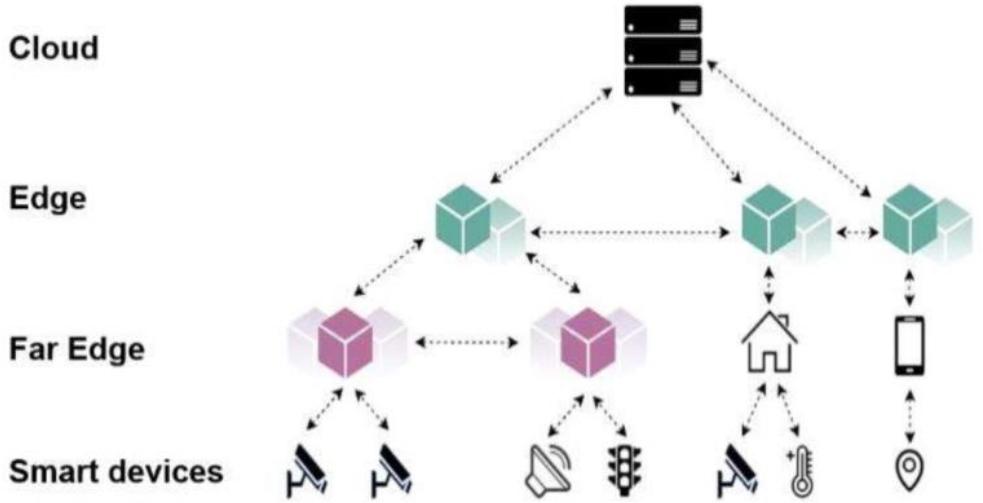
[Date]

[Presenter]

aerOS: 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

CHALLENGES

- 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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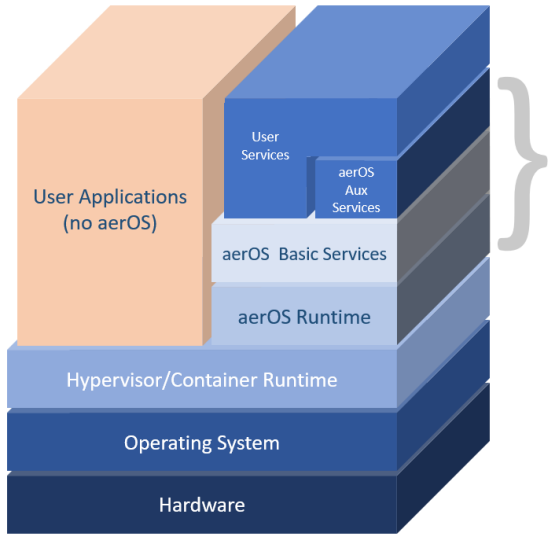
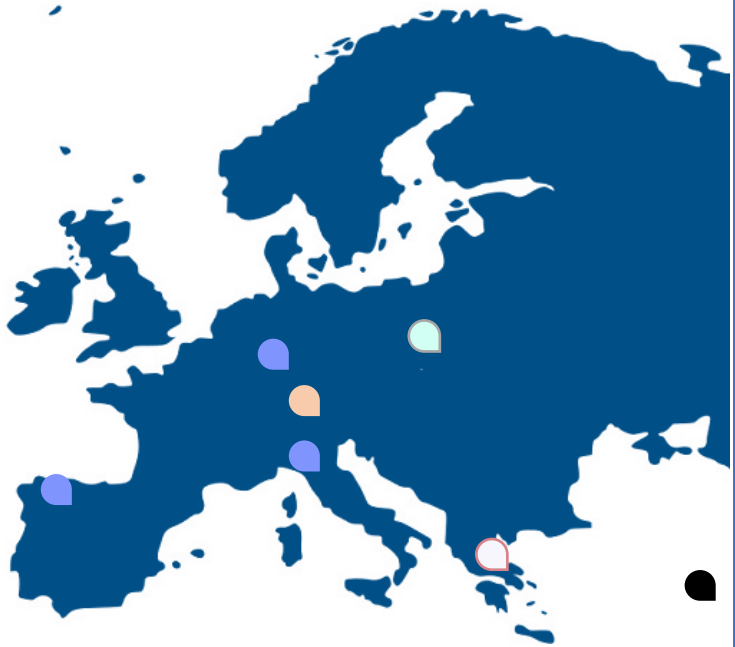
Main innovation, goal and use cases



- …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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Liaison with the CSA EUCloudEdgeIoT Continuum (EUCEI)

ACTIVE CONTRIBUTION to actions organised by EUCEI

Pitches and events

- TF3 Toulouse Technical Meeting
- Capitalising on EUCloudEdgeIoT
- EBDVF 2023 (Valencia)
- **Concertation & Consultation meeting – May 2023**

Via aerOS strategic pilots

One pitch in each sector targeted-webinar:

- Energy: Nov 2023
- Agriculture: Feb. 2024
- Manufacturing: July 2023
- Transportation: March 2023

Reports

- Landscape of projects
- Whitepaper on Architecture
- Demand skills
- Feasibility Tool for Adoption
- Meta OS use cases

DIRECT ACTIONS organised or co-organised by aerOS

Impact-wise

- Open Call webinars (6)
- 7 publications in EUCEI webpage

At the core of the CSA

- Workshop "*Meta Operating Systems: Innovating the CEI landscape*"
- UPV **leads WG5 of TF3 Architecture** (Orchestration)
- ISO/IEC SC41/JTC1 Workshop (Helsinki)

Scientific

- IEEE CloudNet 2023 (NY)
- MECC 2024 (Athens)

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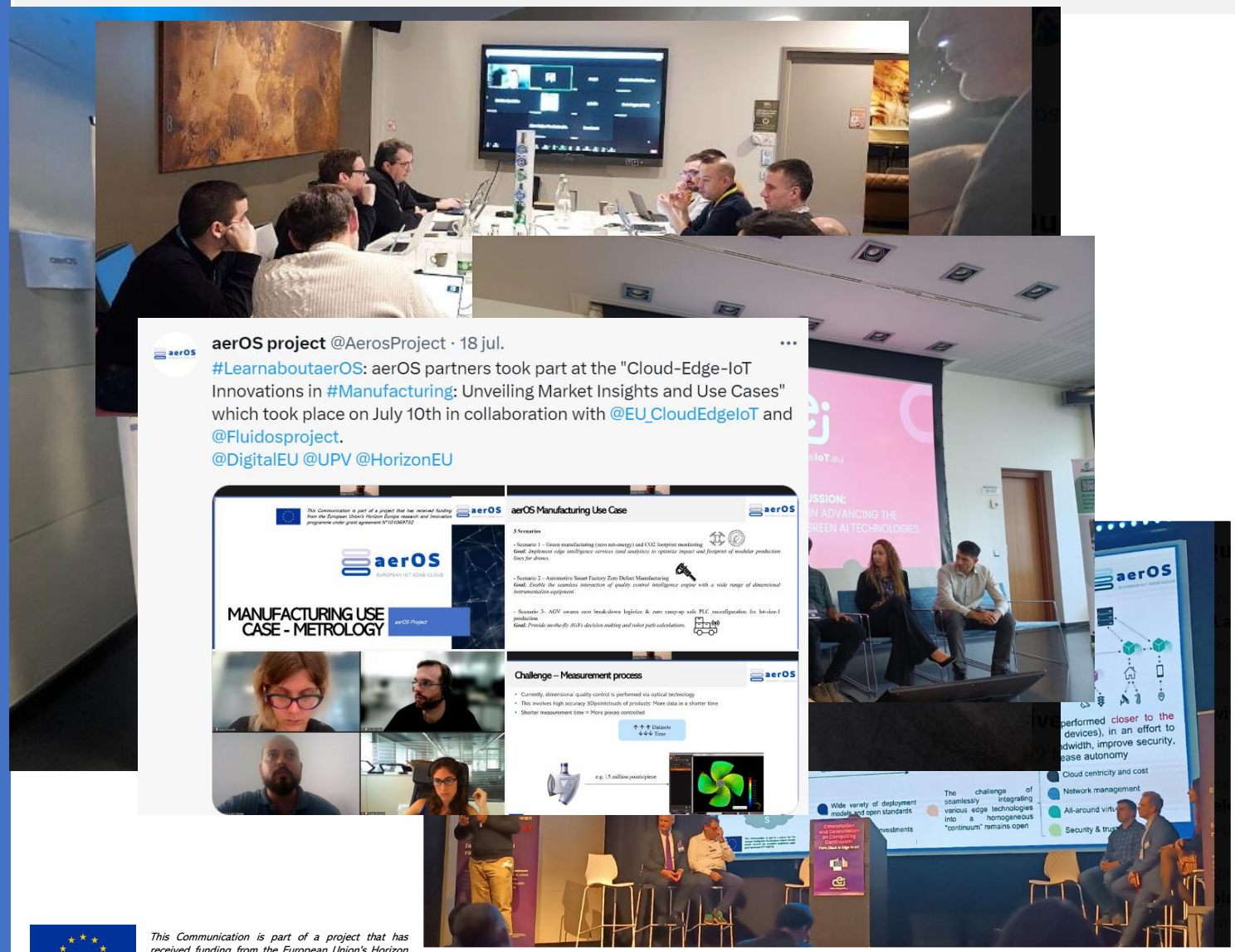
What have we learnt?



- **Common ideas** are shared among projects:
  - Virtualized/containerized services
  - Cloud-native principles as baseline
  - We cannot deny the relevance of current cloud technologies – we must adapt and differentiate
  - Multi-layer orchestration
- Some technical areas intertwine
- aerOS is working in key, strategic sectors
- **Cross-communication is effective** (especially with a single window approach).
- Issues with Open Call preparation have been shared fruitfully.

… and much more events & lessons to come.

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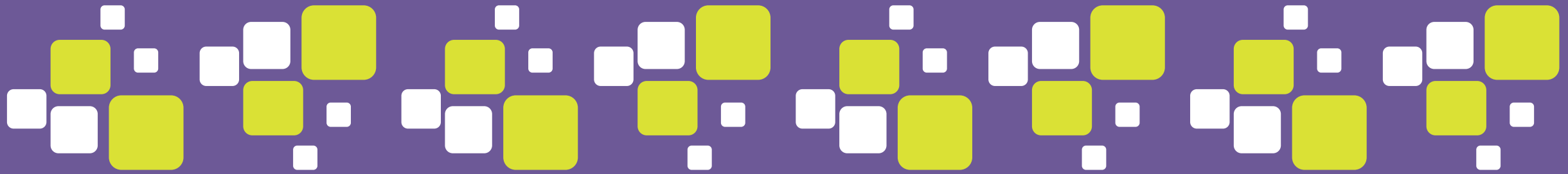
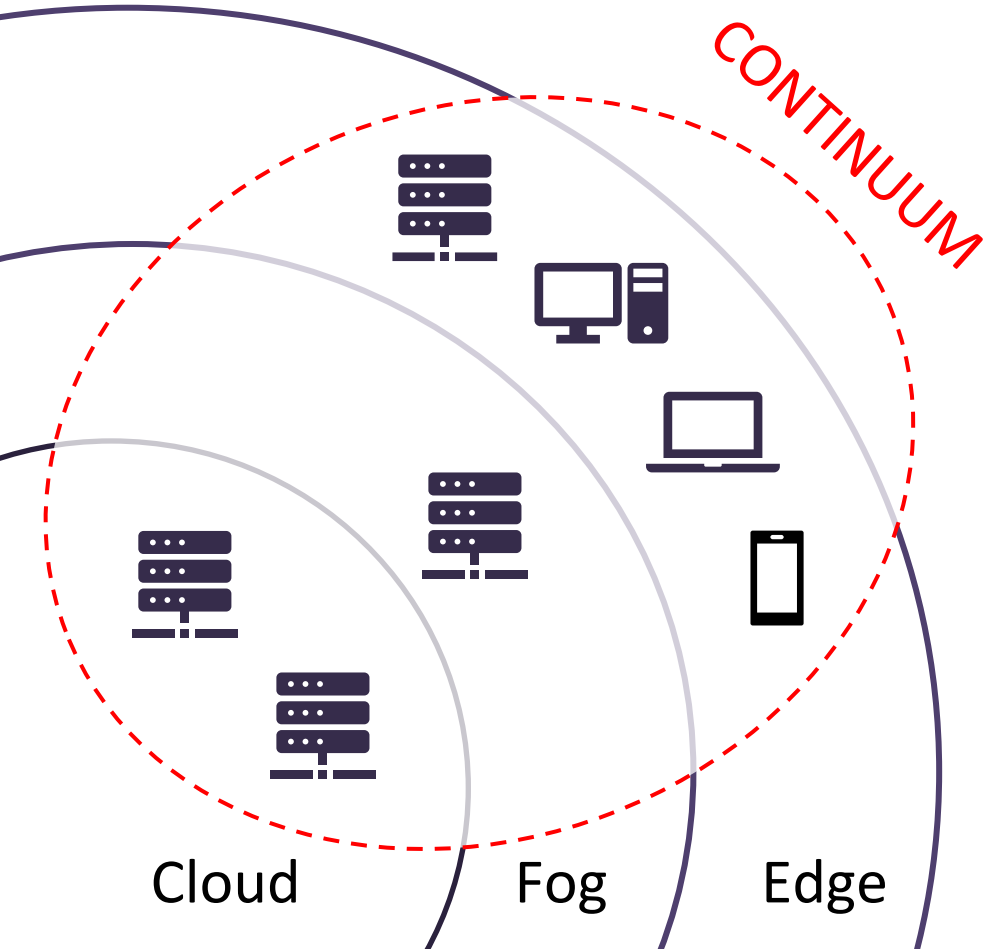
Open Edge-to-Cloud Continuum with FLUIDOS

Flexible, scaLable, secUre, and decentralIseD Operating System

Stefano Galantino, Politecnico di Torino (Italy)



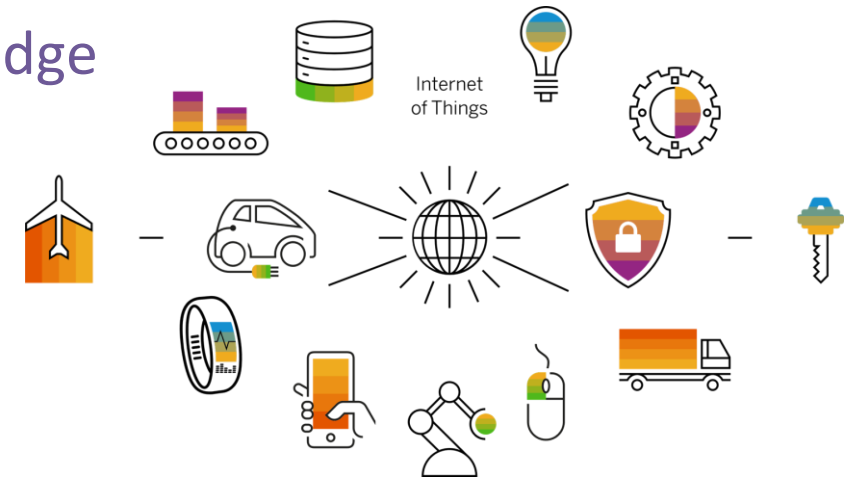
Many silos



Cloud

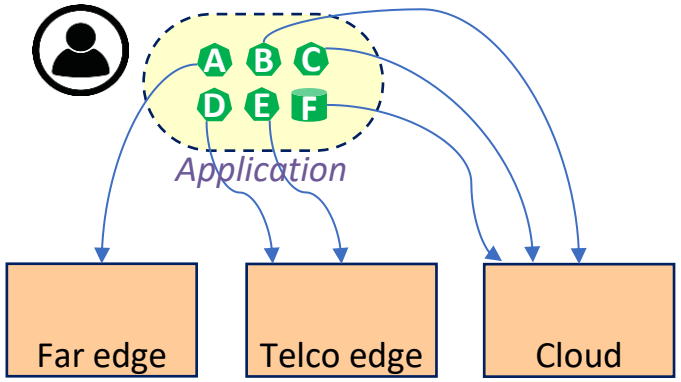
OVHcloud
Tencent Cloud
Google Cloud
aws
ORACLE CLOUD Infrastructure
Alibaba Cloud
DigitalOcean
IBM Cloud
Akamai
Microsoft Azure

IoT/Edge

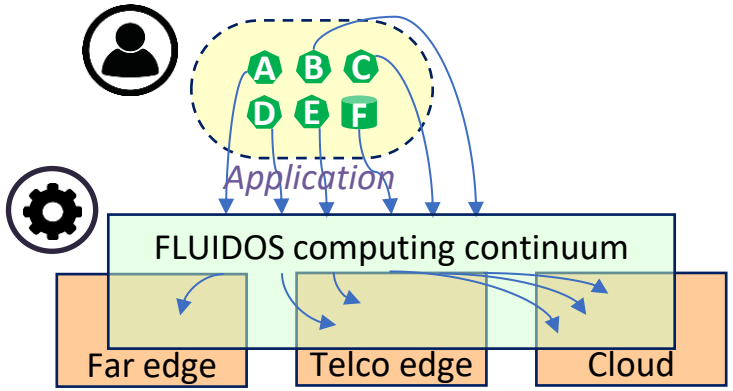


FLUIDOS

FLUIDOS is all about transparency



a) Current silos-based computing continuum



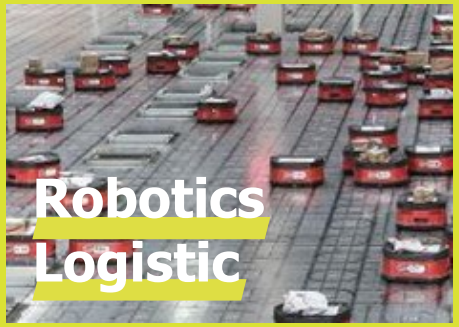
b) FLUIDOS computing continuum

The **FLUIDOS computing continuum** defines *multiple*, *dynamic, secure* **virtual spaces**, spanning across multiple *technological* domains and *administrative* boundaries, with

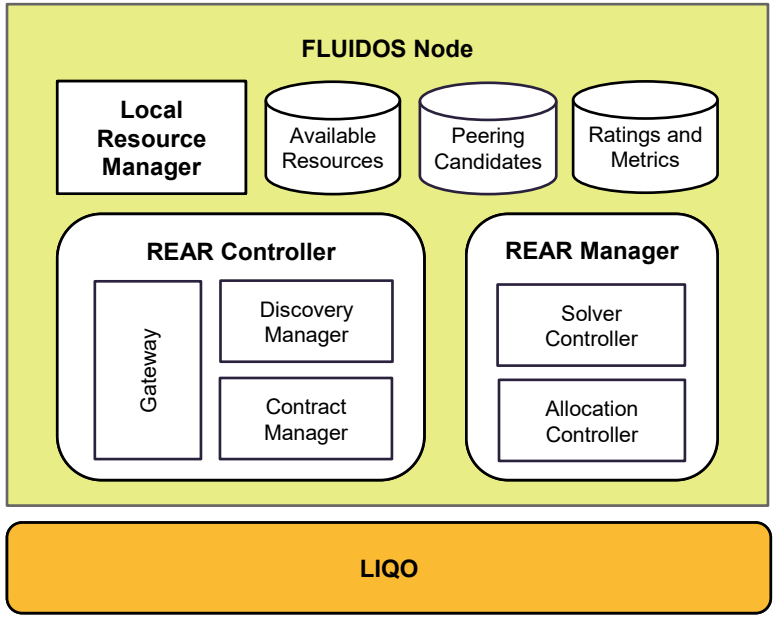
- **DEPLOYMENT TRANSPARENCY**
- **COMMUNICATION TRANSPARENCY**
- **RESOURCE TRANSPARENCY**

The FLUIDOS work packages

- WP3: FLUIDOS NODE
- WP4: META ORCHESTRATOR
- WP5: SECURITY
- WP6: ENERGY
- WP7: USE CASES



+5



https://www.fluidos.eu/

@fluidosproject

https://www.linkedin.com/company/fluidos/

https://www.youtube.com/@FLUIDOS-Project

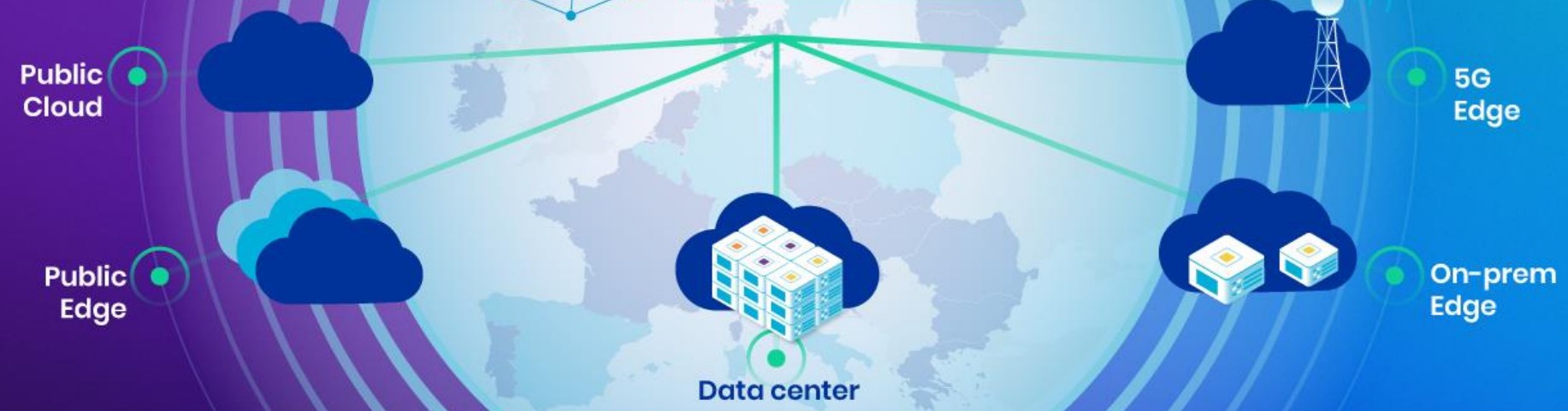
https://github.com/fluidos-project

A Cognitive Serverless Framework for the Cloud-Edge Continuum

Topic: **HORIZON-CL4-2022-DATA-01-02** (Cognitive Cloud) · Execution Dates: **2023 - 2025**

SovereignEDGE.EU

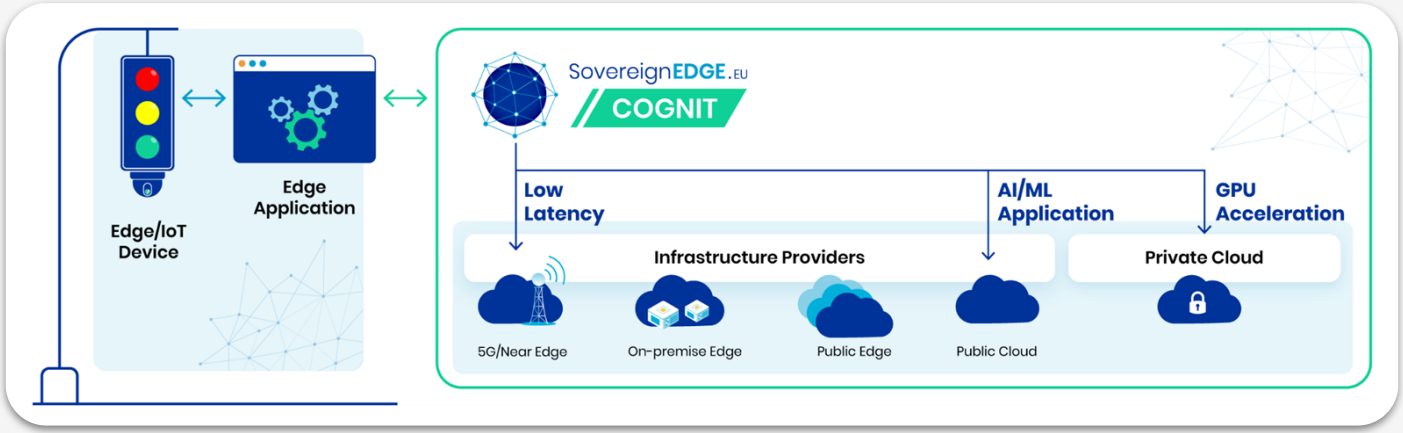
COGNIT



Open Nebula · Umeå Universitet · ikerlan · cetic · RISE Research Institutes of Sweden · SUSE · acisa · Nature 4.0 · Phoenix Systems · Atende Industries

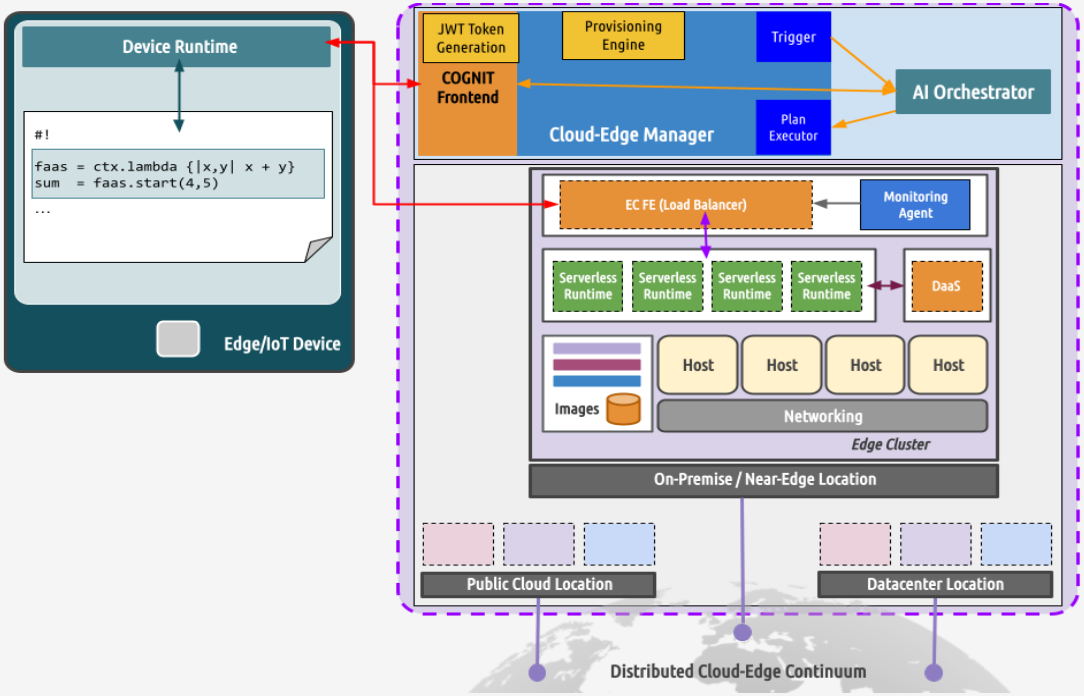
COGNIT Project (2023-2025)

AI-enabled Adaptive Serverless Framework for the Cognitive Cloud-Edge Continuum



PROVIDING EDGE DEVELOPERS WITH A SMART PLATFORM TO EASILY MANAGE, AUTOMATE, AND OPTIMIZE THE DEPLOYMENT OF CONTINUUM-NATIVE APPLICATIONS

COGNIT Architecture



https://vimeo.com/sovereignedge

OASEES

OASEES

How can AI and DAOs govern a swarm?

Akis Kourtis, PhD

noc
Network Operations Center
NCSR "D"

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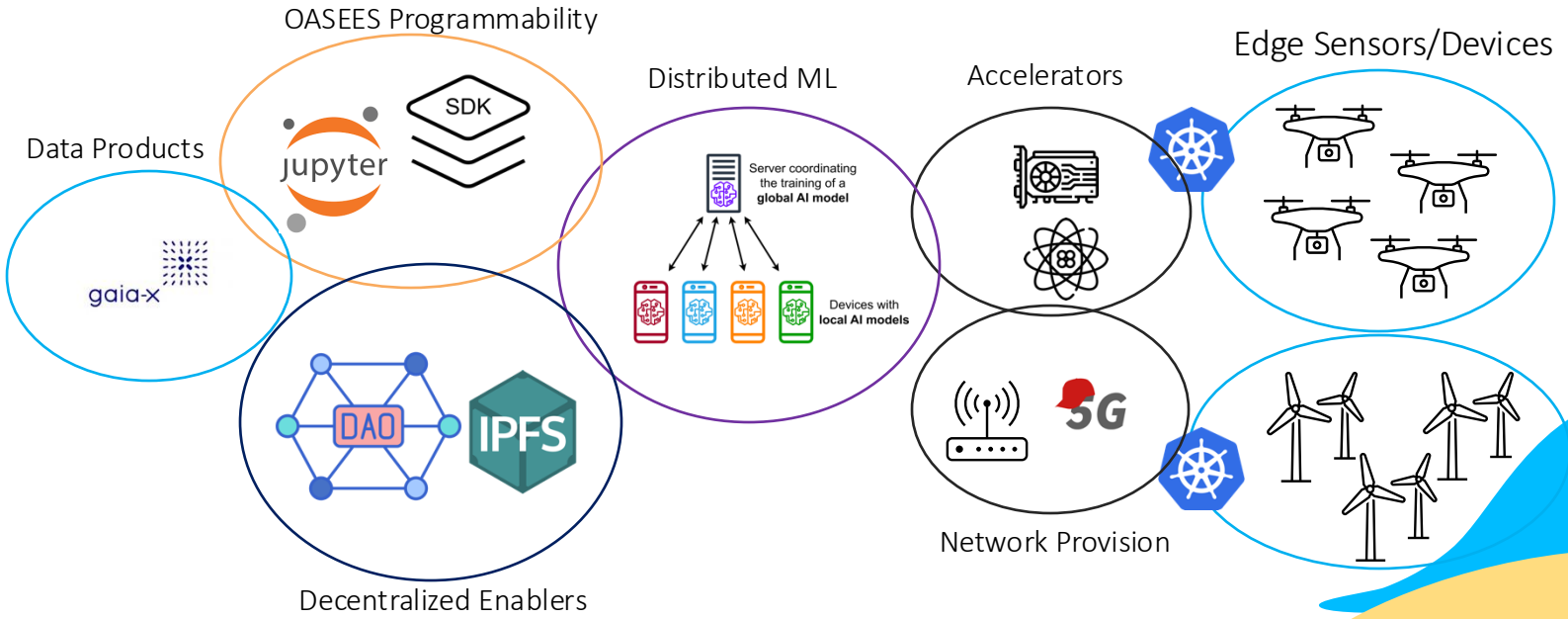
OASEES Cloud to Edge Swarm Approach

- Manages interactions and transactions in the OASEES Ecosystem
- Ensures decisions are made transparently and democratically
- Swarm Topologies:
  - Facilitates coordination and management of smart edge devices operating as a swarm in a **cloud native manner**
  - Allows efficient resource allocation and task distribution among devices **among different accelerators**



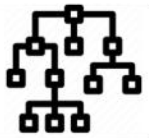
OASEES

SDK

x-Sensors/Devices

x-Networks

x-ML-Algorithms



x-Specialist

01

SSI: DIDs, VCs

02

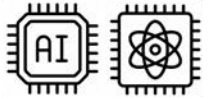
Create their DAO
- Organize through it

03

Choose/Define their AI model/optimization

04

Use the preferred Accelerator

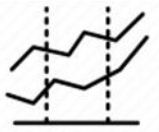


05a

Automated Decision Making/HITL

05b

Optimize & Collect KPIs



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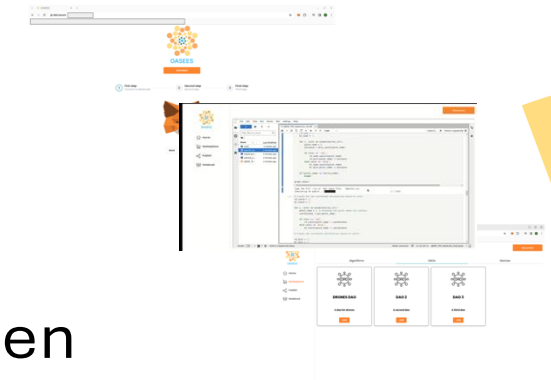
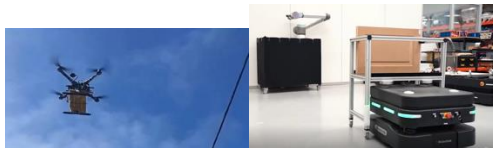
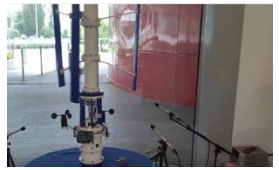


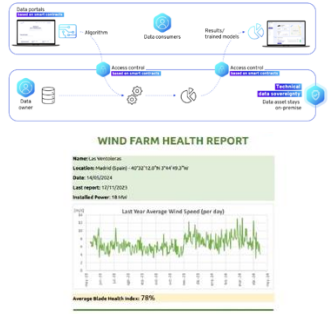




Checkout our Open Source platform and experiment with your swarm!

ocean

gaia-x



OASEES

Thank you!

Do you have any questions?

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INPACE

Indo-Pacific-European Hub for Digital Partnerships

https://inpacehub.eu/

Giacomo Inches
Senior Innovation Manager,
Martel Innovate

20/09/2024

Funded by the European Union

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INPACE: key figures

- **C**oordination and **S**upport **A**ction
- January 2024 - June 2027 (42 months)
- 21 consortium partners
- 13 Asian and European countries
- Funding: Horizon Europe and SERI

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The Consortium

21
Partners

13
Countries

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Context

Why is INPACE important?

1

The **EU aims to strengthen its connection to the Indo-Pacific region** for research, innovation, technology deployment, regulation alignment, and supply chain stability.

2

Promotion of digital technologies being one of the highest priorities, the EU has established Digital Partnerships with Japan (2022), the Republic of Korea (2022) and Singapore (2023), and a Trade and Technology Council (2022) with India.

3

The goal is that society and businesses in both regions **benefit from opportunities in the growing global digital economy**

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Mission

What is INPACE aiming to achieve?

The mission of INPACE is to **support digital partnerships and the Trade and Technology Council** and to contribute to the deepening of the **collaboration between Europe and India, Japan, the Republic of Korea and Singapore** in the domain of digital technologies and their application for the well-being of the citizens in Europe and in the Indo-Pacific region.

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To achieve this mission, INPACE will work on three levels:

Establishing **regular exchanges between leading experts from Europe and the four partner countries** on policies, further developments of key digital technologies, and their implementation and commercialization.

Supporting the **digital policy dialogues on the governmental and institutional level** and the implementation of the Digital Partnerships and the Trade and Technology Council.

Informing and involving a large community of stakeholders in Europe and in the partner countries into the **dialogues via online and in-presence events and via the INPACE Community Platform**.

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Thematic Working Groups

INPACE organises exchanges through Thematic Working Groups that bring together **experts from industry, associations, government institutions and the research communities** from the partner countries and Europe.

Their mission is to foster **joint research and innovation, business collaboration, market opening, policies collaboration**, and to support the implementation of the Digital Partnerships and the Trade and Technology Council with the partner countries.

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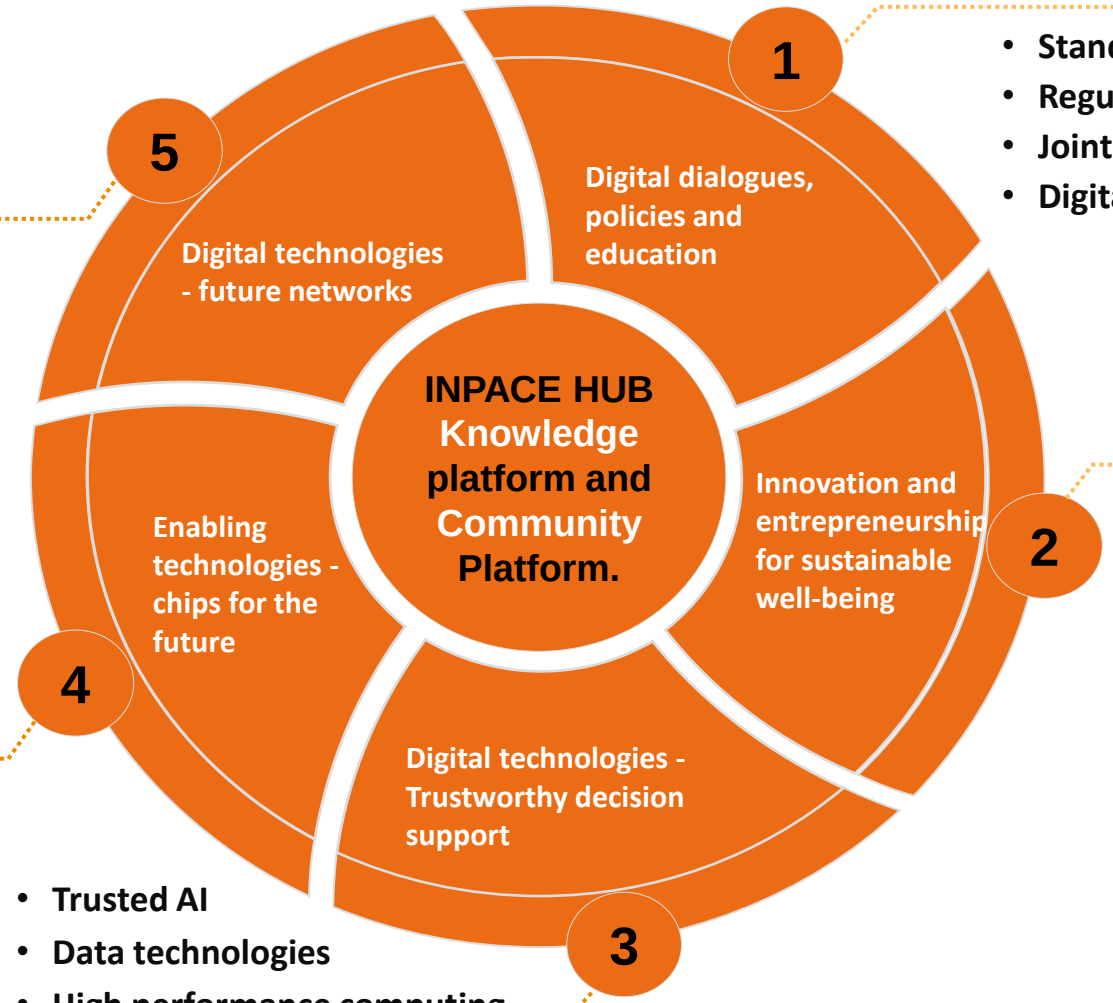
Thematic Working Groups & Clusters



- Standardisation
- Regulation, legislation, policy
- Joint (bidirectional) Programming
- Digital education and skills

- Smart cities and communities
- Digitalization for sustainable ecosystems
- Digitalization of industry, infrastructures and services

- Trusted AI
- Data technologies
- High performance computing

- Advanced computing
- Advanced functionalities
- Ground-breaking technologies

- 5G and beyond
- Internet of trust and security
- Cloud, edge, IoT

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TWG16 Cloud Edge IoT

- INPACE TWG16 coordination
  - Giacomo Inches – Martel Innovate
  - Gilles Orazi – EGM

- Experts
  - Antonio Kung, TRIALOG (Europe)
  - Maria Barros Weiss, IONOS (Europe)
  - Alberto P. Martí, OpenNebula (Europe)
  - Giovanni Frattini, Engineering, (Europe)
  - Debabrata Das IIIT, Bangalore, (India)
  - Jae Jin Ko, Korea Electronics Technology Institute (KETI), (South Korea)
  - Hidenori Nakazato Waseda University, Shinjuku (Japan)
  - _____, _____ (Singapour)
  - *JeongGil Ko, Yonsei University (South Korea)*
  - *Andrew Adams, Meiji University (Japan)*

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Indo-Pacific-European Hub for Digital Partnerships

Thank you

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Project funded by

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

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Trustworthy and Resilient Decentralised Intelligence for Edge Systems

João Leitão
NOVA University of Lisbon

NexusForum.Eu
Brussels, September 2024

Goal and Ambition

TaRDIS aims at simplifying the development, operation, and resilience of emerging Swarm applications being a driver for innovation.

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Goal and Ambition

TaRDIS aims at simplifying the development, operation, and resilience of emerging Swarm applications being a driver for innovation.

A Swarm is a distributed system composed of many, potentially, heterogeneous (hardware and software) nodes that cooperate in a highly autonomous way to achieve a common goal.

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Goal and Ambition

TaRDIS aims at simplifying the development, operation, and resilience of emerging Swarm applications being a driver for innovation.

A Swarm is a distributed system composed of many, potentially, heterogeneous (hardware and software)[1] nodes that cooperate in a highly autonomous way to achieve a common goal.

[1] This not only implies that devices in the swarm might have different amounts of computational resources, but they might even have different architectures, capabilities, or roles. The application logic running on each device might be different because of that.

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Goal and Ambition

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A Swarm is a distributed system composed of many, potentially, heterogeneous (hardware and software) nodes that cooperate in a highly autonomous[2] way to achieve a common goal.

[2] Implies avoiding centralised control components and human intervention to manage the system operating and to allow it to evolve (e.g., grow in number of node in the swarm).

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Motivated by real world use-cases

Renewable Energy Communities

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Motivated by real world use-cases

Renewable Energy Communities

Smart buildings/spaces

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Motivated by real world use-cases

Renewable Energy Communities

Smart buildings/spaces

Satellite constellations

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Motivated by real world use-cases

Renewable Energy Communities

Smart buildings/spaces

Satellite constellations

Smart factories

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Vision and Strategy

TaRDIS aims at addressing the challenges of emergent large-scale swarm systems by combining a holistic approach tackling challenges at different points of the life-cycle of swarms, from development to operation:

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Vision and Strategy

TaRDIS aims at addressing the challenges of emergent large-scale swarm systems by combining a holistic approach tackling challenges at different points of the life-cycle of swarms, from development to operation:

- Development methodologies and tools.
- Verification tools to ensure correctness by design.
- Frameworks and libraries providing powerful abstractions.
- Machine-learning functionalities, including support for autonomous management at runtime.

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Key Result: The Babel Ecosystem

Babel is a java framework that simplifies the development of distributed abstractions (i.e., protocols) and systems.

- Event driven programming model.
- Leverages java inheritance to enforce a programming discipline.
- Shields developers from complex concurrency issues.
- Abstracts low level aspects in system and protocol development.

Babel: A Framework for Developing Performant and Dependable Distributed Protocols.
Pedro Fouto, Pedro Ákos Costa, Nuno Preguiça, and João Leitão.
Proceedings of the 41st International Symposium on Reliable Distributed Systems (SRDS 2022), September 19-22, Vienna, Austria, 2022.

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Key Result: The Babel Ecosystem

Within the context of TaRDIS we have evolved Babel to support additional execution environments and to provide fundamental features for support scalable and resilient swarms.

Key Features:

- Self-Configuration
- Self-Management
- Security

Babel-Swarm

Babel-Android

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Key Features:

- Self-Configuration
- Self-Management
- Security

All open source!!

Babel-Swarm

Babel-Android

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The Consortium

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Funded by the European Union

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Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

TaRDIS project is funded by the EU's Horizon Europe programme under Grant Agreement number 101093006. This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

MYRTUS

MYRTUS, a Computing Continuum Ecosystem Leveraging AI Technologies

Alessandra Bagnato

Alessandra.bagnato@docaposte.fr

HORIZON EUROPE

European Commission

SOFTEAM
UNE MARQUE DE DOCAPOSTE

Tech & Trust by DOCAPOSTE

MYRTUS

Multi-layer 360° d**Y**namic orchestrion and interope**R**able design environmen**T** for compute-contin**U**um **S**ystems

36 months project, Started on the 1st January 20 24. The MYRTUS consortium comprises 8 countries and 14 partners

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European Commission

Consortium

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sideLabs

POLITÉCNICA

KING'S College LONDON

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aruba.it KUBE

Objectives

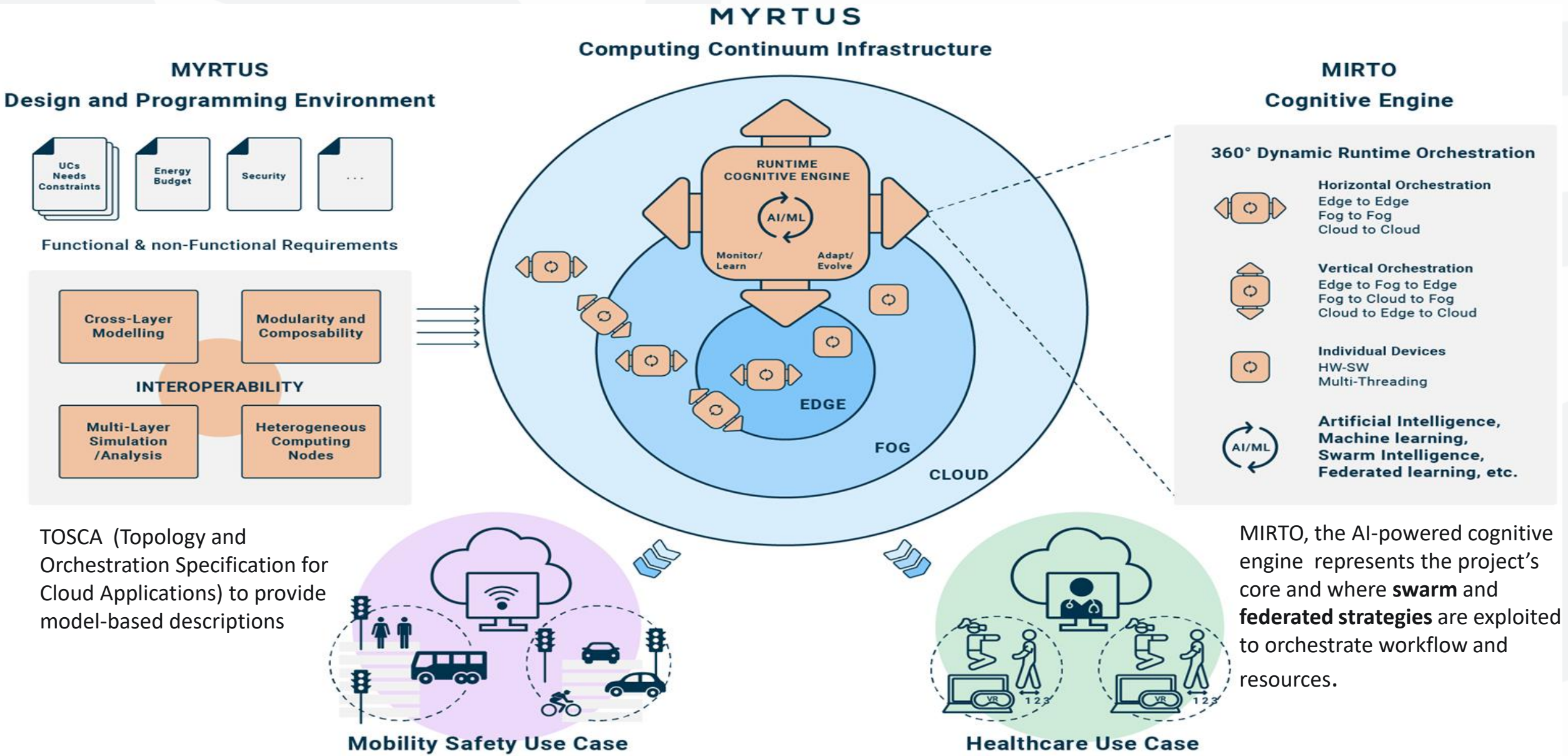
T.OBJ1
MYRTUS defines a **reference infrastructure** where a **diversity** of **fog-level** and **edge-level** devices converge with the **cloud** to form a **computing continuum** capable of addressing the needs of complex and dynamic systems.

T.OBJ2
MYRTUS features a 360° **dynamic runtime orchestration scheme**, embodied within the **MIRTO**
AI-powered cognitive engine, to foster performance and energy optimization, while preserving security and trust.

T.OBJ3
MYRTUS provides a **reference design and programming environment** for continuum computing systems, featuring **interoperable support** for **cross-layer modelling**, **threat analysis**, **design space exploration**, **application modelling**, **components synthesis**, and **code generation**.

Ambition in a nutshell

HORIZON-CL4-2023-DATA-01-04 - Cognitive Computing Continuum: Intelligence and automation for more efficient data processing (AI, data and robotics partnership) (RIA)



TOSCA (Topology and Orchestration Specification for Cloud Applications) to provide model-based descriptions

MIRTO, the AI-powered cognitive engine represents the project's core and where **swarm** and **federated strategies** are exploited to orchestrate workflow and resources.

MYRTUS has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101135183.

TRUSTWORTHY, COGNITIVE AND AI-DRIVEN COLLABORATIVE ASSOCIATIONS OF IOT DEVICES AND EDGE RESOURCES FOR DATA PROCESSING

Call: HORIZON-CL4-2023-DATA-01-04: Cognitive Computing Continuum: Intelligence and automation for more efficient data processing (AI, data and robotics partnership)

Duration: 01 February 2024 - 31 January 2027

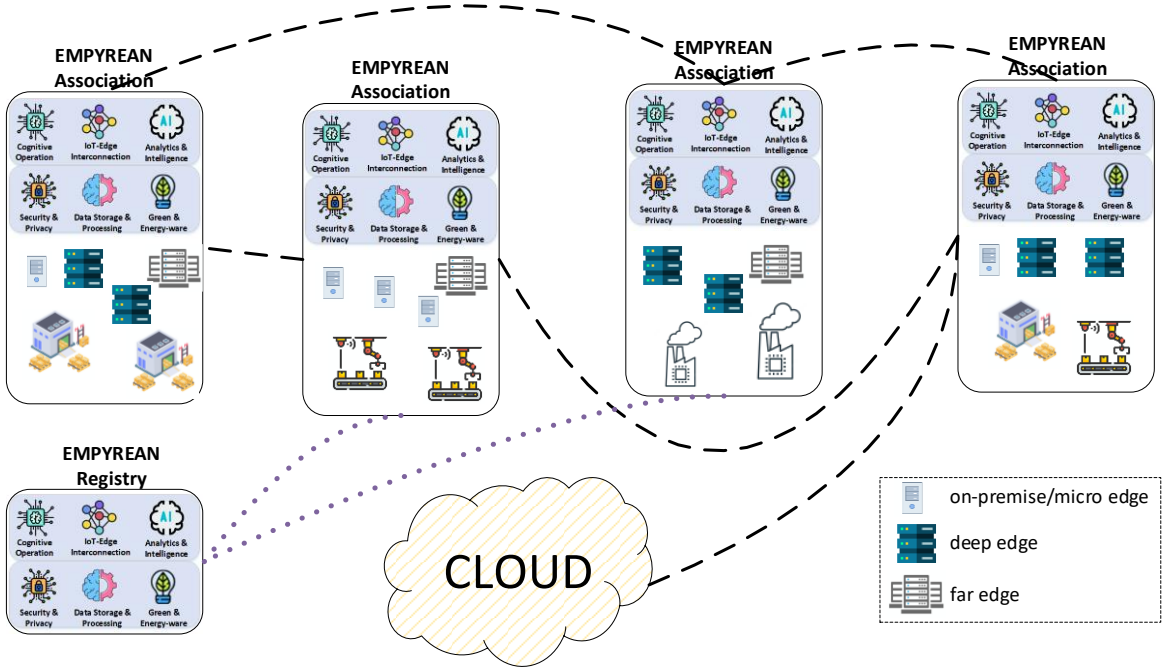
Project Coordinator: Institute of Communication and Computer Systems – ICCS

Project ID: 101136024

https://empyrean-horizon.eu https://twitter.com/empyrean_he https://www.linkedin.com/company/empyrean-project/

EMPYREAN – Vision and Concept

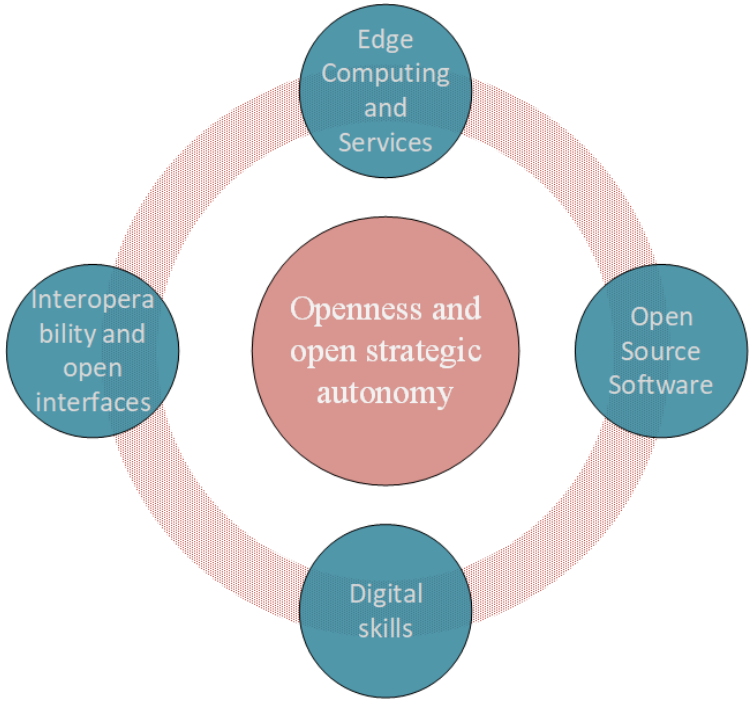
- EMPYREAN envisions a **collaborative** autonomous computing ecosystem over heterogeneous resources, different providers and connectivity types.
- EMPYREAN will build **federations** of collaborative resources, the **Associations**.
- Association provides a secure execution environment, coupled with identity and access mechanisms.
- Associations form the control & management plane, operating in autonomous, cognitive, AI-driven manner.
- Association-based continuum will balance computing tasks and data locally inside an Association as well as between federated Associations.
- EMPYREAN platform will provide:
  - decentralized security & privacy, secure distributed edge storage, IoT-edge interconnection, efficient data processing of ML-workloads, cognitive operation, AI-augmented application development & deployment, energy-aware orchestration



- EMPYREAN includes 3 UCs in: (i) advanced manufacturing, (ii) smart agriculture, (iii) warehouse automation:
  - High-demanding, safety-critical, dynamic, applications that include IoT devices, robots, drones, equipped with cameras and sensors

Expected Impact

- EMPYREAN's Associations will enable European entities, to make their own choices, regarding data processing and storage.
- EMPYREAN’s unique technological advancements and their application in key sectors will contribute towards the realization of Europe’s digital and industry related targets.
- EMPYREAN is committed to promote software interoperability and portability, realizing an EMPYREAN open ecosystem based on Associations.
- EMPYREAN partners will promote the strategic industrial cooperation in AI/ML-based data storage and processing that can benefit the EU industry in the global IoT-edge-cloud service markets.



NEXUS FORUM.EU

CoGNETs
Continuums of Game Nets

The Vision of the Cognitive Computing Continuum: The CoGNETs approach

Presenter: Georgios Spanos
Affiliation: Centre for Research and Technology Hellas
Date: 20/09/2024
Location: Brussels, Belgium

Funded by the European Union

Project funded by
Schweizerische Eidgenossenschaft
Confédération suisse
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Swiss Confederation

Federal Department of Economic Affairs, Education and Research EAER
State Secretariat for Education, Research and Innovation SERI

Grant Agreement No 101135930

Vision

CoGNETs aims to develop a **Middleware Framework** that will empower **IoT**, **Edge**, and **Cloud** devices to autonomously organizing dynamic **IoT-to-Cloud swarm continuums** for optimal data processing and seamless service provisioning

To enable operation of continuums with no fixed orientations shifting to an on-demand opportunistic approach targeting to **“dynamic swarm continuums”**

To promote **“self-organization”** and **“collaborative-learning”** of devices, **Asymmetric Multi-Player Competitive Games**, containing self-organizing “Pricing”, “Bidding”, and “Auctioning” properties, are introduced

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Concept

To fuse such game logic within the individual device and turn it into a cognitive resource, capable to **self-realizing** (or *"Pricing"*) its on-board data and resources, **self-organizing** (or *"Bidding"*) if, and how to utilize them within **common computing spaces** (or *"Auctionings"*), subject to the users' service requests

Swarm continuums can be formed dynamically as results of the game play that will be running as a decentralized optimization process across all devices, and converge to mathematically precise Computing Equilibriums, i.e., *"golden-states"* where all services are maximized, while no data and resource is wasted

The games are designed to sensing and deciding for **additional heterogeneity dynamics** related to **cyber-risks**, **energy consumption**, **system faults**, offering more freedom with respect to the devices' cognition for safeguarding the overall continuum's cyber-resilience, digital-privacy, and energy-efficiency holistically

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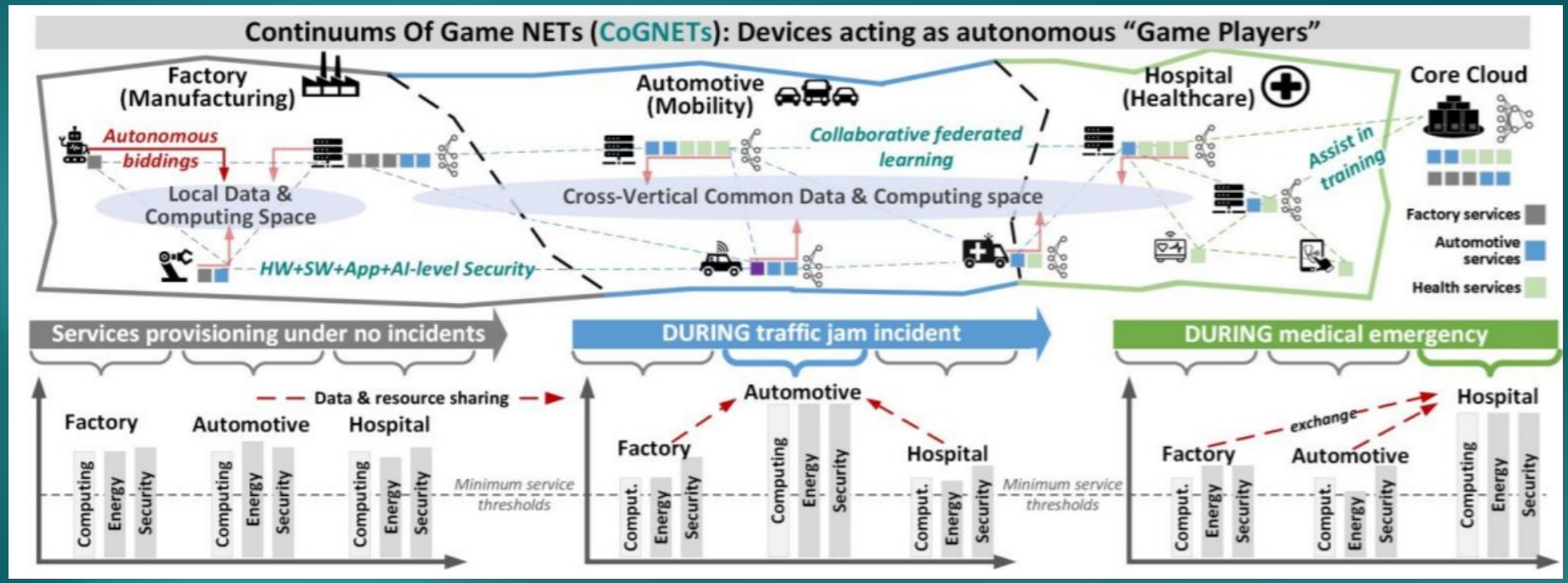
Concept



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Ambition

i. **Novel autonomous design**: Autonomous decision-making abilities to IoTs and Edge devices via **competitive game** strategies using **stochastic analysis** to enable asymmetric decentralizations of the control and reasoning of players

ii. **Future-proof distributed system architecture**: A middleware architecture over **multi-context broker** and **DDAG DLT model** distribution functions with parameters to inject function instructions, thereby lightweighting the node management

iii. **Holistic Computing-vs-Energy-vs- Security optimization**: A **multi-dimensional KPI** trade-offs optimization leading to a new regime of exploiting gains from such diversity

iv. **Pervasive heterogeneity perception via feature-based models**: Heterogeneity models using feature-based techniques to capture each node's resources together with the extent that the node could be target of a successful attack or that it may fail due to defective circuit

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Ambition

v. **Rapid service provisioning via collaborative federated learning**: New **Collaborative Federated Learning** models will be developed, capable to split layers among IoT/Edge devices for rapid **responsiveness** and use the Cloud for training **accuracy**

vi. **End-to-end security embedded in all actions**: New ***"swarm-mode end-to-end security"*** solutions will be adopted, combining both system and application-level security to strengthen cyber resilience and trustworthiness in highly distributed applications

vii. **Efficient data interoperability, sovereignty, and trust based on Open Standards**: **Open standard ETSI NGSI-LD APIs** for real-time access to data, **FIWARE Smart Data Models** for effective data interoperability and exchange and decentralized components for data exchanges recording and storage in distributed ledgers will be adopted, to create service points accessing data across CEI continuum and to increase trustworthiness

viii. **Immersive productivity and Ethics compliance**: A new layer will be introduced to use data locally making user-side applications intelligent, secure, and responsive and a human oriented **IoT-to-Cloud solution** that needs **human-in-the-loop** features will be developed

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CoGNETs
Continuums of Game Nets

Thank you!

GET IN TOUCH

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CoGNETs

The CoGNETs project received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No 101135930. This work has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

Funded by
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Virtual Environment and Tool-boxing for Trustworthy Development of RISC-V based Cloud Services

Ramon Canal, UPC (project coordinator)

NexusForum2024 Summit, September 19th, 2024
Brussels (Belgium)

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the HaDEA. Neither the European Union nor the granting authority can be held responsible for them. Project number: 101093062. https://www.vitamin-v.eu

Digital Autonomy starts from the hardware

Dell warns of hardware Trojan

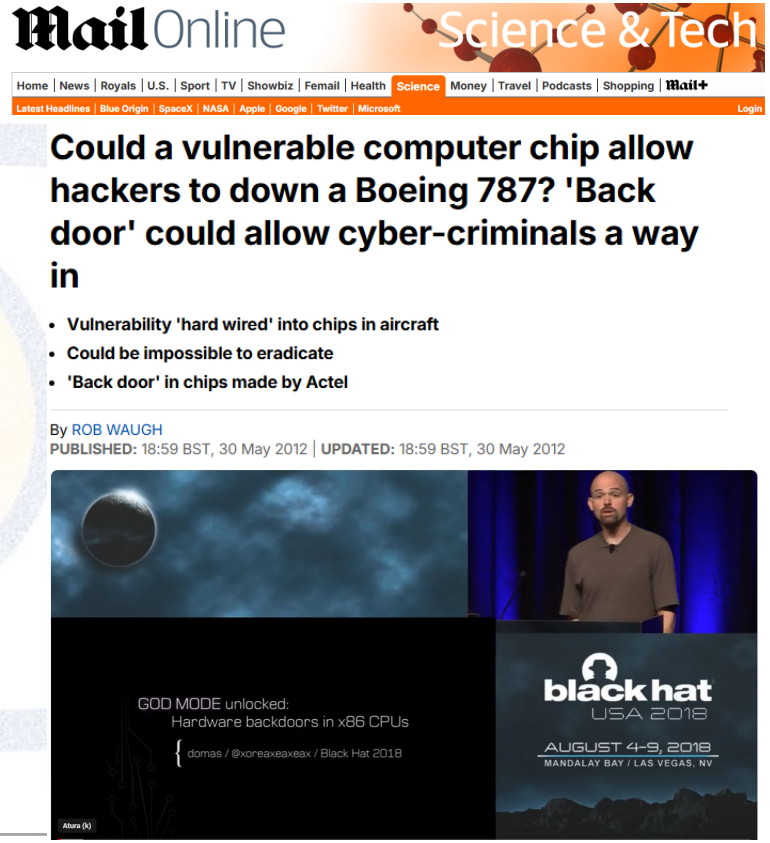
Computer maker Dell is warning that some of its server motherboards have been delivered to customers carrying an unwanted extra: computer malware. It could be confirmation that the "hardware Trojans" … are indeed a real threat .

- Homeland Security News Wire July 2010

F.B.I. Says the Military Had Bogus Computer Gear

…the .. sinister specter of an electronic Trojan horse, lurking in the circuitry of a computer or a network router and allowing attackers clandestine access or control, was raised .. by the FBI and the Pentagon.
The new law enforcement and national security concerns were prompted by Operation CISCO Raider, which has led to 15 criminal cases involving counterfeit products bought in part by military agencies, military contractors and electric power companies in the United States.

-The New York Times, May 2008



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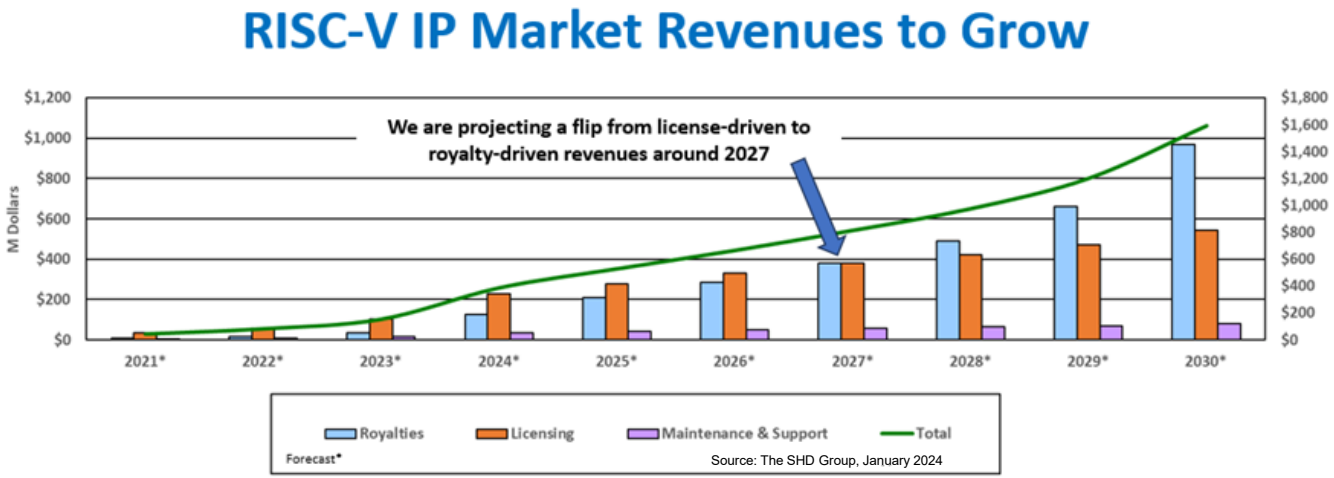
RISC-V an open standard ISA

A royalty-free ISA for hardware-vendor independent systems



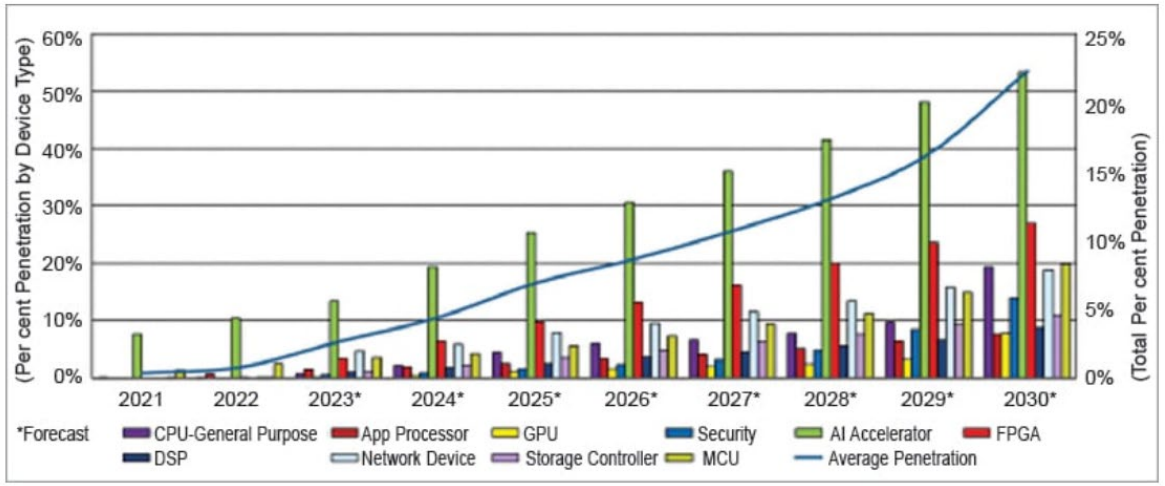


Fig. 4: Penetration of RISC-V SoCs by revenue of device types, 2021-2030 (Source: The SHD Group, January 2024)

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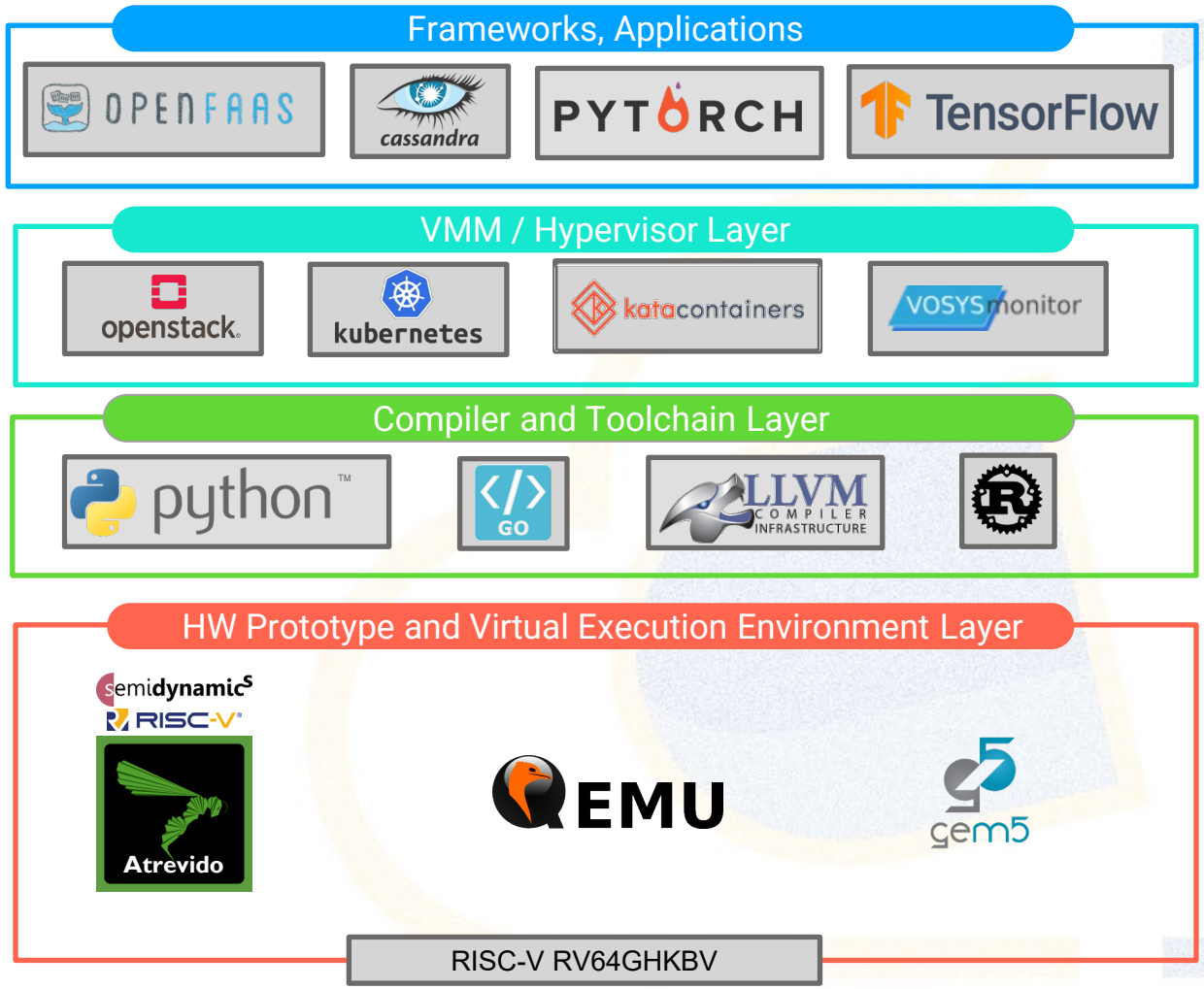

Open-Source Contributions to main repositories

1. OpenFaas
2. Cassandra
3. Pytorch
4. Tensorflow
5. OpenStack
6. Kubernetes
7. KataContainers
8. LLVM
9. Python, Go
10. Rust
11. QEMU
12. Gem5
13. HW/SW Security Toolset

Commercial exploitation

1. Semidynamic's Atrevido softcore
2. Zeropoint Memory Compression IP
3. VOSYS VOSYSmonitor solution

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VITAMIN-V

Virtual Environment and Tool-boxing for Trustworthy Development of RISC-V based Cloud Services

https://www.vitamin-v.eu
@VitaminVProject

Thanks!

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Virtual Open Systems

ZeroPoint

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silicon design and verification services

ICCS

EXAPSYS
Exascale Performance Systems

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