

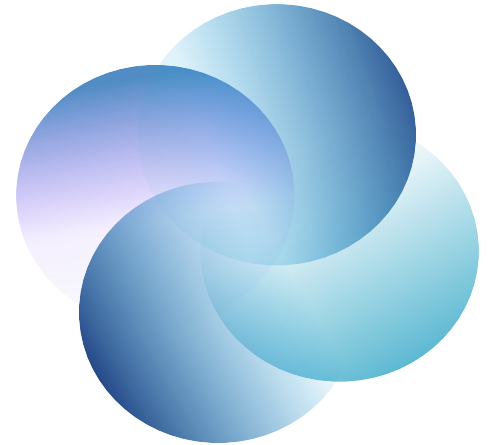


ICOS

Towards a functional continuum operating system

Swarms projects workshop

Francesco D'Andria (ATOS)
(September, 5th 2024)



Funded by
the European Union

ICOS: Towards a functional continuum operating system

<https://www.icos-project.eu/>

ICOS Mission:

1. The ICOS project aims to design, develop, and validate a **meta-operating system** for a computing continuum.
2. This continuum integrates resources from the **Internet of Things**, edge computing, and cloud computing.

Challenges Addressed:

1. **Device Volatility and Heterogeneity**: Managing diverse devices with varying capabilities.
2. **Continuum Infrastructure Virtualization**: Creating a seamless infrastructure across edge and cloud.
3. **Optimized Service Execution and Performance**: Ensuring efficient and scalable service delivery.
4. **Resource Consumption**: Efficiently utilizing computing resources.

Project Information

ICOS

Grant agreement ID: 101070177

DOI

[10.3030/101070177](https://doi.org/10.3030/101070177)

EC signature date

21 June 2022

Start date

1 September 2022

End date

31 August 2025

Funded under

Digital, Industry and Space

Total cost

€ 10 997 675,00

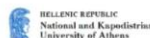
EU contribution

€ 10 997 675,00

Coordinated by

ATOS SPAIN SA

 Spain



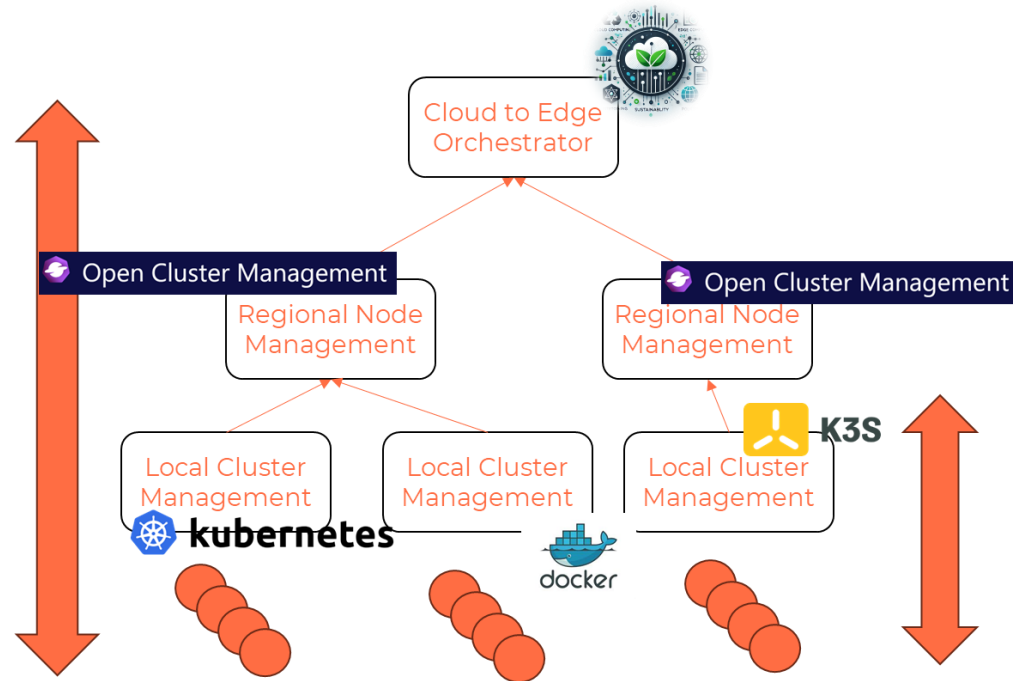
What is, What isn't

What ICOS is:

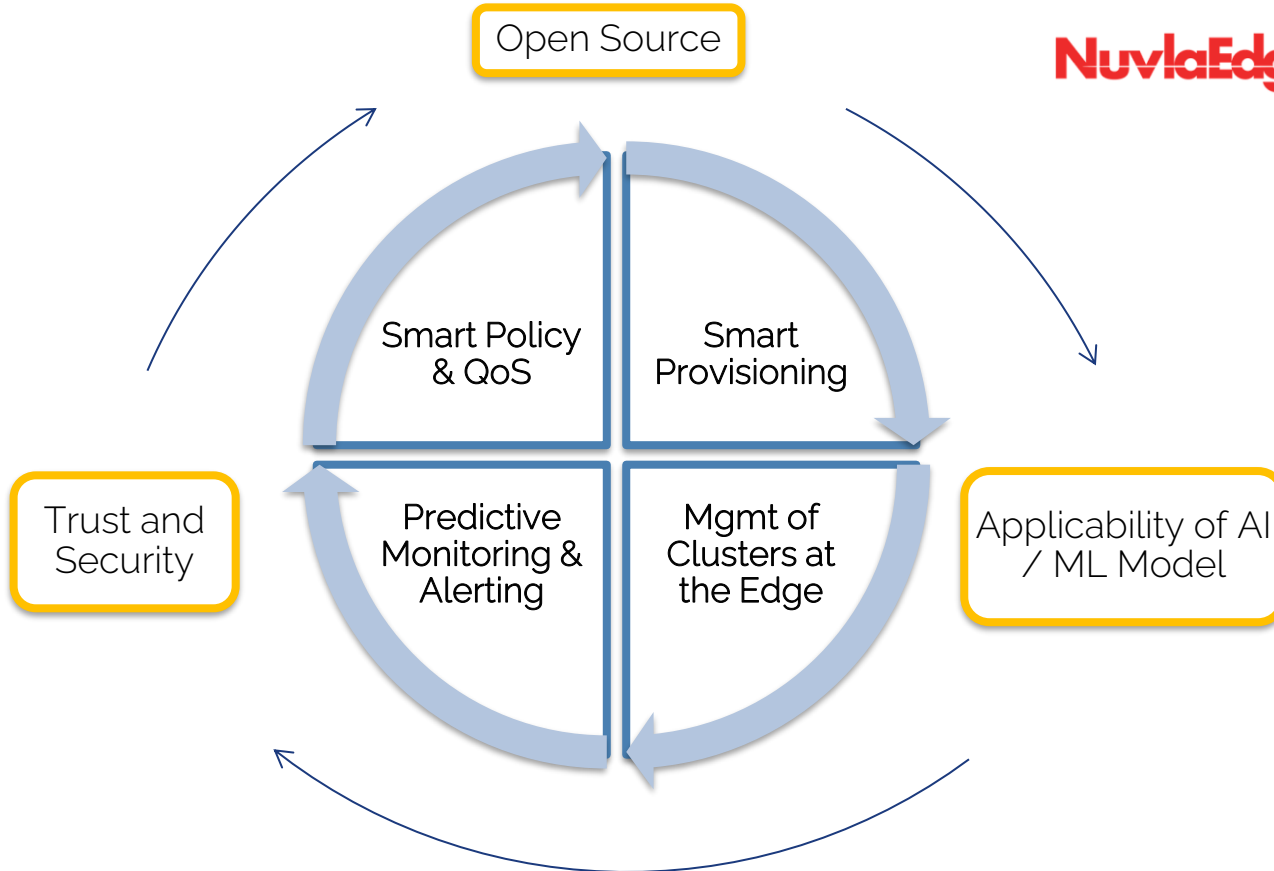
- It is a toolkit that provides a tech agnostic interface to abstract and manage the distributed and dissimilar resources (computational, data provider, etc) within the Cloud – Edge – IoT Continuum.
- It eases the matching, the deployment and the management of distributed business applications through the Cloud – Edge – IoT continuum.

What ICOS isn't:

- It isn't a XaaS (IaaS, PaaS, etc) system.
- It doesn't own/doesn't have the responsibility of the resources (computational, data provider, etc) it manages

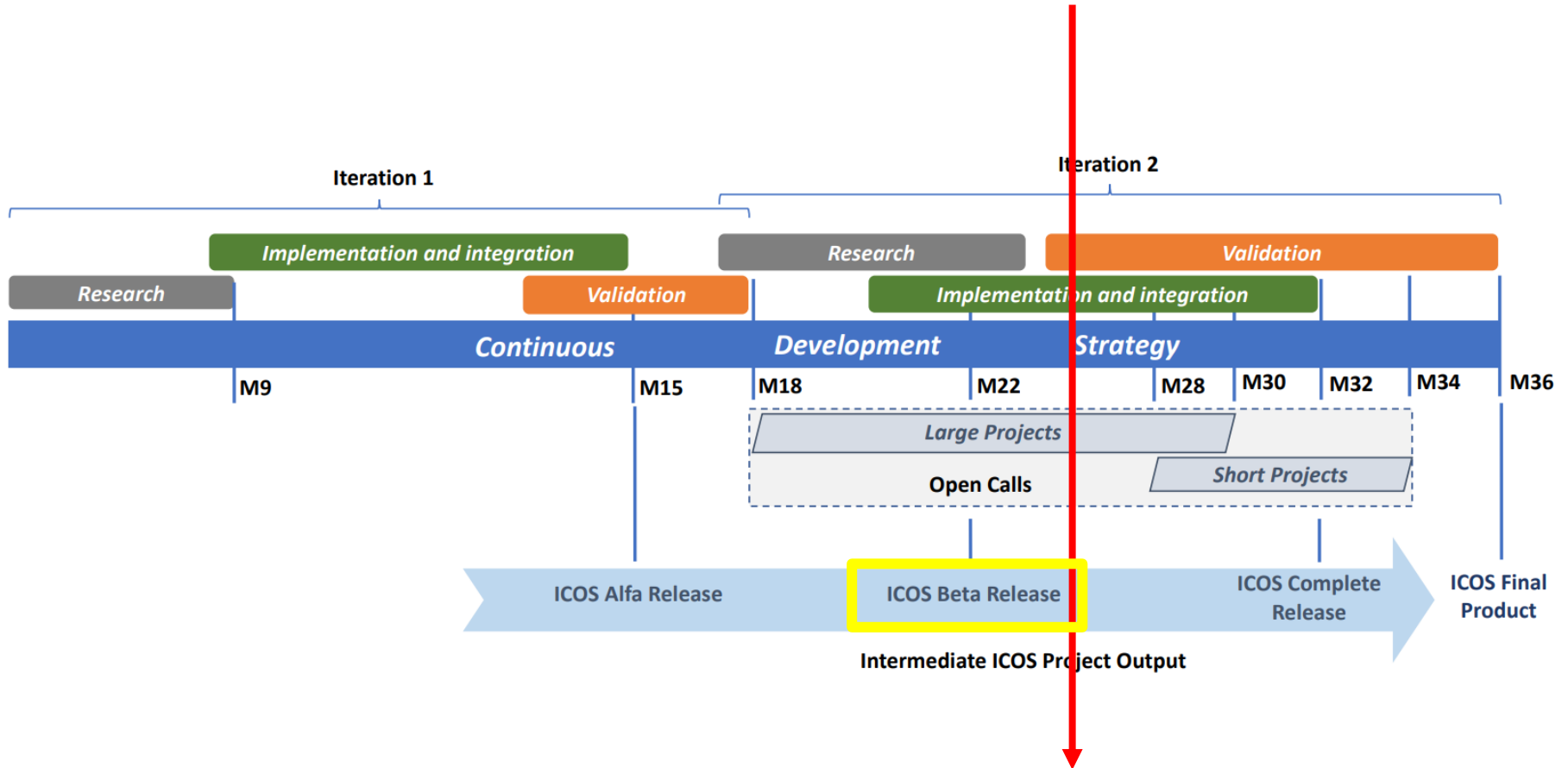


ICOS: A cloud to edge to IoT ecosystem orchestrator



Where we are....

Here where we are....



[About ICOS](#)[Objectives](#)[Consortium](#)[Deliverables](#)[Promotional
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Towards a functional continuum system

The unstoppable proliferation of novel computing and sensing device technologies, and the ever-growing demand for data-intensive applications in the edge and cloud, are driving the next wave of transformation in computing systems architecture. The resulting paradigm shift in computing is centered around dynamic, intelligent and yet seamless interconnection of IoT, edge and cloud resources in one computing system, to form a continuum.

[About Continuum](#)

WP5 - Integration towards the ICOS Platform

D5.1 - ICOS Alpha Release

This document lays out details about the ICOS alpha release; the result of joint work under the umbrella of work package 5 which also allows for the presentation of the work that happened so far within the technical work packages 2-4. The main goal is to describe the software that is released for this first iteration, how it can be deployed, how the components interact with each other, and which functionalities are currently included as well as the resulting plans for the remainder of the project. This provides the reader with an overview on what can be expected from the alpha release and how.

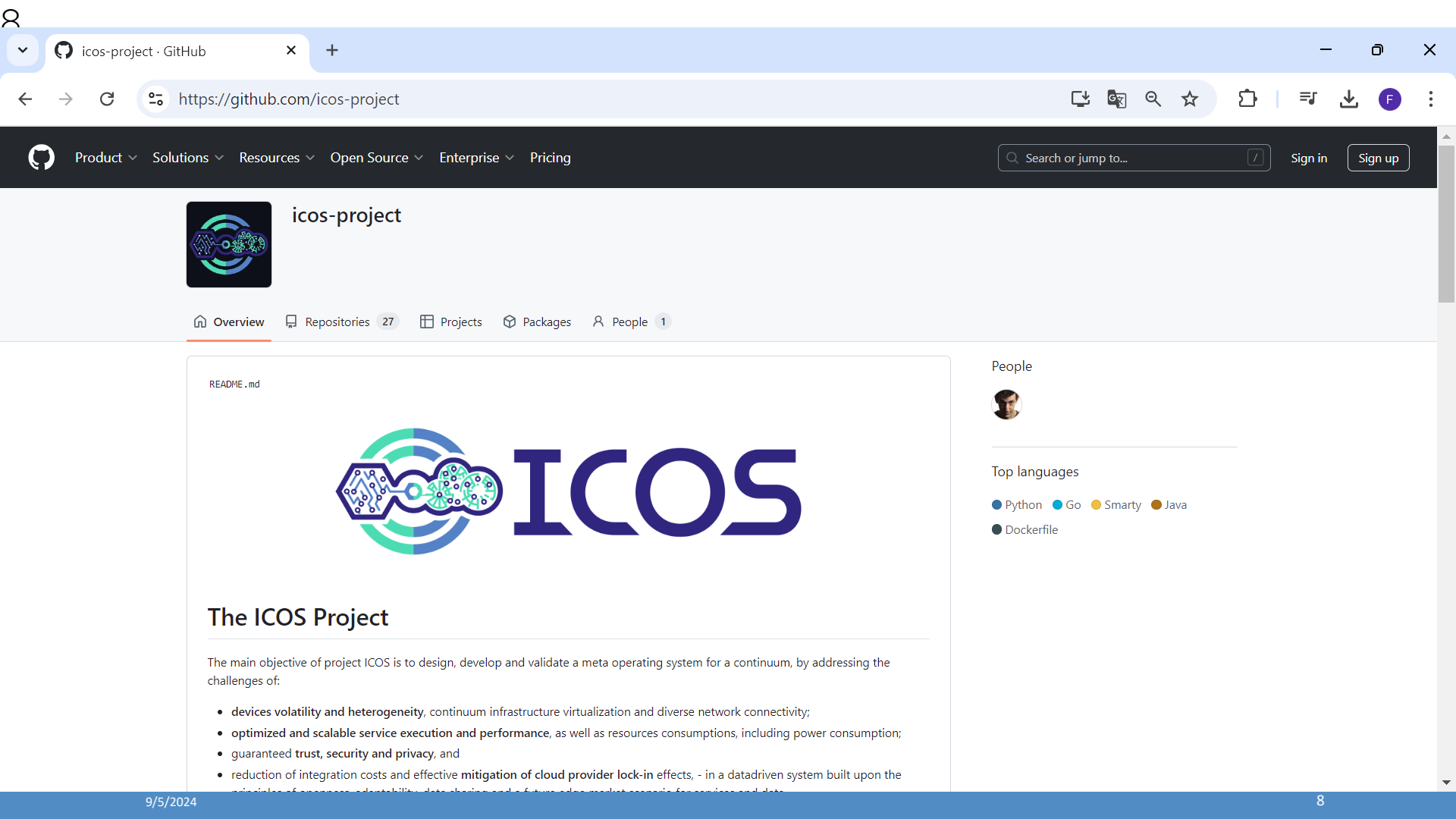
[View Document](#)

D5.2 - ICOS Beta Release

This document describes and accompanies the second release of the ICOS software: the ICOS Beta release. The release has been delivered at project's month 22, seven months after the first release ICOS Alpha. The ICOS Beta release was developed and integrated following the system architecture and the implementation plan, and incorporating changes implemented from the feedback received from the first evaluation of ICOS provided by the project's Use Cases and the first project's review.

[View Document](#)





icos-project

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README.md



The ICOS Project

The main objective of project ICOS is to design, develop and validate a meta operating system for a continuum, by addressing the challenges of:

- **devices volatility and heterogeneity**, continuum infrastructure virtualization and diverse network connectivity;
- **optimized and scalable service execution and performance**, as well as resources consumptions, including power consumption;
- **guaranteed trust, security and privacy**, and
- **reduction of integration costs and effective mitigation of cloud provider lock-in effects**, - in a datadriven system built upon the principles of openness, adaptability, data sharing and software-defined market economic for services and data.

People



Top languages

- Python
- Go
- Smarty
- Java
- Dockerfile

ICOS Beta Release



Open Calls ▾

Technology ▾

Project ▾

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Architecture

Use Cases

Documentation



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About Continuum



Objectives

ICOS Meta OS

https://www.icos-project.eu/docs/#welcome-to-the-icos-meta-os-documentation-website

ICOS Home

GUIDES

Administration

Learn on how to create and manage an ICOS System.

Developer

Learn on how use and configure in details single ICOS components and how to programmatically integrate and/or extend them.

It includes a reference for all commands and APIs exposed by ICOS.

User

Learn on how to use ICOS Meta OS for running applications.

LEARN

Concepts

A theoretical introduction to the ICOS Meta OS introducing the architecture, the main functionalities and the main components.

Glossary

Learn the main words using in ICOS Meta OS.

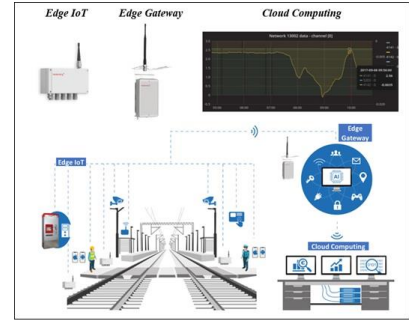
July 4, 2024 June 17, 2024 Gabriele Giammatteo, MariaAntoniettaDiGirolamo

https://www.icos-project.eu/docs/Developer/9/5/2024

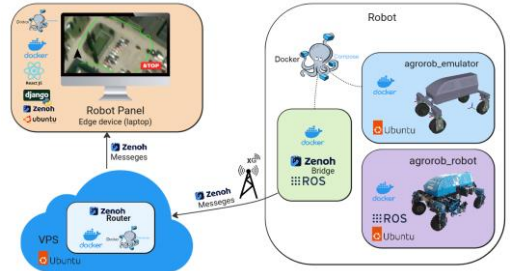
ICOS 4 Use Cases

Railway Structural Alert Monitoring System

improving wireless networking protocols, efficient and optimal utilization of the available edge-to-cloud resources



Agriculture Operational Robotic Platform



Reduction of decision-making latency, improved AI models, increased system availability, and predictive maintenance.

In-car Advanced Infotainment & Multimedia Mng system



Cloud - Persistence Layer / Big Analytics



Edge Node: Rendering / Small Analytics / Data from IoT Devices

In-Car Edge Node: Rendering / Small Analytics / Data from IoT Devices

Energy Management and Decision Support system

Ensuring data protection and security, providing customized energy solutions, and ensuring real-time solutions in areas of poor connectivity.



ICOS 1st Open Call Use Cases

Large and heterogeneous scenarios with massive deployment of mobile (far) edge/IoT devices

GridSync

IoT solution (Linc) for real-time, scalable monitoring of transformers and grid networks - tracks different parameters, with which feeds into **AI-Energy's algorithms**, data pre-processed by Linc's edge devices for real-time analytics.



Pre-processed data



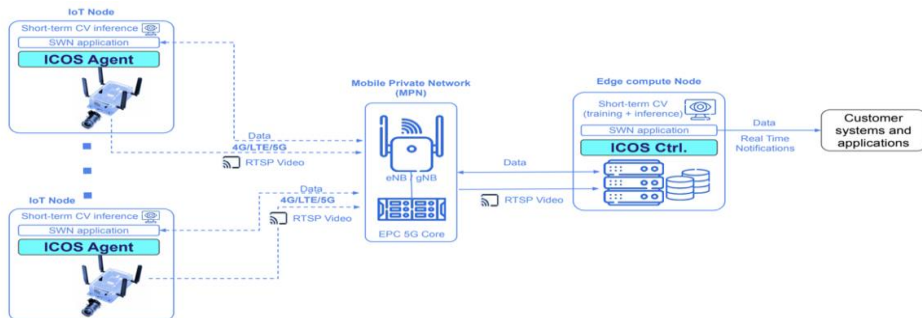
AI-Energy's algorithms

ICOSmart

Kentyou and **Data in Motion** will build the base for an integrated mobility hypervisor that will monitor various events occurring in the **road infrastructure**.



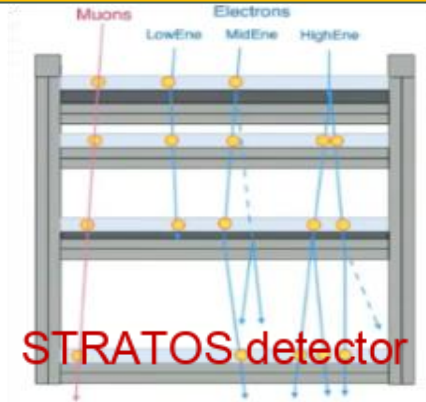
Critical scenarios demanding for distributed execution while supporting strong security/privacy guarantees.



The SafeWorkNet (SWN)

Inerco and **Secmoti** will deploy an innovative digital occupational safety and health (OSH) monitoring system based on a 5G network with machine vision capabilities.

Development of a distributed network of sensors that make use of the computing capabilities of the cloud to fine-tune each one of the sensors to its specific domain.



Distributed Cosmic Ray Observatory Continuum

Logicmelt and **Hidronav Technologies** aim to create a network of next generation sensors based on cosmic rays detectors to generate unprecedented data for **Climate** and **Space Weather** applications in real time.

Real-time monitoring, and control through distributed edge decision-making and alerts generation.



SHMart4Bridges

SolutiONN and **DCube engineering** aim to apply the ICOS framework to a bridge Structural Health Monitoring (SHM) problem stemming from the Servia High Bridge in Greece.

ICOS 2nd Open Call

KEY OBJECTIVE: Demonstrate the project outcomes in key relevant scenarios.

ICOS validation in key industrial and societal applications (Use Cases), which in a near future will require more power at the edge.

9 verticals will be validated to prove the added value that Use Cases (End Users) can get from using the ICOS solution. The goal is to prove that thanks to ICOS, Use Cases can improve:

- Improve service availability between 10% and 20%
- Reduce delay by 10% (e.g., average time to response for the target application),
- Reduce cyber-security threats by 10%.

APPLY BY 30th September: <https://icos2.fundingbox.com>



Towards a functional continuum operating system

For more information please contact:
<email address>

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



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