COLLABORATIVE INNOVATION DAY
4th October 2022 | Virtual Event

iNGENIOUS: Next-Generation IoT Solutions for the Universal Supply Chain

Nuria Molner
Universitat Politècnica de València

ORGANIZED BY:

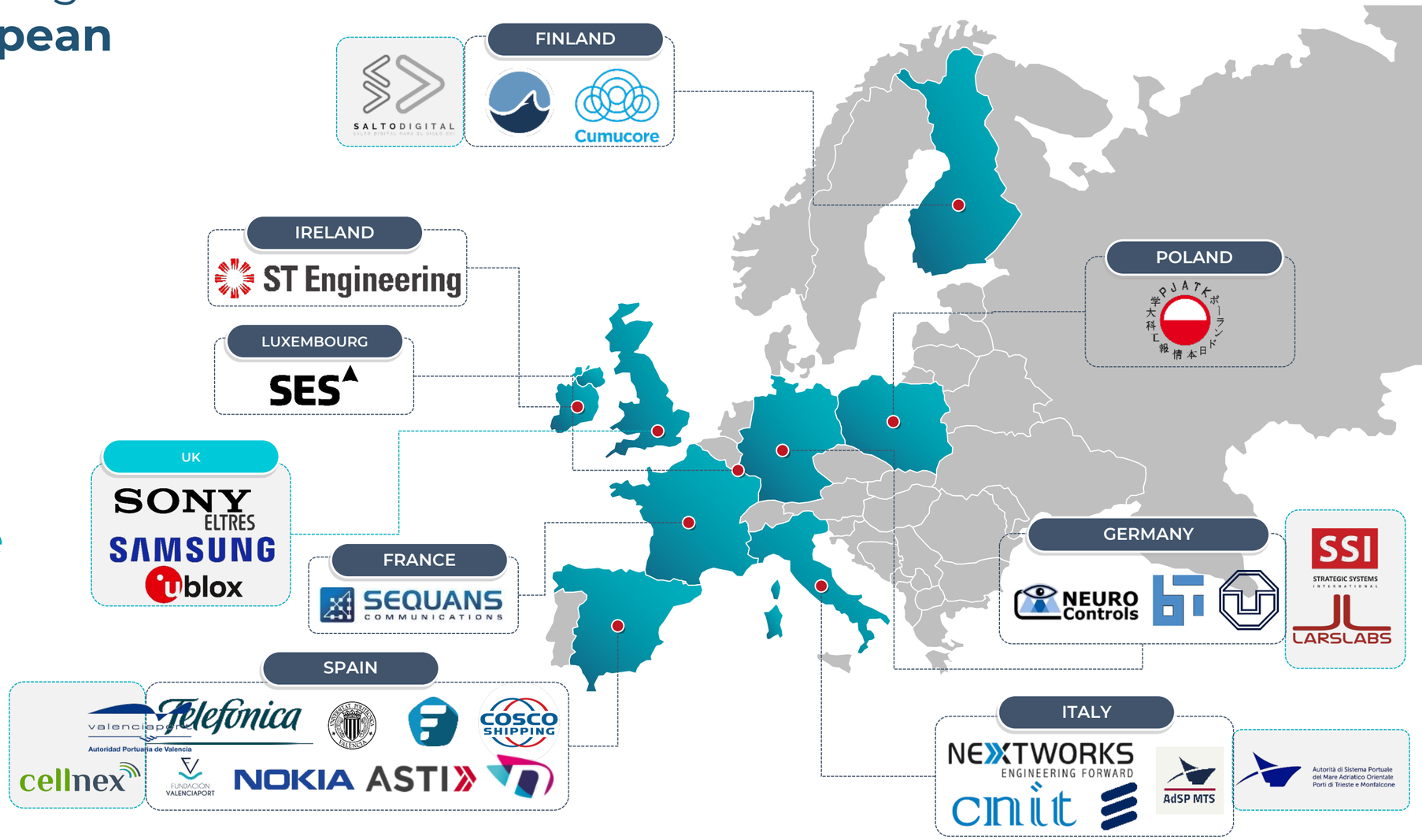
5GLOGINNOV alice | Alliance for Logistics Innovation through Collaboration in Europe

Co-funded by the European Union

1. Overview

21 organisations coming from **8** different **European countries**

An external **Advisory Board** formed by **9 organisations** will **provide** wider **feedback** from industrial and communications side



2. Ambition & Use Cases

> ***iNGENIOUS aims to design and evaluate the NG-IoT solution***, *with a particular emphasis on* **5G** *and the development of* **Edge** *and* **Cloud** *computing extensions for IoT in addition to providing smart networking and data management solutions with AI/ML.*

Next Generation Automation:

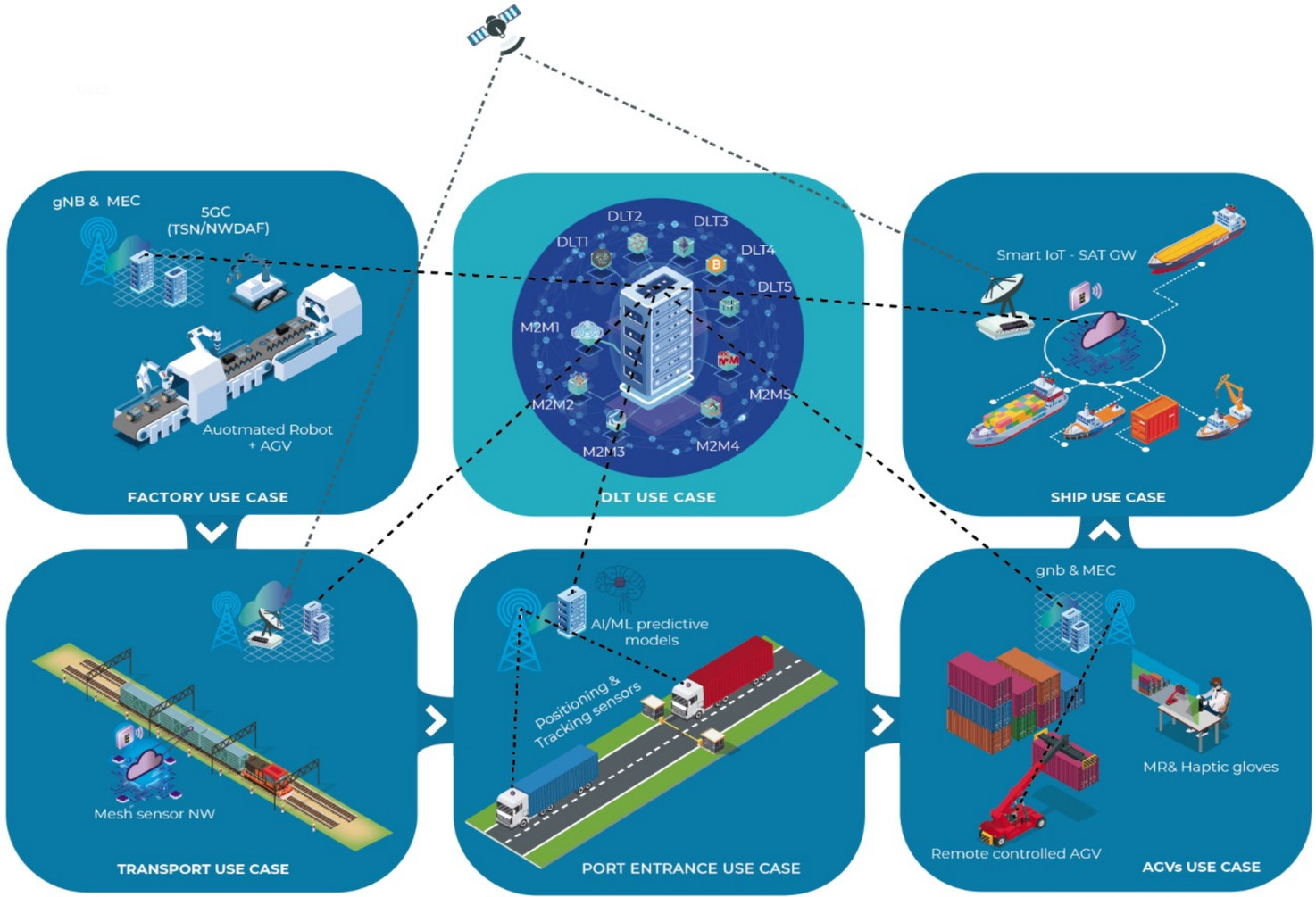
- **Factory Use Case**
- **AGVs Use Case**

Advanced wide area tracking:

- **Transport Use Case**
- **Ship Use Case**

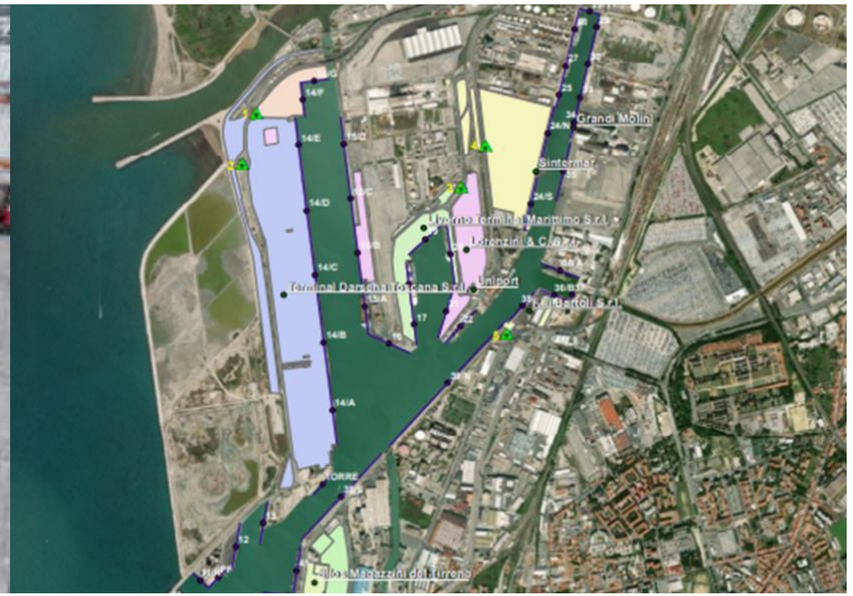
Smart information flows:

- **Port Entrance Use Case**
- **DLT Use Case**



3. iNGENIOUS testbeds

- The Port of Valencia (Spain)
- COSCO Shipping Lines boat (international waters)
- The Port of Livorno (Italy)
- ASTI Mobile Robotics (now ABB) factory (Spain)

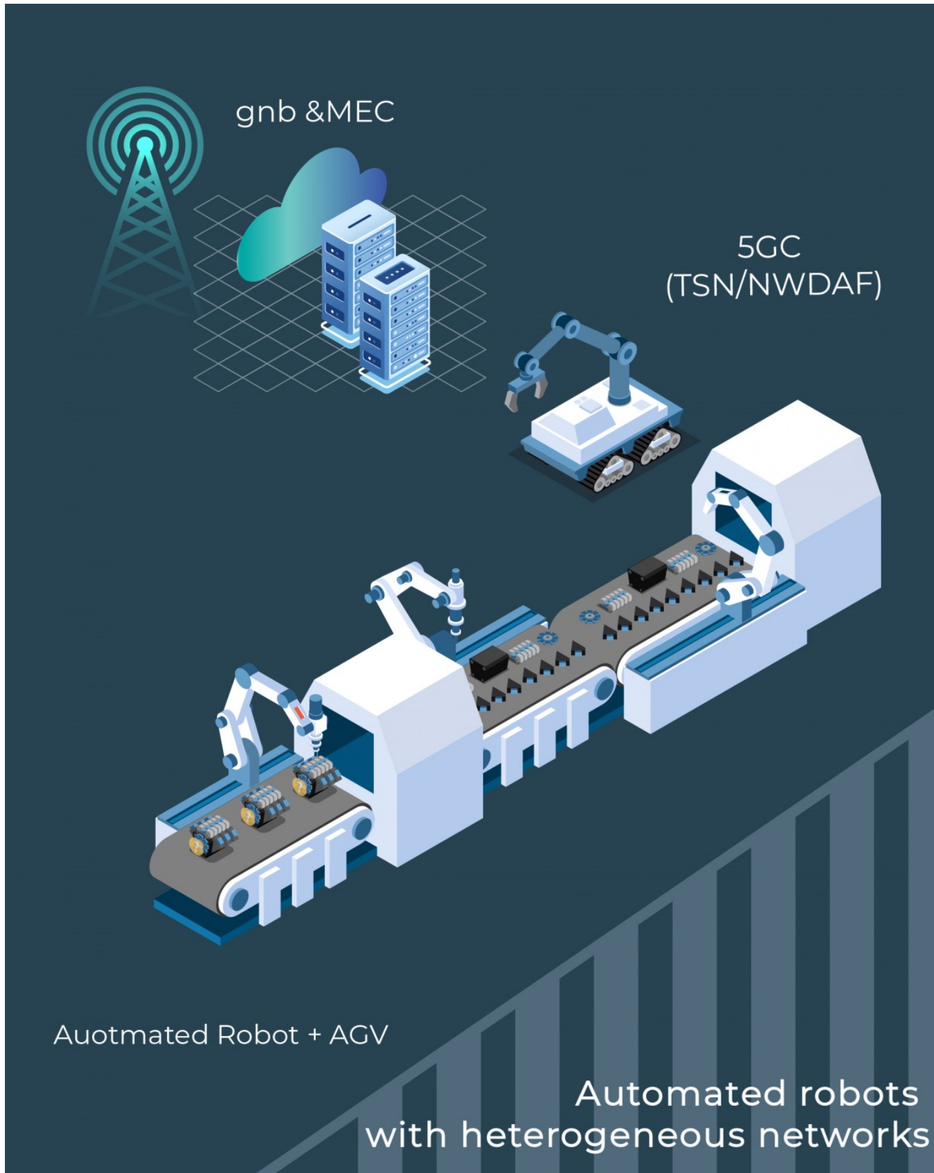


4. iNGENIOUS Use Cases

Factory

AUTOMATED ROBOTS WITH HETEROGENEOUS NETWORKS

Foresees the use of 5G-enabled multi-task **automated robots** in future **smart factory** production lines or warehouses, targeting the **interoperability** of **wireless** and **wired** environments and the tactile internet where sensors and actuators synchronously work with latencies of few milliseconds.



4. iNGENIOUS Use Cases

Factory

ASTI factory Testbed

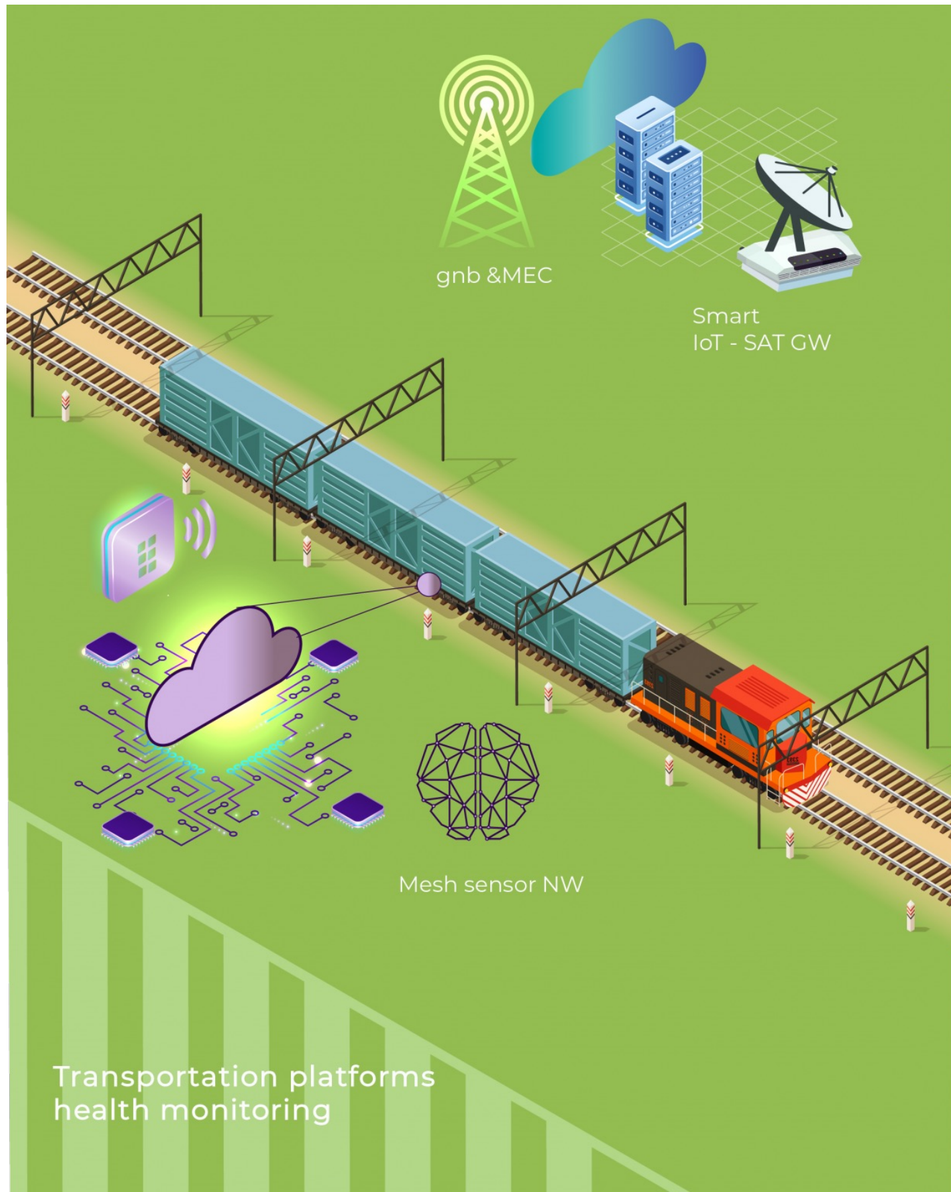
- **Objective:** to **interconnect** varieties of **sensors** and **actuators** to a centralized controller running on the **edge**.
- **Demo** with a **robotic arm equipped with a 3D sensor camera** to perform an inspection operation over an AGV.
- The robotic arm and the AGV will be synchronized thanks to the 5G network.

4. iNGENIOUS Use Cases

Transport

TRANSPORTATION PLATFORM HEALTH MONITORING

Pursues the **asset health tracking** in order to decrease operational costs and increase asset availability with new data-based service provided by **low-power edge distributed network** and intelligent sensor modules installed in the transportation platforms.

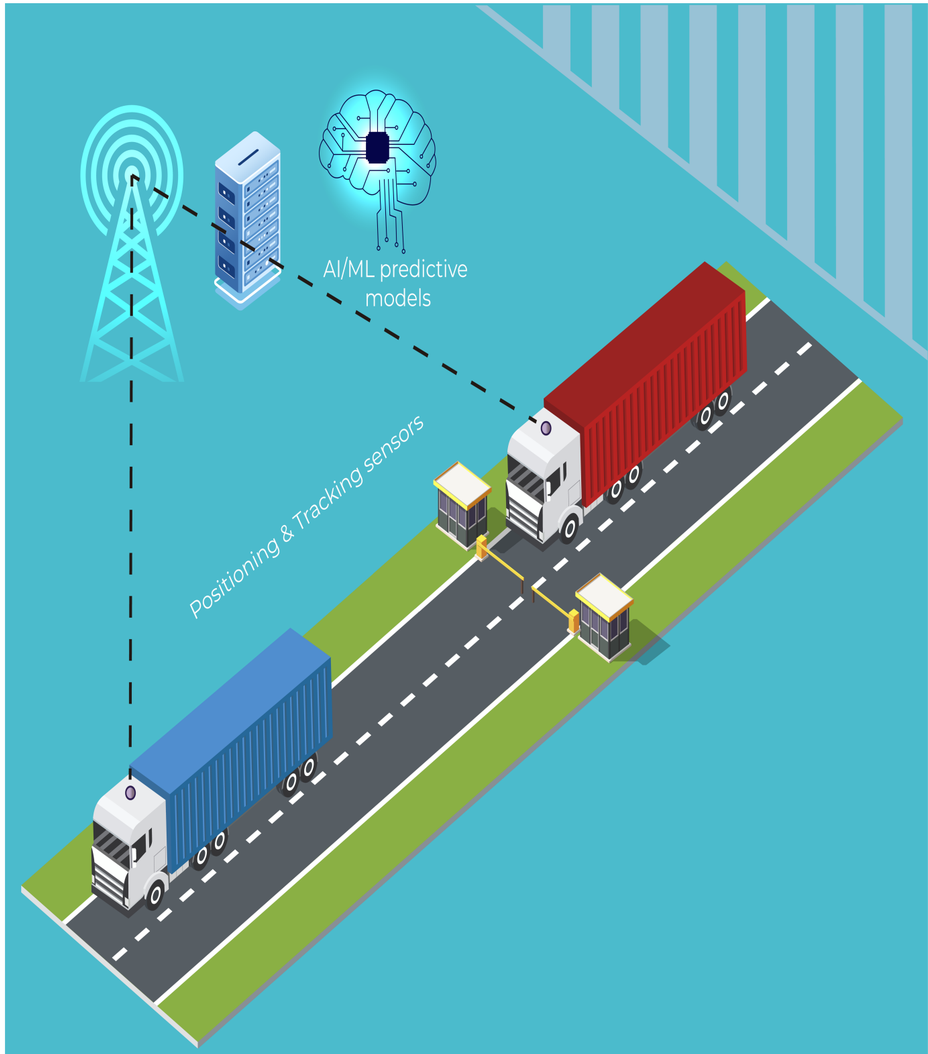


4. iNGENIOUS Use Cases

Port Entrance

SITUATIONAL UNDERSTANDING AND PREDICTIVE MODELS IN SMART LOGISTICS

Aims to integrate **artificial intelligence** to improve the **access** of vehicles to **ports** and **reduce** the **waiting times**, leading to corresponding savings on direct costs for carriers.

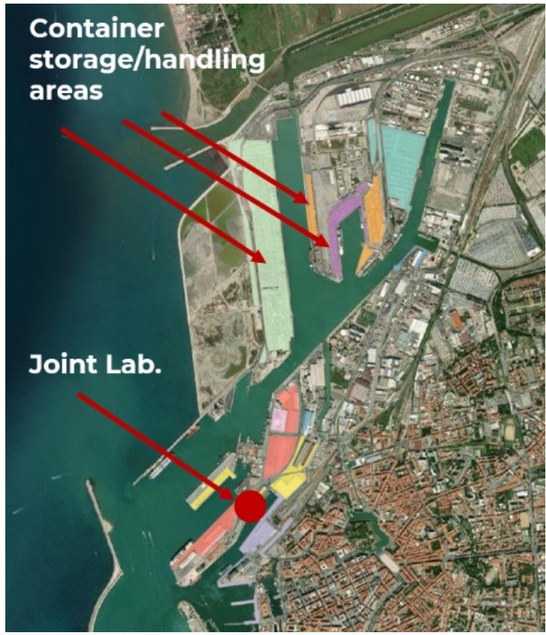


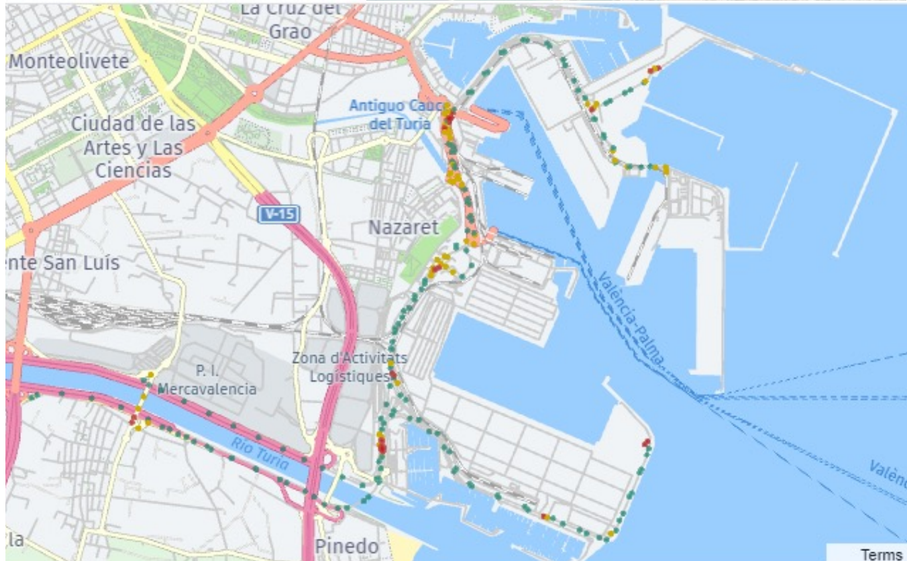
Situational Understanding and Predictive Models in Smart Logistics Scenarios

4. iNGENIOUS Use Cases
Port Entrance

Valencia and Livorno Ports

- **Demo:**
  - **Situational understanding:** trucks flows considered predictive models for the TTT estimation within the Port of Valencia and Livorno
  - tracking trucks inside the port facilities and gather data to validate the models.





4. iNGENIOUS Use Cases

AGVs

IMPROVE DRIVERS' SAFETY WITH MR AND HAPTIC SOLUTIONS

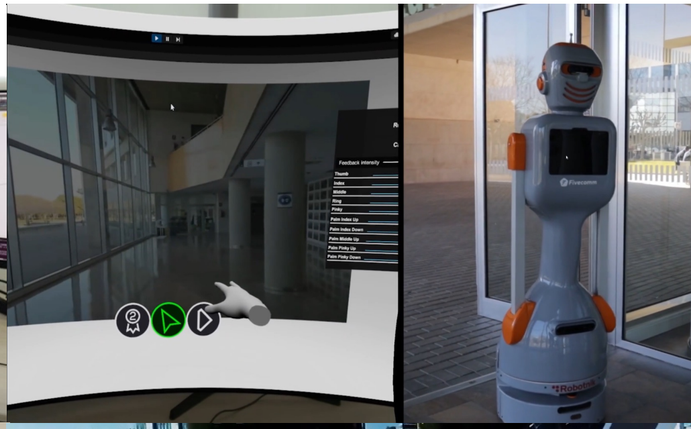
Is a **safety-centric** use case that pretends to **remotely control** transportation of goods with **Automated Guided Vehicles** (AGVs) thanks to **tactile internet**, edge computing and immersive enablers (**Mixed-Reality** engines, **haptic gloves**) so that employees will be safe, away from hazardous working locations such as fuel port terminals.

4. iNGENIOUS Use Cases

Factory

Valencia Port

- **Demos:**
  - **Drivers' safety: control AGV remotely** by means of mixed reality and haptic solutions.
  - Remote driving with **immersive Mixed-Reality** (MR) cockpit.
  - Autonomous AGVs control with **haptic gloves**



4. iNGENIOUS Use Cases

Ship

INTER-MODAL ASSET TRACKING VIA IoT AND SATELLITE

Aims to provide End-to-End (E2E) intermodal asset tracking with **satellite connectivity** for enabling enhanced real-time monitoring of shipping containers when they are **sailing through oceans without connectivity** to terrestrial IoT networks.

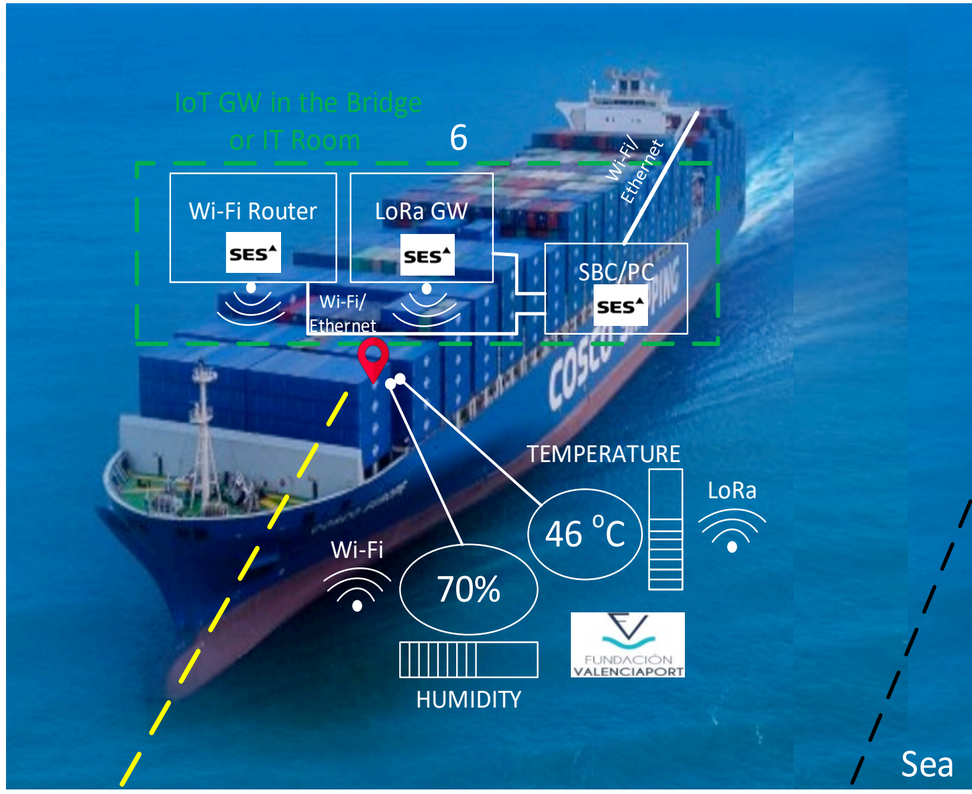
Inter-modal asset tracking via IoT and satellite technology

4. iNGENIOUS Use Cases

Ship

COSCO Ship

- **Objective:** to assess IoT tracking technologies that contribute optimizing end-to-end supply chain service, real-time data exchange and customer satisfaction.
- **Demo** using a 20 feet empty container equipped with the IoT sensors and transported both on the maritime and inland leg.
  - **Maritime transport:** trip Valencia to Piraeus.



4. iNGENIOUS Use Cases
DVL/DLTs

SUPPLY CHAIN ECOSYSTEM INTEGRATION

Overcomes the absence of a virtual interoperability IoT and DLT layer that will be capable of **securely** and semantically **exchange the information** flows between the different actors that can take part along the supply chain ecosystem.

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- Linkedin group
- YouTube channel
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DAVID GOMEZ-BARQUERO

dagobar@iteam.upv.es

NURIA MOLNER

numolsiu@iteam.upv.es

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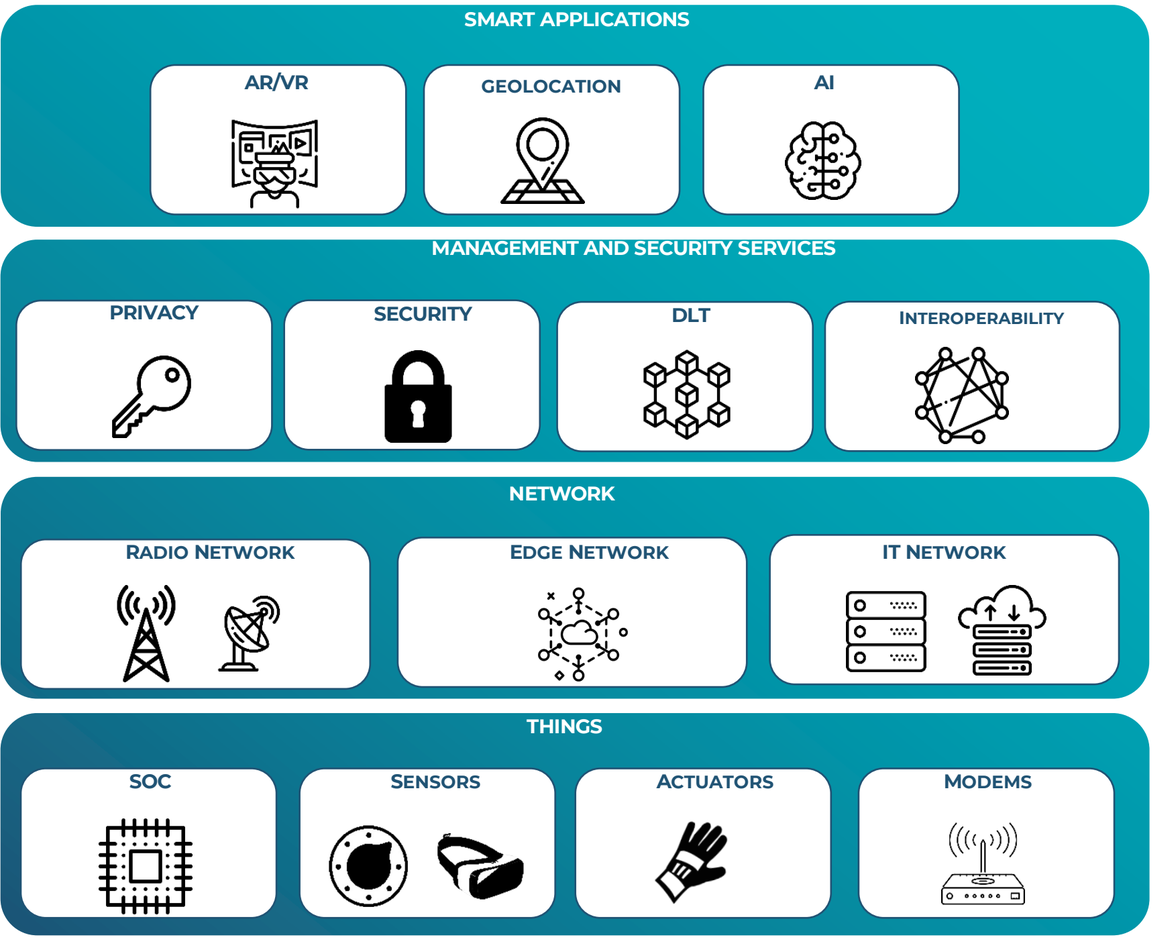
5. Cross-layer Architecture



Artificial Intelligence & Machine Learning

- **Smart Application level:** prediction of vessel arrival times and TTT in maritime ports.
- **Network level:** network resources adaptation to IoT devices at the things layer.
- **Things level:** data processing at the edge within energy-constrained IoT sensors.

Security and privacy

- **Management and Security level:** data interoperability with pseudonymization for personal data; and data integrity using DLTs.
- **Network level:** security enhancements over previous 3GPP standards.
- **Things level:** policy analysis and definition for Identity & Access management for 5G-connected IoT devices.