INCODE

INCODE - PROGRAMMING PLATFORM FOR INTELLIGENT COLLABORATIVE DEPLOYMENTS OVER HETEROGENEOUS EDGE-IOT ENVIRONMENTS

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incode-project.eu

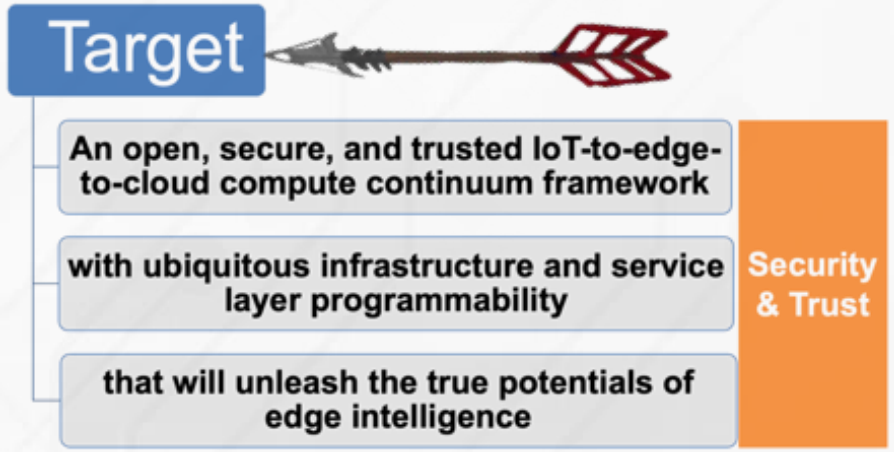
GAPS, VISION & SOLUTIONS

The entire continuum starting from IoT devices and going to all the way to core cloud systems is still immature

How can we…

…exploit IoT processing capabilities?

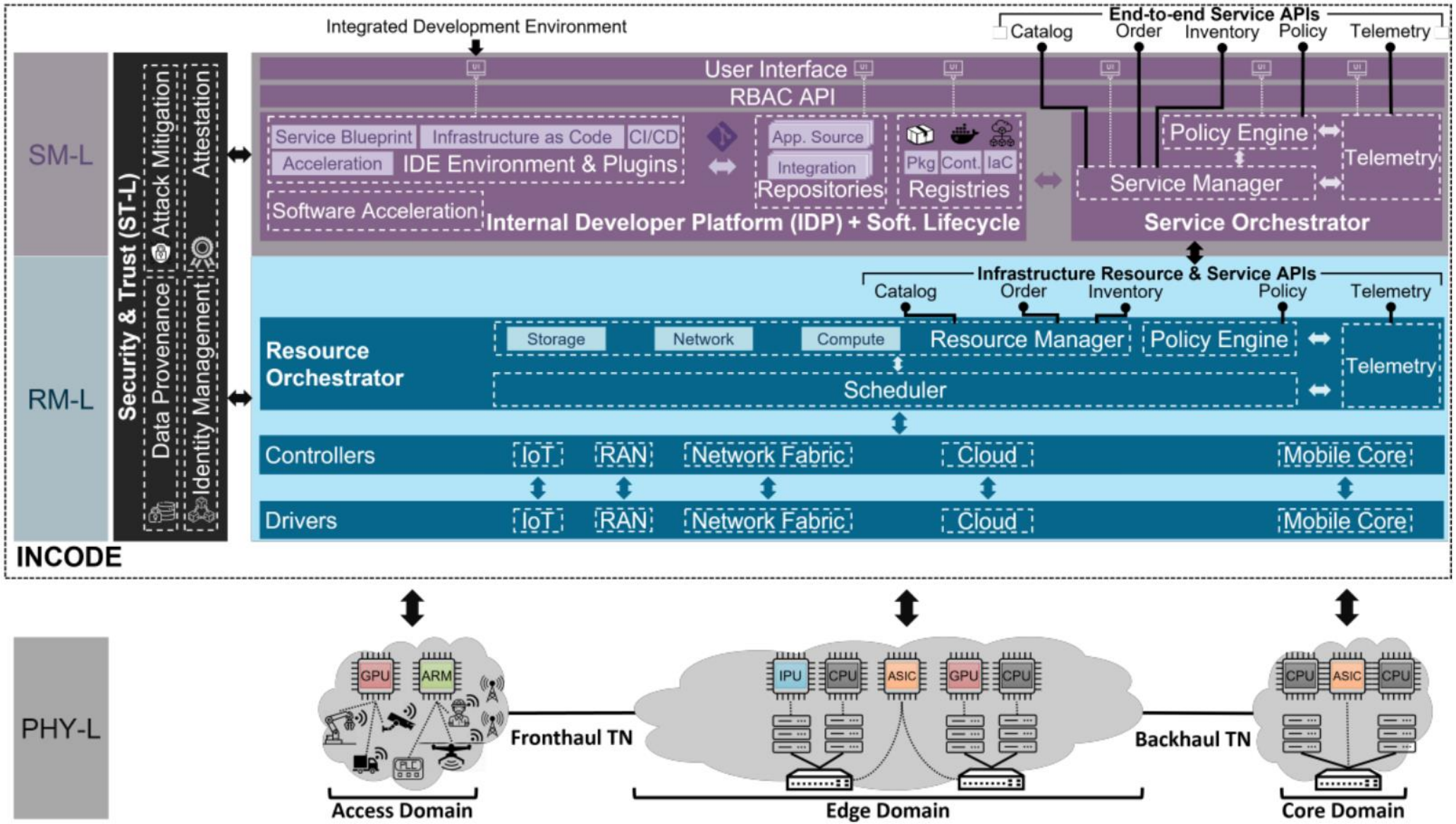
…enable intelligent collaborative deployments?



Under the hood… The INCODE solution

1. **INCODE Distributed Resource Management and Vertical Security & Trust Layers** → performs resource allocation/release & process scheduling across the entire IoT-to-edge-to-cloud continuum including microservices like:
   - Infrastructure manager controllers
   - Infrastructure drivers
   - Core components
   - Security & Trust
2. **INCODE End-to-end Service Management Layer** → allow apps to run on the underlying HW in a HW-agnostic way including microservices like:
   - UI portal
   - RBAC
   - Runtime Orchestration
   - Telemetry
   - Software Lifecycle

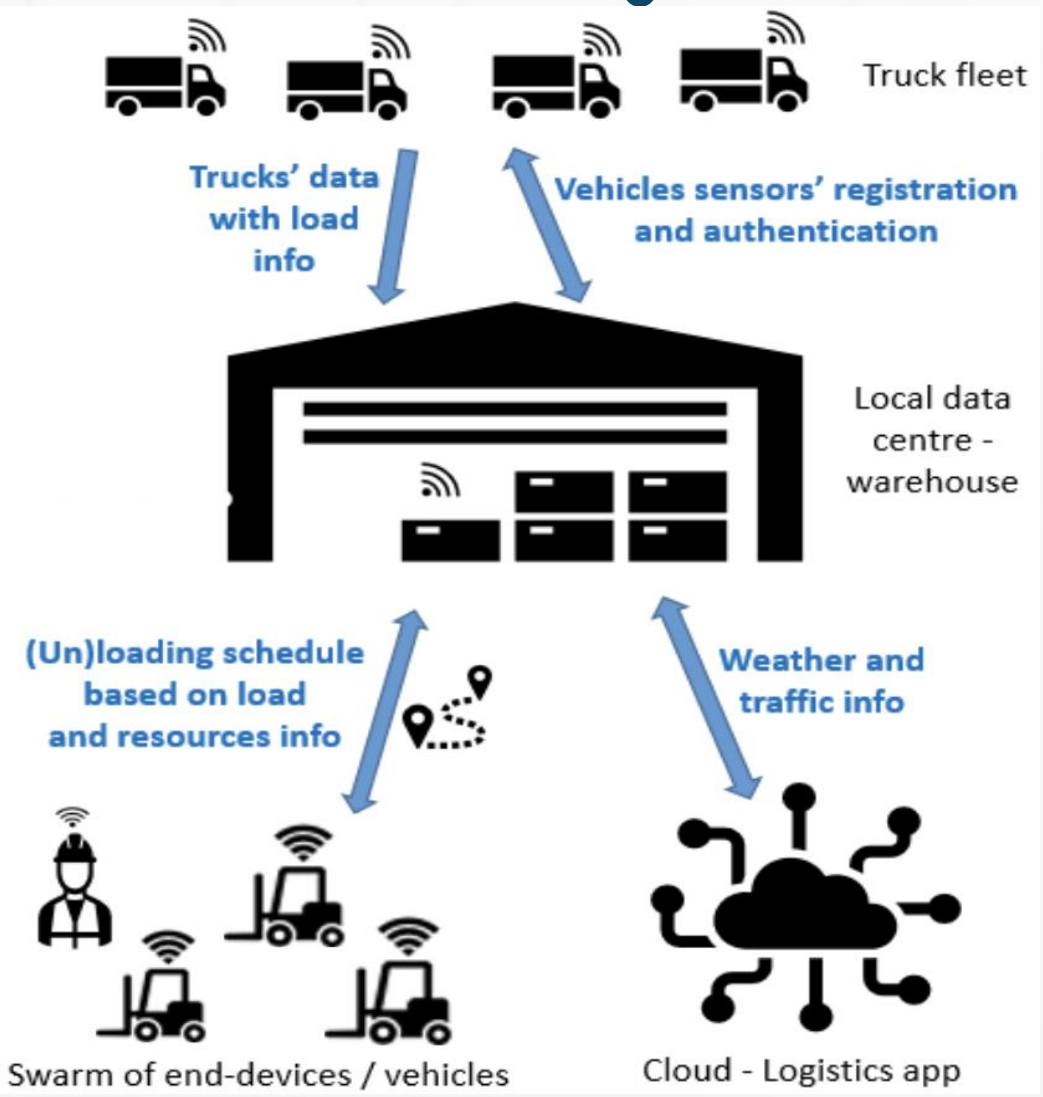
ARCHITECTURE



INCODE AA1 | SMART LOGISTICS

Concept | End-to-end optimisation process from the warehouse to the destination while satisfying safety standards:

- Load information data flows from sensors on trucks (register & authenticate with the local data center)
- Static IoT sensors in the warehouse → inventory status info
- Local data is enriched with cloud intelligence
- The local data center receives commands to manage a swarm of end devices/vehicles for (un)loading of the trucks



Benefits

- ✓ Optimized (un)loading scheduling & allocation resources →damage prevention
- ✓ Reduced unit costs of using trucks/loading vehicles
- ✓ Increased profits of the logistics actors
- ✓ A logistics app → trusted framework for all the logistics actors.
- ✓ Workplace safety and prevention of product mishandling.

INCODE AA2| UTILITIES INSPECTION

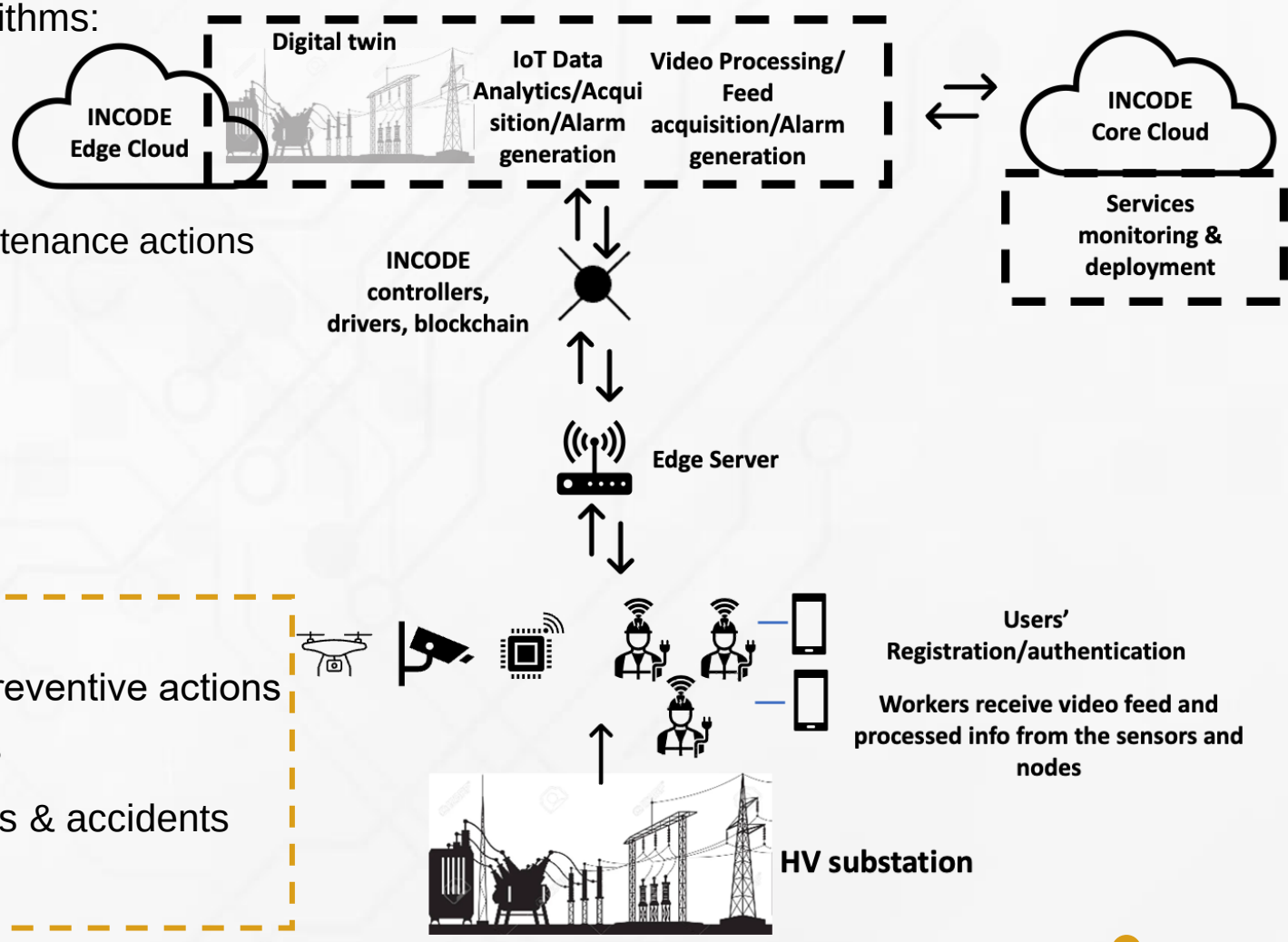
Concept | This pilot involves the demonstration of 2 scenarios relevant to power utilities by taking advantage of new, low-cost, high-performance IoT equipment and computer vision algorithms:

Predictive maintenance action sequence

1. Collect data from power utility infrastructure
2. Analyse data → useful insights
3. Generate appropriate indications → predictive maintenance actions
4. Visualise data in online dashboard

Intruder/equipment failure detection sequence

1. Collect video feed from cameras & drones
2. Computer vision techniques → useful insights
3. If a critical event is detected → alarm
4. Visualize alarm in online dashboard & response



Benefits

- ✓ More efficient maintenance of facilities due to use of preventive actions
- ✓ Less equipment failure due to precautionary measures
- ✓ Safer workforce from threats related to malicious actors & accidents
- ✓ Improvement of application interoperability

INCODE AA3 | SMART WORKER ASSISTANT

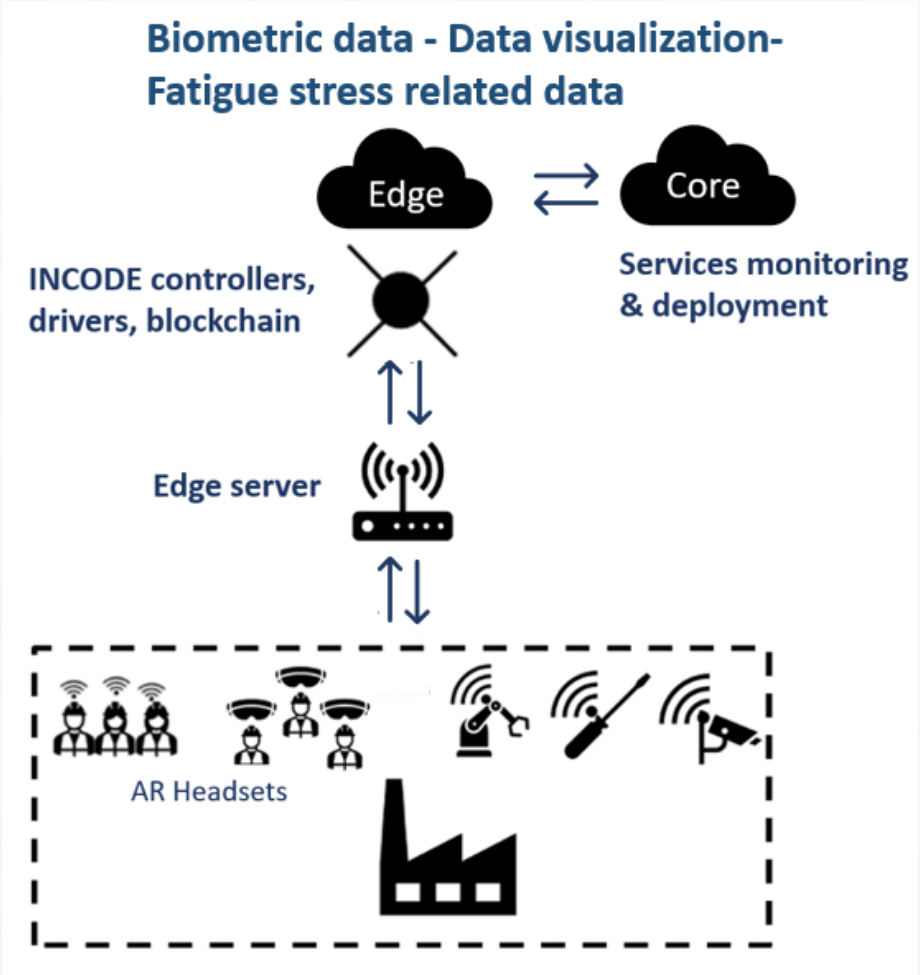
Concept | Demonstration of new technologies like IoT sensors, collaborative robots, wearables, exoskeletons, capable of detecting variables that i) indicate a risk situation for the operator and ii) modify the work environment.

Smart worker in the loop action scenario:

- High-resolution data is collected by robots/exoskeletons/smart watches applied to workers in a smart factory
- Data sent to edge node for advanced processing leading to useful insights
- Indications for fatigue/dangerous events are generated and visualized → tasks inside the production line are rescheduled/adapted
- The production line will slow down the speed until workers' parameters return to their usual set/the worker is replaced

Benefits

- ✓ Actions triggered by workers' vital signs → workers' position optimization
- ✓ Prevented accidents → safer working environment
- ✓ Better informed & directed workers → improved labour efficiency
- ✓ Improved maintenance and fault detection times



INCODE AA4 | PPDR SERVICES

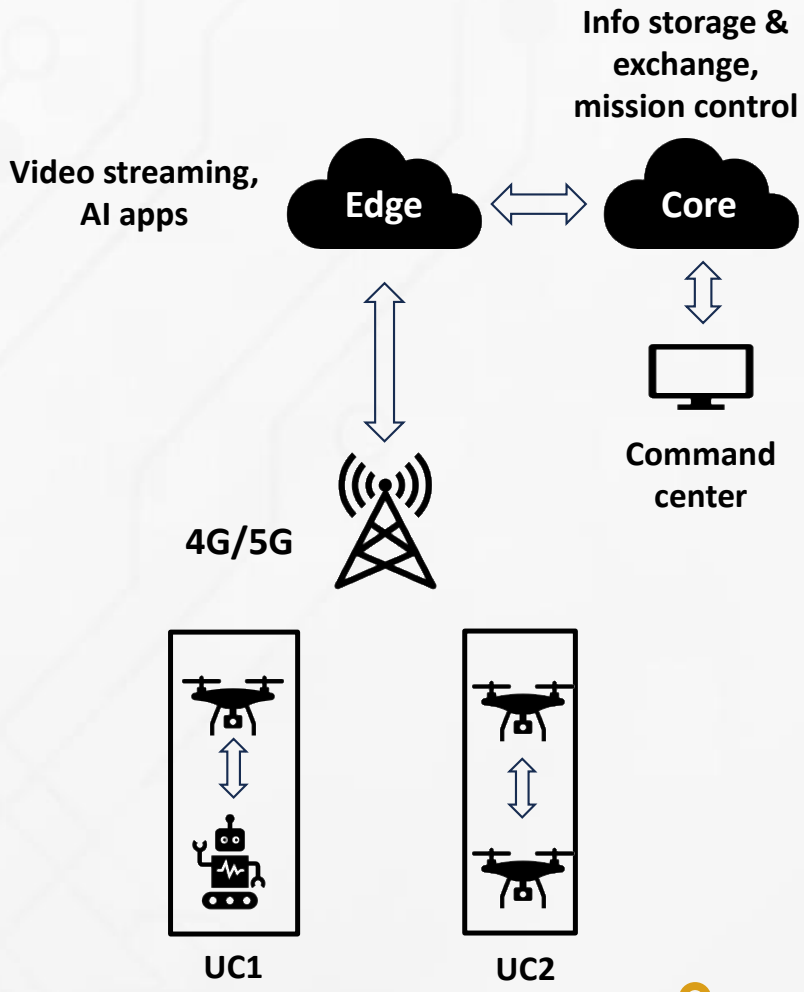
Concept | This pilot focuses on utilizing the collaboration between UAVs (Unmanned Aerial Vehicle) in 2 UCs: UAV to UGV (Ground Robot) and UAV to UAV (Swarm Drones) for the purpose of conducting search and rescue operations in disaster and emergency situations.

UAV to UGV/UAV

- The UAV streams live video footage & telemetry data to the edge node for the detection of missing individuals
- The video undergoes processing at the edge to detect & locate missing persons
- Commander watches the video
- Upon detection, the UAV shares the precise GPS coordinates of the missing person with the UGV/UAV to provide assistance/more elaborated search

Benefits

- ✓ Efficient search & rescue operations
- ✓ Real time collaboration and information exchange between UAVs & UGV through INCODE infrastructure & platform
- ✓ Minimised human intervention
- ✓ Optimised resources in critical service delivery



EXPECTED IMPACT

Scientific & Technology:

i. Easy interconnection of multiple IoT platforms
ii. Creation of a common development framework for IoT drivers & controllers
iii. Enhanced trust & security
iv. New & custom applications for smart IoT-edge cross-industrial environments

Business & Social:

i. New business opportunities for infrastructure providers & systems integrators
ii. Verticals benefited from new types of applications
iii. Safety in working environment
iv. Work quality & satisfaction increase
v. Goods quality through traceability
vi. Advance community crisis management services

THE TEAM

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