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Core functionalities of the RAINBOW fog computing platform

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DEFINITON

An open, trusted fog computing platform facilitating the deployment, orchestration and management of scalable, heterogeneous and secure IoT services and cross-cloud apps

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MOTIVATION

With IoT now present at our homes, work and daily routines, the number of connected devices and IoT generated data are rapidly exploding. Thus, the amount of data expected to be in transit between IoT devices and the cloud for central processing and analysis is ever increasing, putting higher demands on the cloud services especially for real time and mission critical applications.

Fog computing fills the gap between the edge and the datacenter, broadening the range of options as to where to execute analytics, further reduce the amount of data transferred across networks and upwards to the cloud, and facilitate collaboration between edge devices.

OPEN CHALLENGES

- Efficient and agile orchestration of fog services in dynamic fog networks
- Intelligent planning in data placement, devising inter-network communication fabric to bridge cross-fog and hybrid cloud/fog deployments
- Effective security mechanisms accounting for the distributed nature of the fog computing architecture and the lack of compute and energy resources

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MISSION & VISION

- Design and develop an open and trusted fog computing platform
- Enable fog computing's true potential
- Provide significant benefits for popular cloud platforms, fog middleware, and distributed data management engines
- Extend the open-source ecosystem

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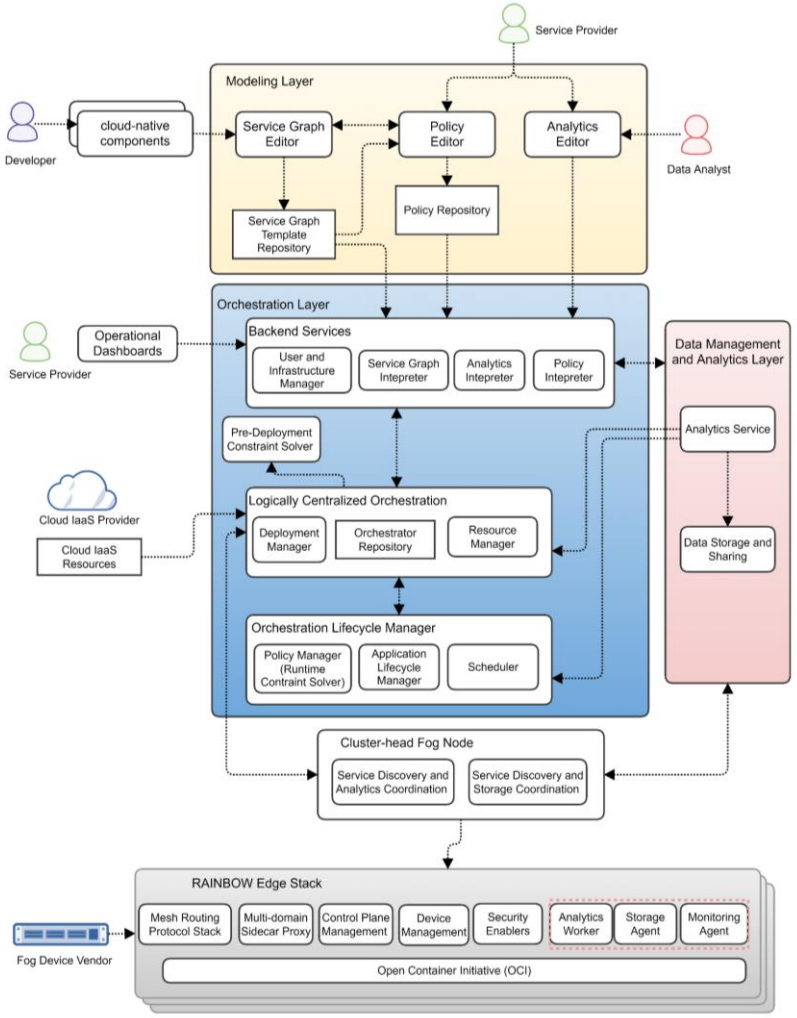
OBJECTIVES

- Open trusted fog computing reference architecture and use-cases incorporating highly relevant technological and business requirements
- Innovative mechanisms and intelligent middleware tools for IoT orchestration, data collection & decentralized analytics
- Secure and efficient data storage and processing at the fog & edge layer
- Stress-test and validate the RAINBOW framework, mechanisms and services in real industrial applications
- Wide dissemination of RAINBOW's innovative results to industry and research community

HIGH LEVEL ARCHITECTURE



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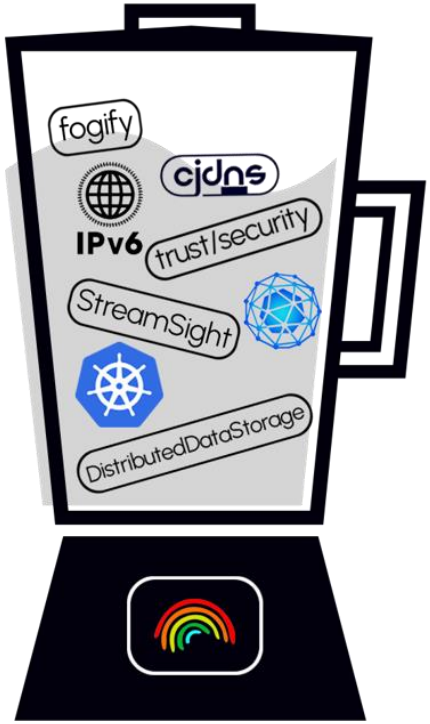
THE RAINBOW MIX



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AS-IS IMPLEMENTATION STATUS

- Attestation protocol (Edge)
- Cluster Formulation (Edge)
- IPv6 overlay(ed) K8S
- Service Graph as K8S resources
- SLO engine as K8S resources
- Monitoring & Edge Processing
- User Interface for managing service graphs

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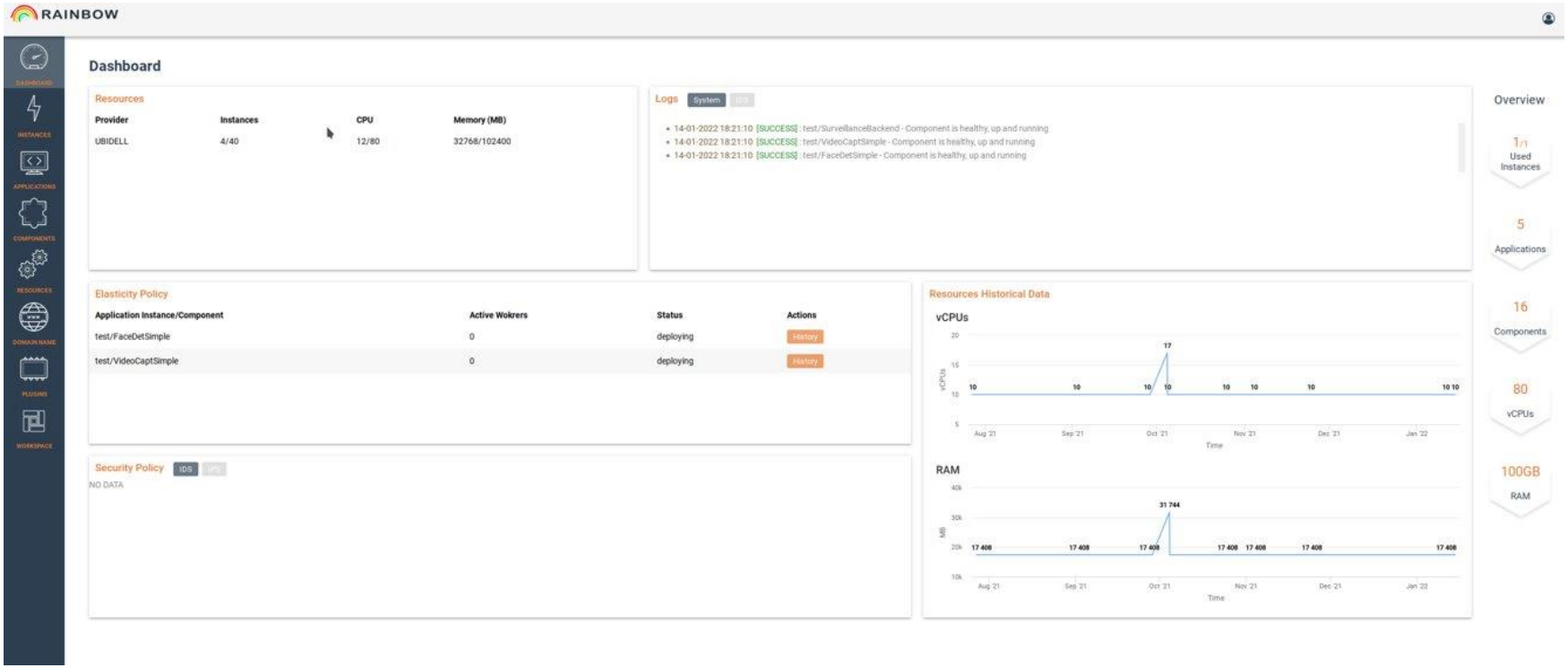
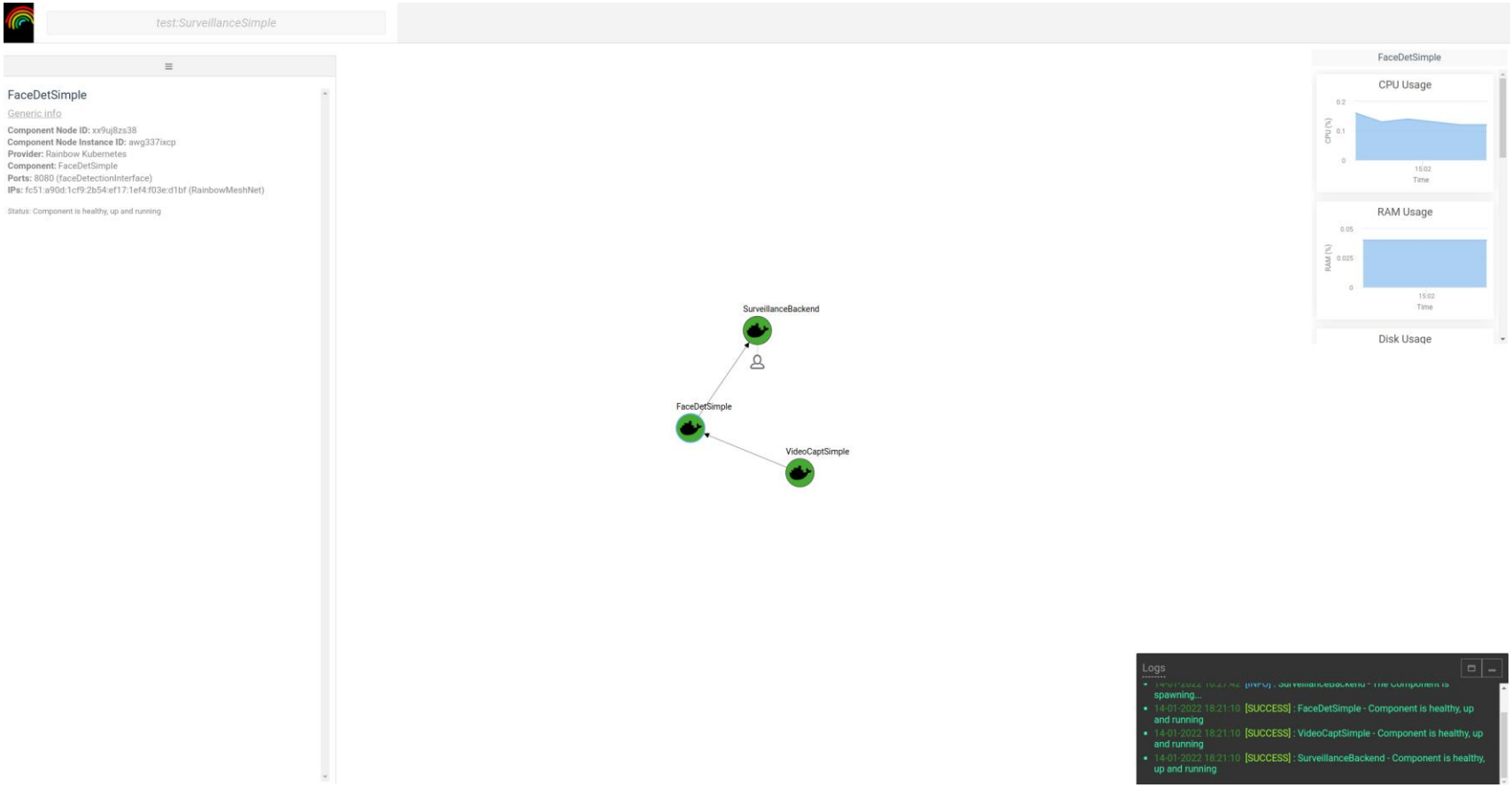
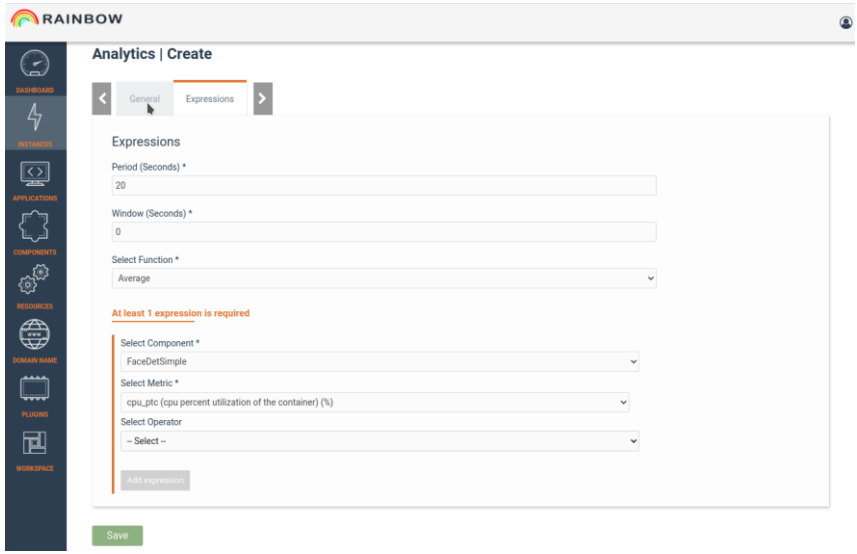
SCREENSHOTS (1/3)

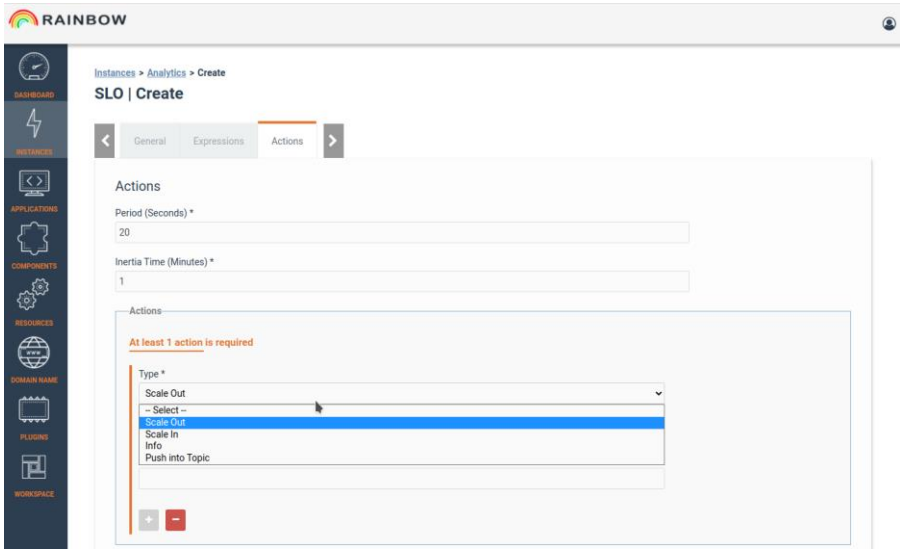


SCREENSHOTS (2/3)

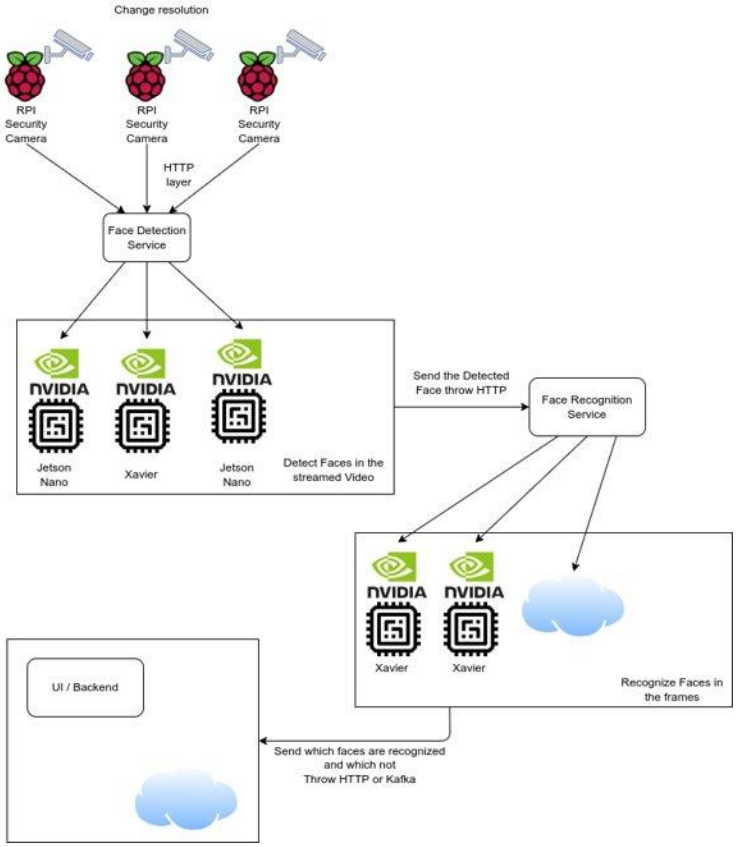


SCREENSHOTS (3/3)



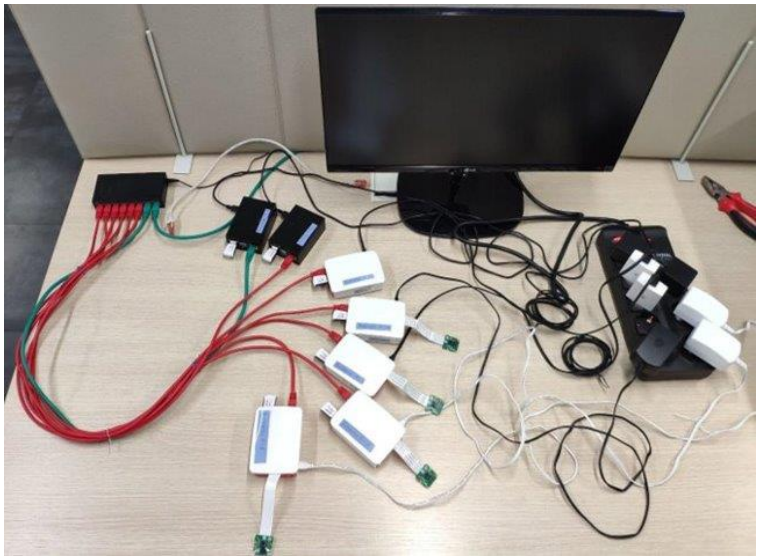


USE CASE



- Raspberry Pi with camera
- Nvidia Devices for face detections and recognition services
- Elasticity policies based on custom metrics

TESTBEDS



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IMPACT (1/2)

- Accelerate production of successful ICT products and services for the fog paradigm
- Lower the entry point of researchers and DevOps engineers to reuse and build on RAINBOW's results
- Empower innovation by making fog services more efficient and effective
- Contribute to open standards for fog services

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IMPACT (2/2)

- Strenghten competitiveness of EU cloud industry in fog and edge services
- Benefit end users and the public sector due to the adoption of decentralized, edge and fog computing applications

- *facilitating the deployment, orchestration and management of scalable, heterogeneous and secure IoT services and cross-cloud apps*

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Thank you!

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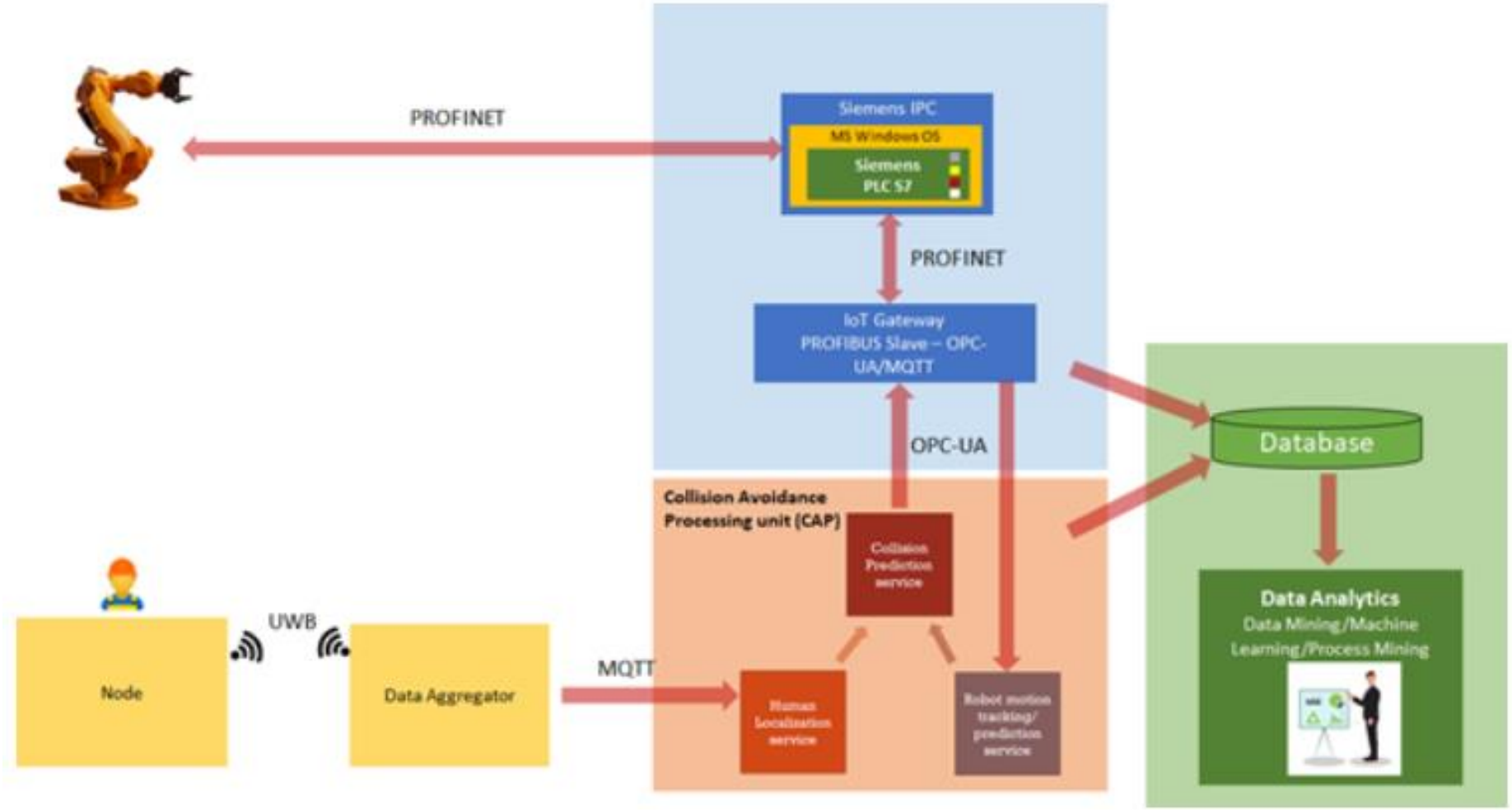
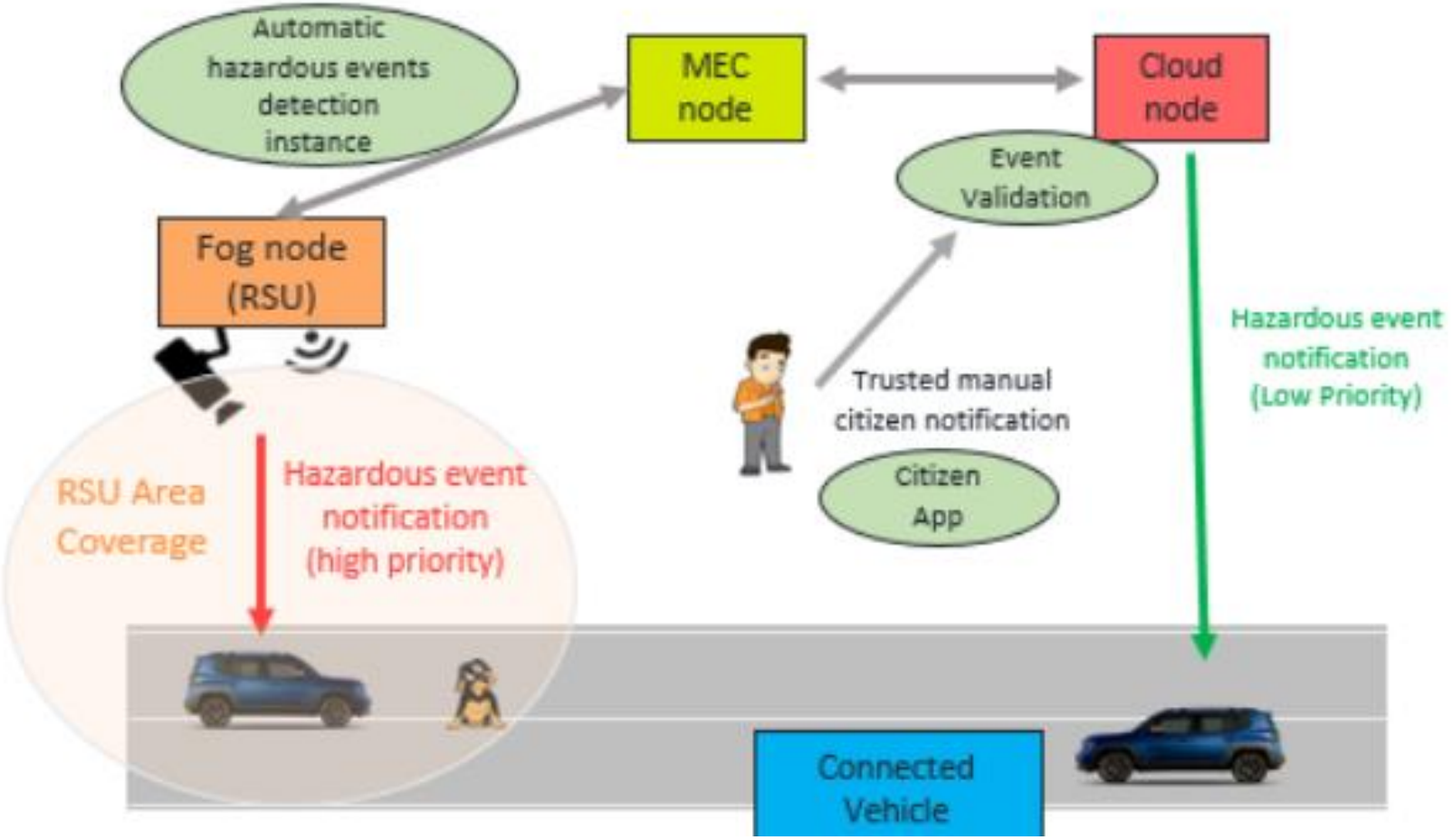
Technological Drivers

- Stay close to de-facto standards (control-plane orchestration APIs, TPM) – TCG, OpenFog Architecture
- Backward compatible with existing semantic models (e.g. service graph metamodel)
- Guarantee cloud-native properties
- Open-source roadmap for reference implementation

Human Robot Collaboration in Industrial Ecosystems



Digital Transformation of Urban Mobility



Power Line Surveillance via Drone Swarms