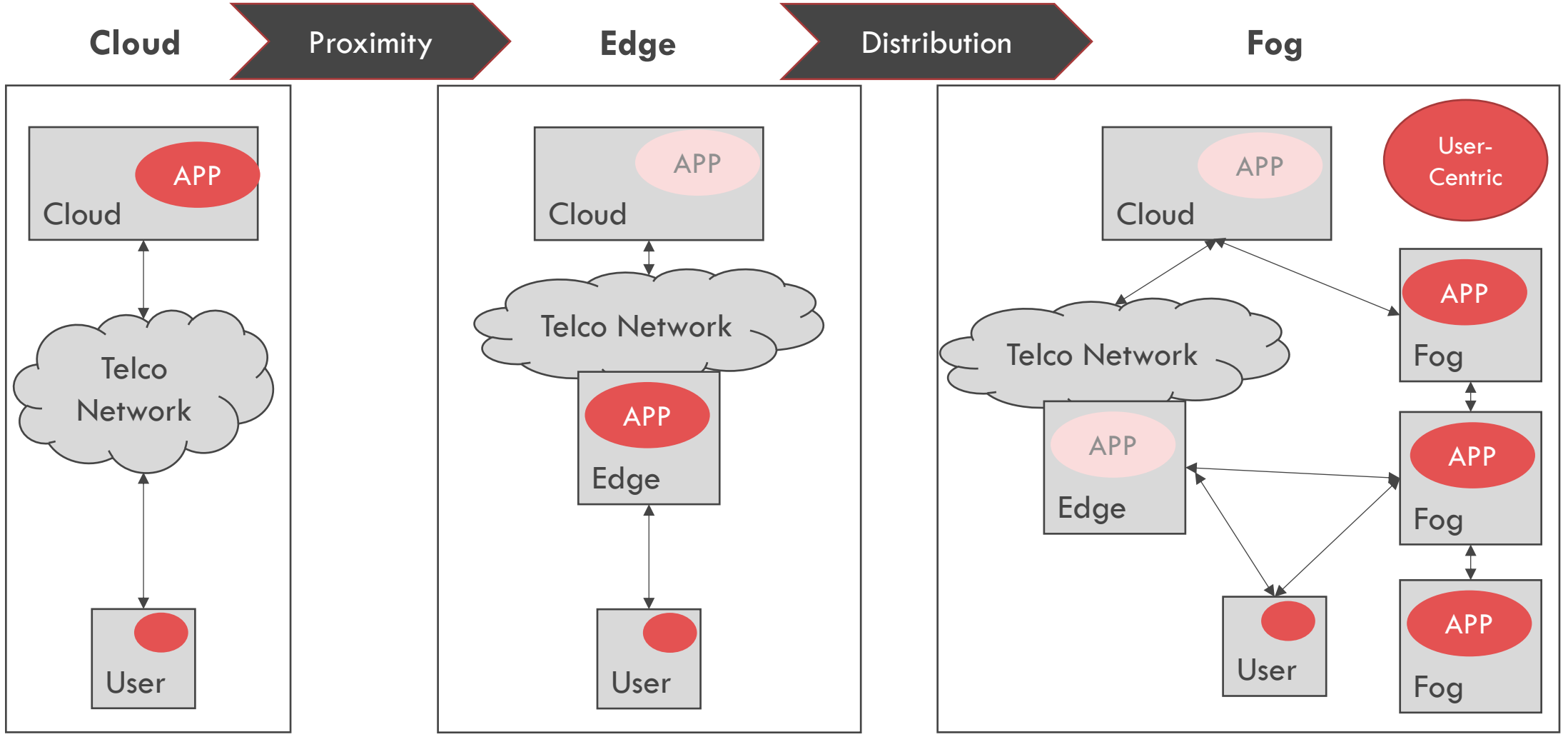
5G-CORAL meets 5G-DIVE

EuCNC 2019

19th June 2019

Antonio de la Oliva (UC3M)

Introduction - The Cloud, Edge and Fog

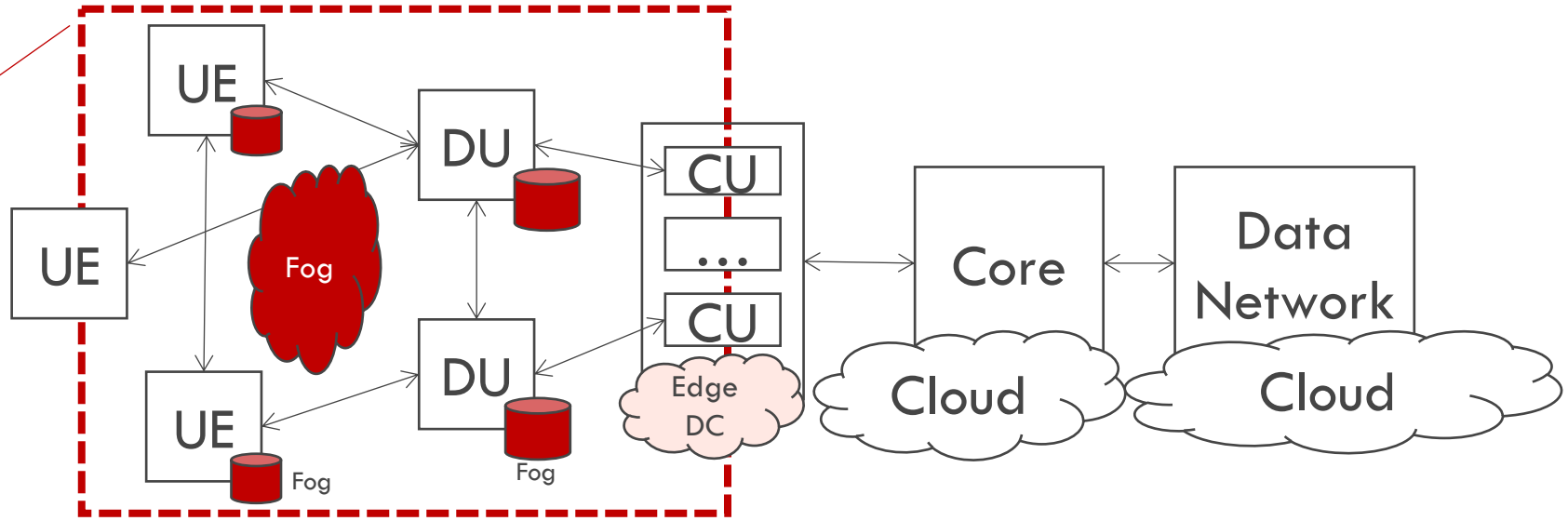


5G-CORAL Project Vision

The computing fabric does not stop at the Edge. It is more pervasively distributed through the Fog into access infrastructure and user terminals

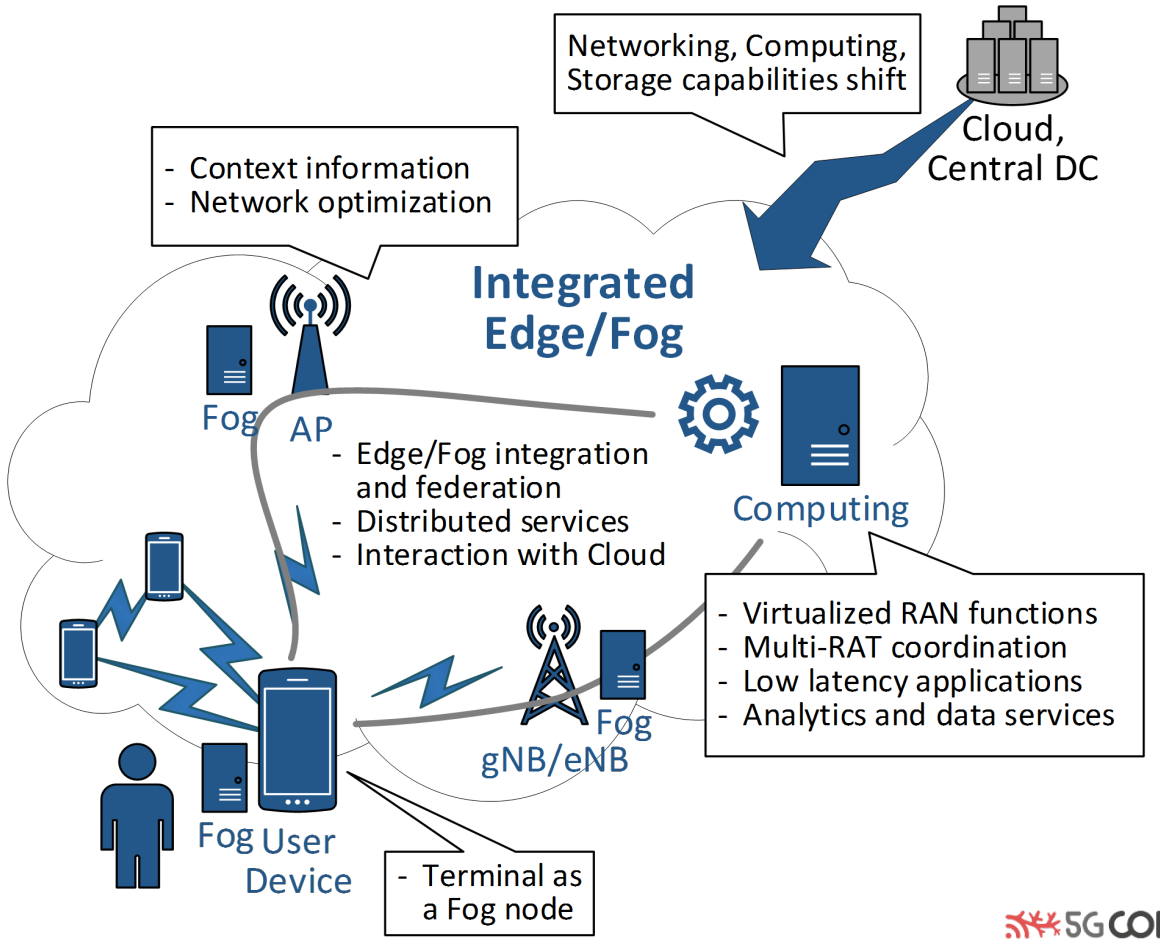
- 5G brings a **flexible RAN architecture** including flexible functional split of the gNB/eNB (DU <-> CU) and a diverse set of terminal (UE/CPE) types which all have computing capability ready for harvesting
- Edge and Fog are complementary, and **jointly together** will define the computing substrate of next generation radio access networks

A rich pool of distributed computing fabric



5G-CORAL Project Mission

Target an integrated virtualized solution deep into the RAN offering distributed data services for various applications

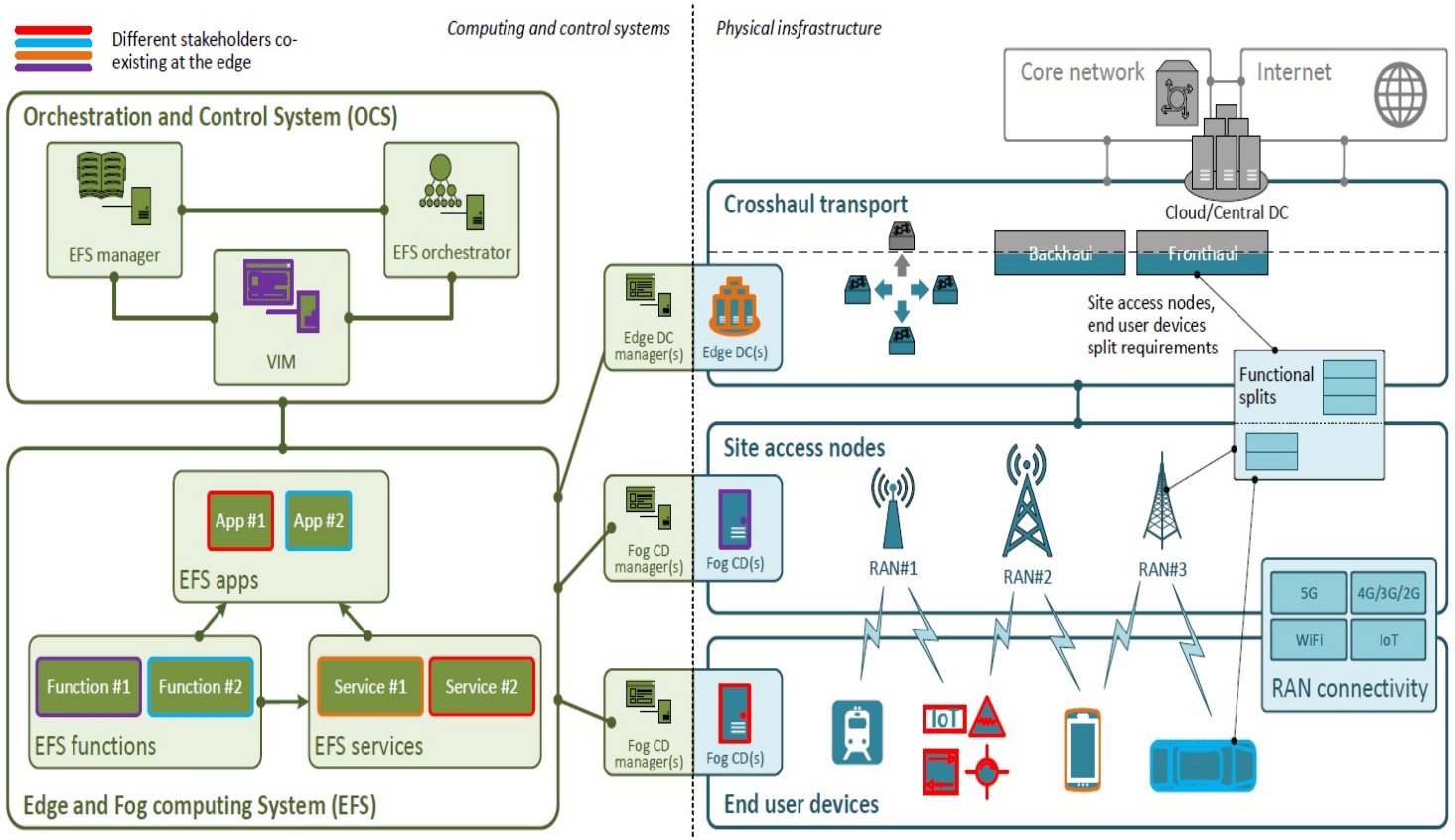


Mission: To develop the framework for an **integrated virtualized Edge/Fog solution** and demonstrate its value proposition for various use cases

Solution Building Blocks

Builds on two sub-systems, the EFS (Edge and Fog computing System) and the OCS (Orchestration and Control System)

- OCS: A logical system for **composing, controlling, managing, orchestrating, and federating** one or more EFS(s). An OCS may interact with other OCS domains
- EFS: A logical system providing **service platforms, functions and applications** on top of Edge and Fog resources. It may interact with other EFS domains



Integration and Demonstration

EFS and OCS baseline implementations integrated and demonstrated at several events

Use Case	Demonstrations
Augmented Reality	Shopping Mall (Nov'18)

5G-CORAL Evolution: 5G-DIVE

- **Goal:** Design, validate and verify an intelligent 5G solution that integrates 5G connectivity with edge and fog computing (and intelligence residing on this new distributed edge).
- **Target products:** UE (including, drones), CPE, gNB, fog, edge, and core

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THUNDER TIGER GROUP

Vertical Pilots – Industry 4.0

Digital Twin Apps

- Provides a virtual replica of a robot or of a part of a production line.
- The 5G network coverage will be deployed to enable real-time visibility and remote insights into robot status and performance without having to directly operate on the physical machine.
- Requires **eMBB** and **URLLC** for the on-time delivery of the information of the sensors to the virtual twin and for the interaction with the digital model.
- Facilitates assessing the concepts of remote control, monitoring for preventive maintenance, and safety.

Connected Worker Augmented Zero Defect Manufacturing (ZDM) Decision Support System (DSS)

- Explores the capabilities of Fog/MEC/Cloud multi-tier Edge to address this local processing and visualization of geometric features for manufactured parts.
- Deploys in the Fog devices (e.g., video cameras), algorithms able to detect characteristic patterns for defects in the production.
- Requires **eMBB** for the interaction with the platform for reinforced learning and **URLLC** for processing of results in the Fog devices.
- ZDM techniques may potentially reduce scrap by 100%, and predict form and/or welding errors.

Vertical Pilots – Autonomous Drone Scout

Drone Fleet Navigation

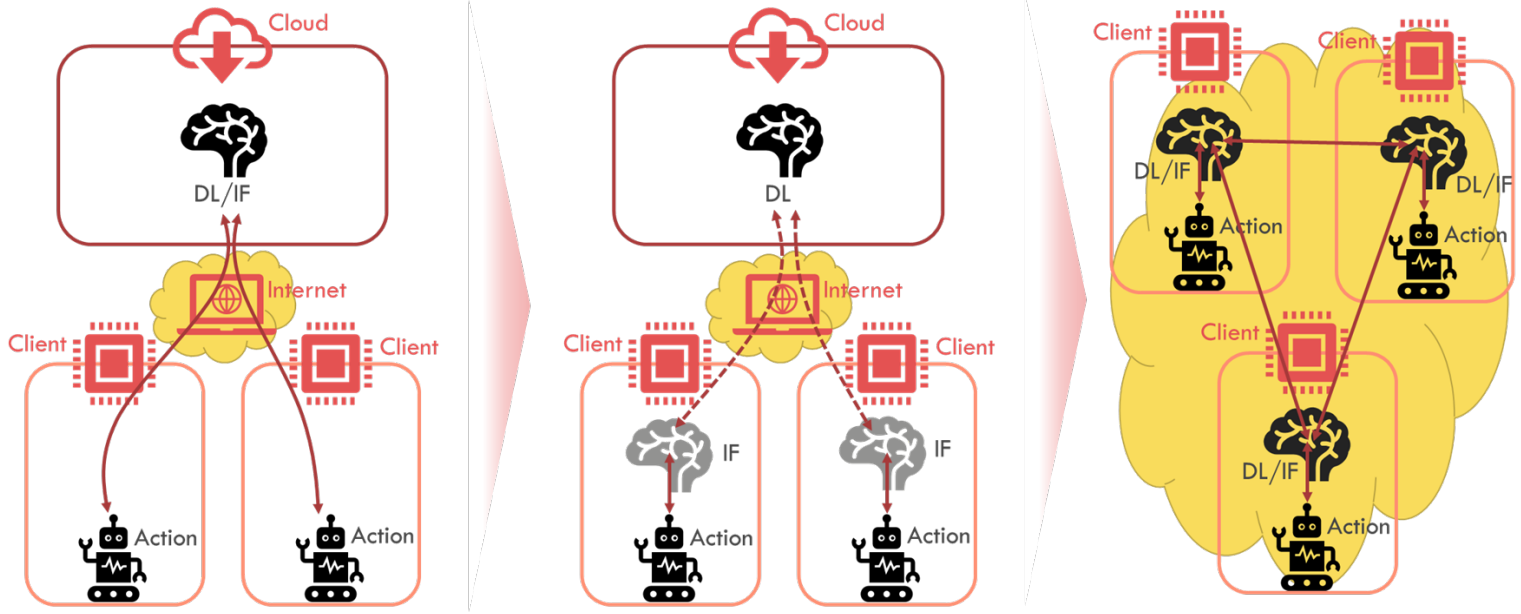
- Improves current Drone product portfolio, enabling a better piloting of the Drone swarm.
  - Providing intelligence in the Drones
- Requires **eMBB** and **URLLC** for the on-time delivery of the information of the sensors to the edge data centre for drone interaction.
- Enables new Drone-based services:
  - delivery, inspection and monitoring, scouting, Aerial Imaging, and precision agriculture on large scale.

Intelligent processing of images in the Drones

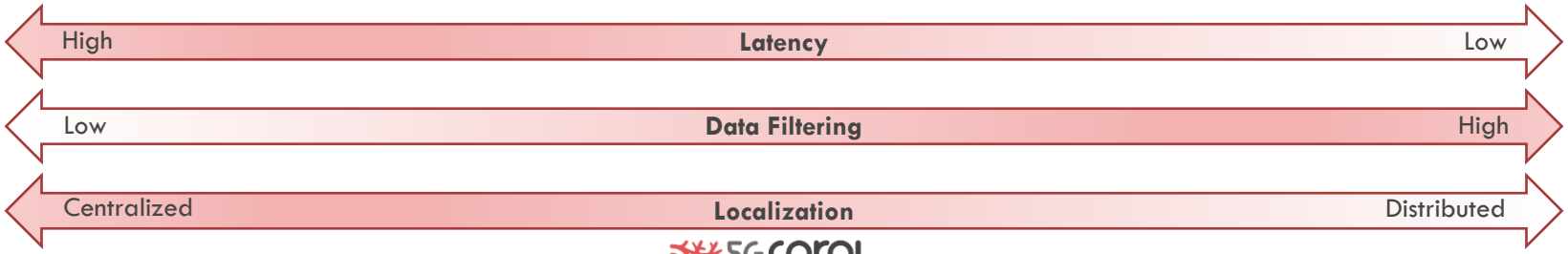
- Enables the deployment of intelligent functions in the Drones and its cooperation with the different tiers of the 5G-DIVE platform.
- Requires **eMBB** and **URLLC** for the on-time delivery of the information of the Drone.
- More automation in the scouting processes, creating a new value chain of services which can be used to provide more services to the customers.

What are we missing in 5G-CORAL?

- Cloud-based AI
- Cloud-assisted On-device AI
- On-device AI



* DL: Deep-learning, IF: Inference



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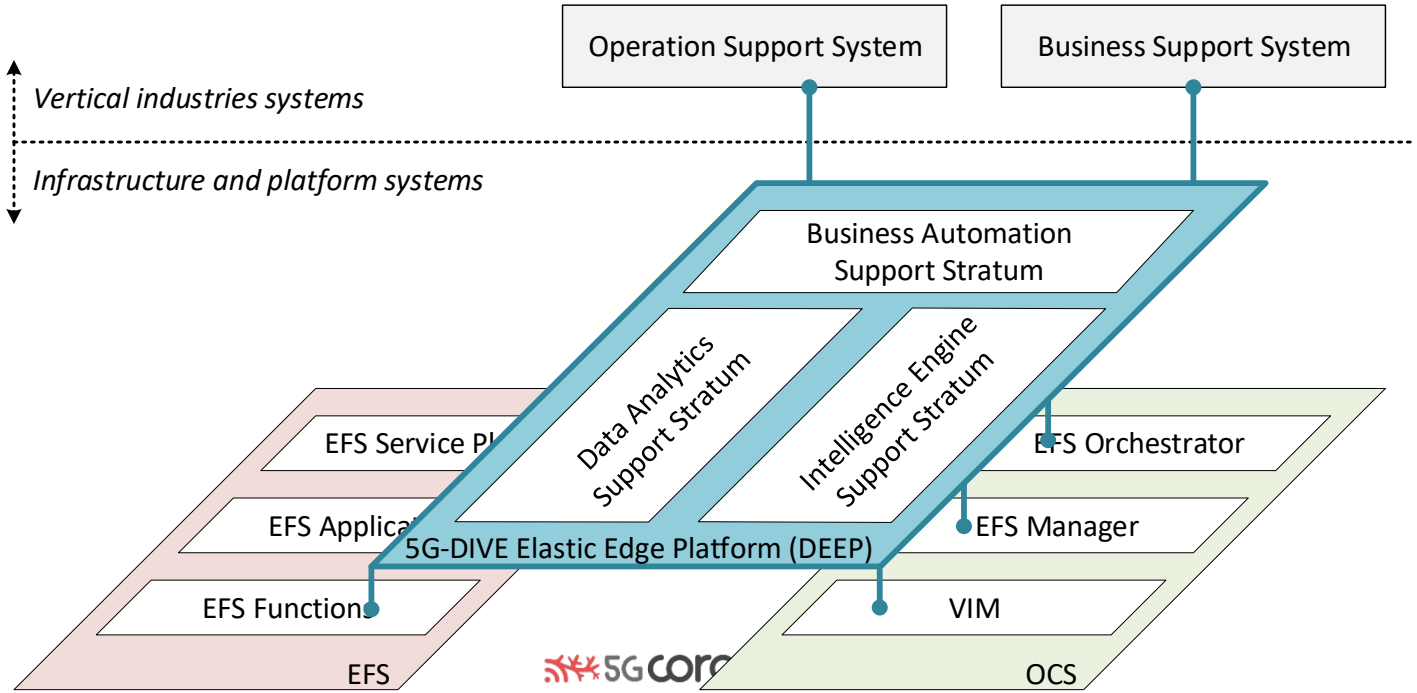
5G-DIVE Building Blocks

(1) EFS:	hosting all proposed virtualized functions, services, and applications
(2) OCS:	managing and controlling the EFS, and its interworking with other domains
(3) DEEP:	supporting vertical industries in day-by-day operations, management, and automation of businesses processes on-top of an edge and fog infrastructure.



Consortium partners and acknowledgment

5g-coral.eu twitter.com/5G_CORAL www.linkedin.com/in/5g-coral

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01/09/2017 - 31/08/2019

Cost:
3.856.973,75€

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