



# PLATOON

Digital platform and analytic tools for energy

# Edge Cloud Framework for Intelligence Decentralization

[NGIoT workshop on \*IoT and Edge computing: Energy\*](#), 18.5.2021

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# About PLATOON

- An H2020 project funded on the topic of **Big data solutions for energy** (DT-ICT-11-2019)
- 20 partners, 7 pilots, 9 countries (Belgium, France, Germany, Italy, Poland, Serbia, Slovenia, Spain, and Switzerland)
- Started 1.1.2020, duration 36 months



# Approach

- Addressing the EU's energy and climate policy objectives the approach of PLATOON is constituted on three pillars



## Interoperability

Enabling data exchange and integrated value chains between platforms using a wide spectrum of heterogeneous data sources, formats and interfaces.



## Data Governance & Security

Addressing digital sovereignty challenges of multiple data owners and providers for multi-party data exchange along the energy value chain via IDS-based connectors.



## Data Analytics Toolbox & Edge Computing

Deploying technologies for data processing and analysis in batch and real-time to optimise the energy system management for the energy domain experts.

# Objectives

- The EU-funded H2020 project PLATOON aims to **digitalise the energy sector**, enabling thus higher levels of operational excellence with the adoption of disrupting technologies.
- PLATOON will develop a COSMAG-compliant reference architecture for big data processing for the energy sector. PLATOON will **develop interoperability** layer based open standards (e.g. SAREF, CIM, NGSII-LD) to ensure compatibility with different platforms and legacy systems.
- PLATOON will develop IDS connectors, **enabling multi-party data exchange** while ensuring data governance and data sovereignty.
- **PLATOON will develop a data analytics toolbox and edge computing solutions for optimised real-time energy system management in a simple way for energy domain experts.**
- The project will be validated in **7 pilots in 5 countries** that provide real **Energy Big Data cases**. PLATOON will facilitate the technology transfer into the market by a well-established tendering process via **Open Calls**.
- The project will reinforce the European efforts for the modernisation of the European electricity grid, as it focuses on new smart grids services through data knowledge exploitation. Moreover, PLATOON will offer access to cheaper and **sustainable energy** for energy consumers and maximise social welfare.
- PLATOON will contribute to **increased renewable energy consumption, smart grids** management, increased **energy efficiency** and **optimised energy asset management**.

# Edge

## Concept

- **Multi-access edge computing (MEC)**
  - Network architecture enabling cloud computing capabilities at the edge of the cellular network
- **On-premise edge computing**
  - Private + secure compute facility
- **Smart edge device**
  - Interoperability (protocols, systems, brown-field) gateways

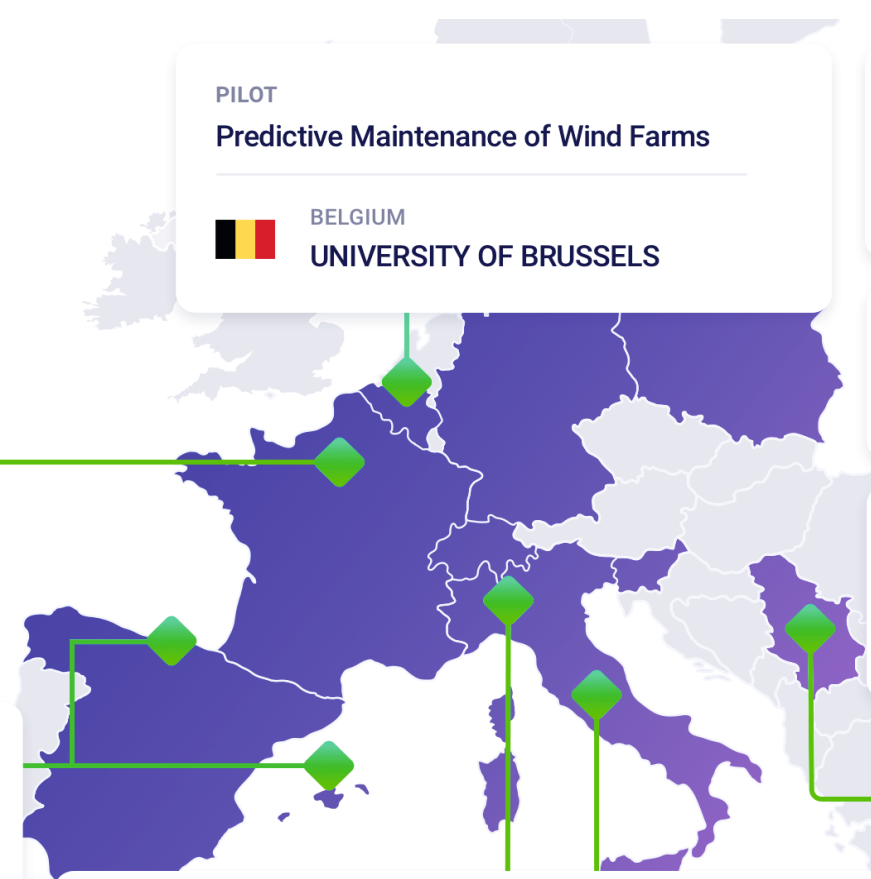
## Motivation

- **Offload raw data (pre-) processing**
  - Sparse event detection
- **Network offload**
  - Feature extraction
- **Privacy preservation**
  - Federated learning
- **Real-time (latency) requirements**
  - Control loops
- **Autonomous operation**
  - Network/service interruption

## Challenges

- **Diversity of environments**
  - Management and orchestration of applications
- **Scalability**
  - Number of geographically distributed assets
- **Connectivity**
  - Up/down-stream, private and public
- **Security**
  - Increase perimeter and new threat vectors

# Pilots



PILOT  
Predictive Maintenance of Wind Farms

 BELGIUM  
UNIVERSITY OF BRUSSELS

 GERMANY  
UNIVERSITY OF BONN  
FRAUNHOFER IAIS  
TIB

 POLAND  
FUNDINGBOX ACCELERATOR  
SP. Z O.O


 SWITZERLAND  
MANDAT INTERNATIONAL  
UNIVERSAL DEVICE GATEWAY  
ALLIANCE

 SLOVENIA  
COMSENSUS

PILOTS  
Office building Operation performance with physical models and AI algorithms

 FRANCE  
ENGIE

PILOTS  
Energy Efficiency and Predictive Maintenance in the Smart Tertiary Building Hubgrade  
Electricity grid stability, connectivity and Life Extension

 SPAIN  
TECNALIA  
GIROA VEOLIA  
SISTEPLANT, S.L.  
SAMPOL INGENIERIA Y OBRAS  
INDRA SOLUCIONES TECNOLOGIAS DE LA INFORMACION  
CLUSTER ENERGÍA – BASQUE ENERGY CLUSTER

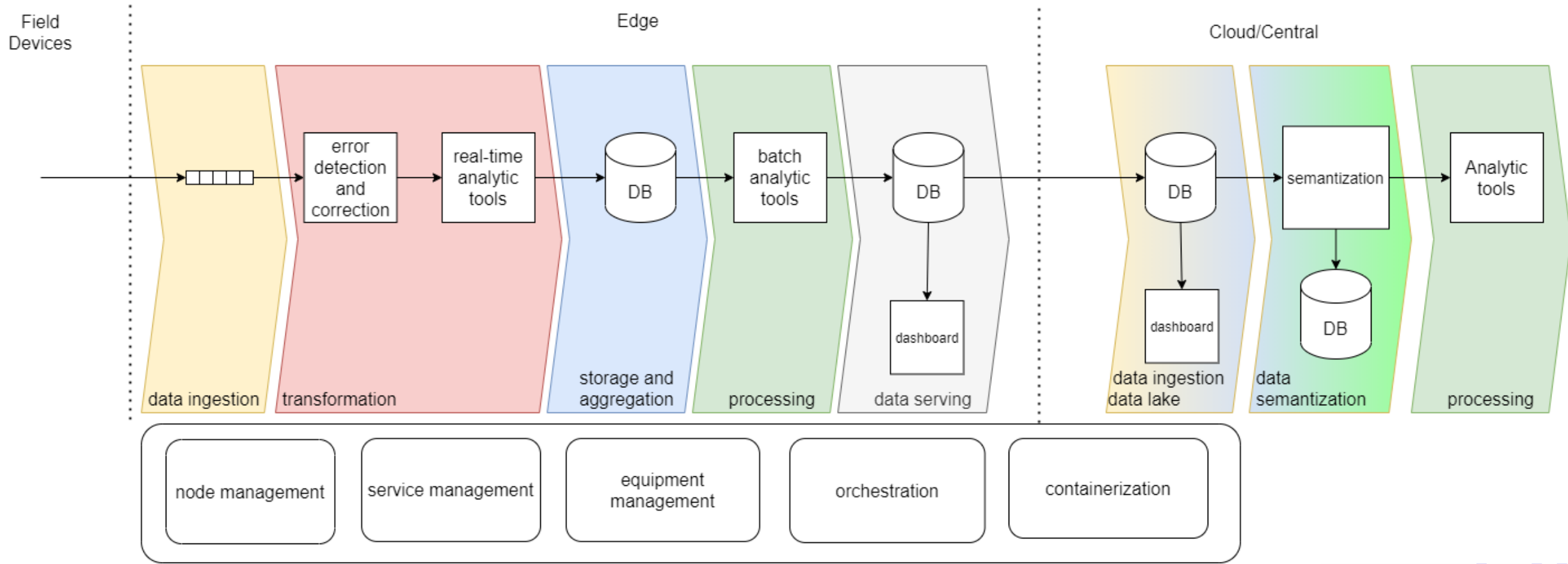
PILOTS  
Advanced Energy Management System and Spatial Predictive Models in the Smart City Energy Management of Microgrids

 ITALIA  
POLITECNICO DI MILANO  
ENGINEERING INGEGNERIA  
INFORMATICA SPA  
ROMA CAPITALE  
POSTE ITALIANE SPA

PILOT  
Electricity Balance and Predictive Maintenance

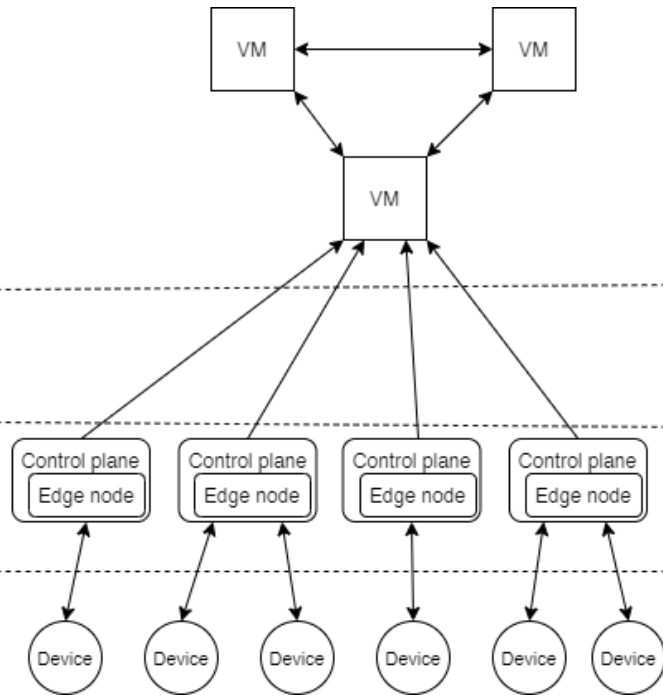
 SERBIA  
INSTITUT MIHAJLO PUPIN

# Edge-Cloud Framework

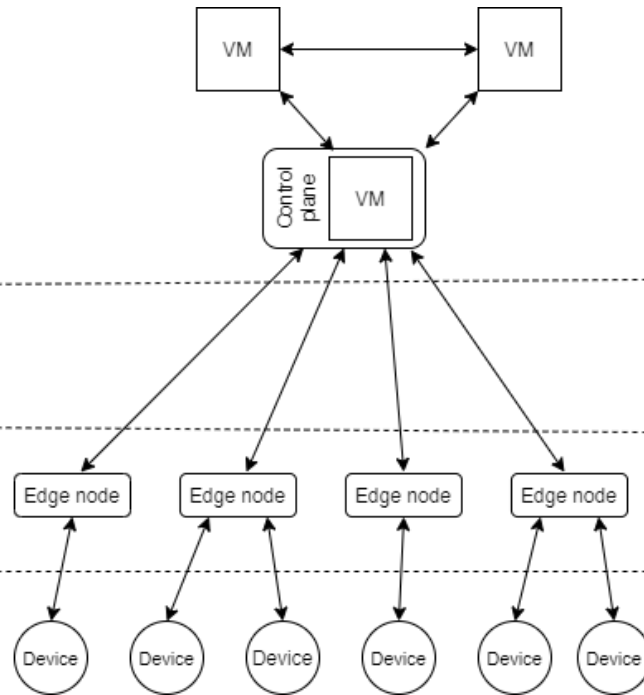


# Edge-Cloud Framework Instantiation Scenarios

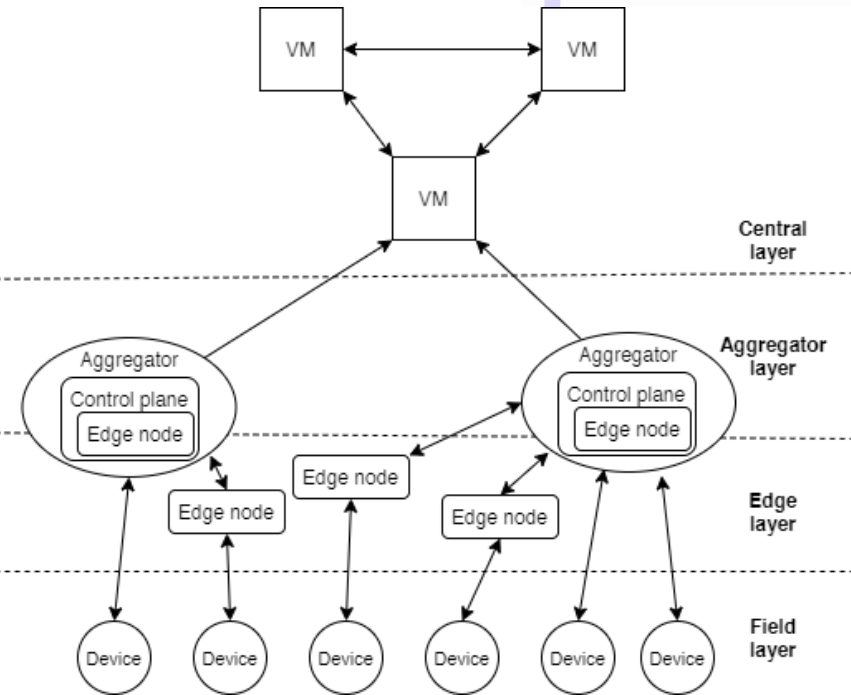
## Distributed control



## Centralized control



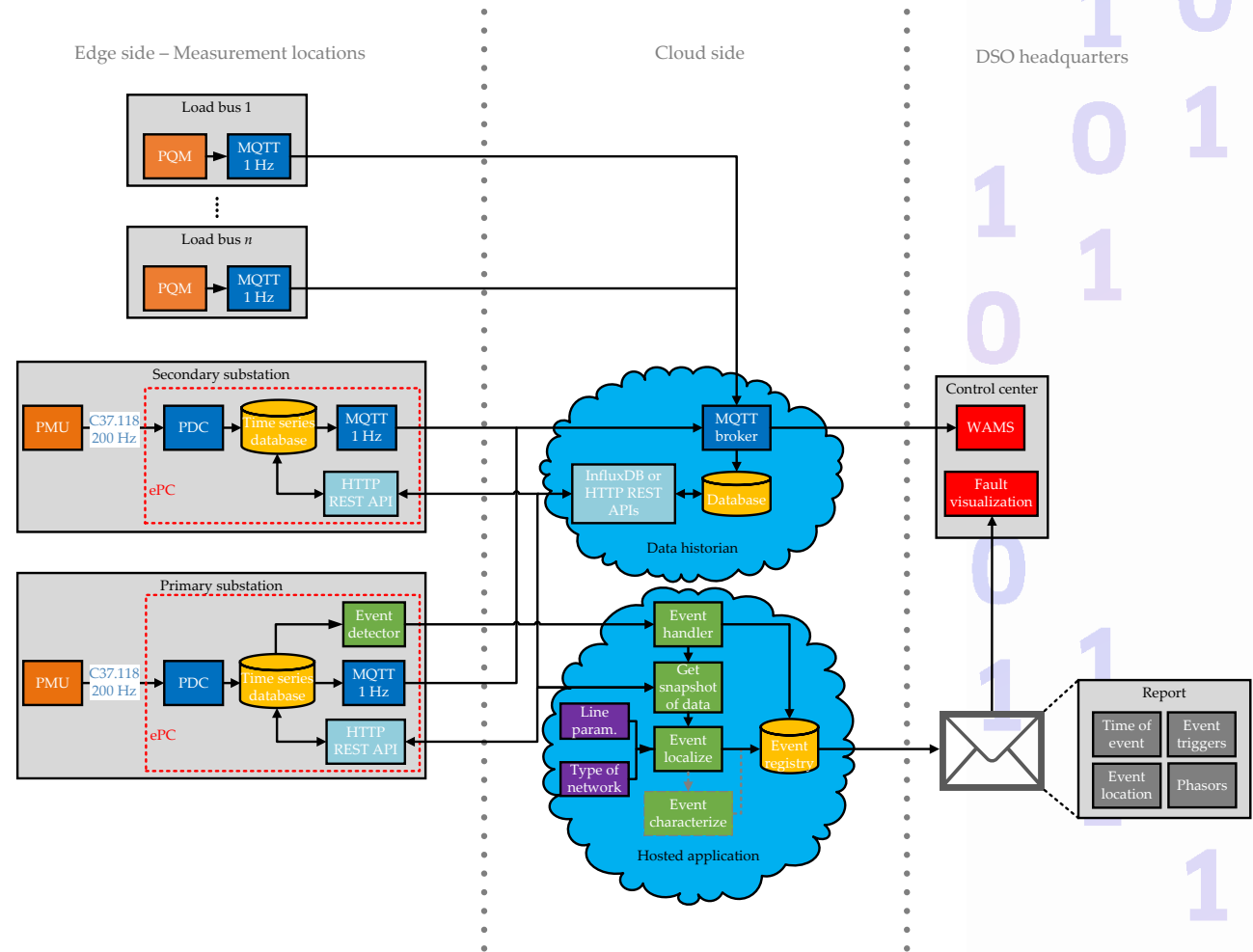
## Hybrid (aggregated) control





# Edge-Cloud Framework Example

- **Real-time fault detection, classification and localization in distribution grids**
  - Edge layer: measurement and pre-processing (detector)
  - Aggregation layer: events historian (classifier)
  - Central layer: events interpreter (localizer)
  - Report/alert generation
- **Context**
  - *20 ms* measurement period
  - *x\*10 s* event duration
  - *x\*1 month* events frequency



# Solution Vision

## • Requirements

- Nodes management
  - Upgrades, life-cycle evolvement
- Privileges management
  - Data access, service deployment
- Services orchestration
  - Monitoring, migration

## • Features

- Arbitrary edge hardware
  - /w Linux OS
- Zero touch provisioning
  - Programming and configuring automatically
- Security by-design
  - Hardware root of trust, VPN

# Thank you!



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PLATOON H2020 Project

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