The railway maintenance challenge

There is currently **no optimal** solution to inspect, monitor and maintain railway signalling assets

That is why **RADIUS** proposes a completely **new paradigm**

RADIUS will design, develop, test and demonstrate a **complete monitoring and maintenance system** using unmanned aerial systems (**UAS**)

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EU SPACE WEEK 2023

7 - 9 November - Sevilla, Spain

Project RADIUS – Railway digitalization using drones

European Commission

EUSPA European Union Agency for the Space Programme

User Consultation Platform: Rail

Fabio Scarpa, Manuel Oñate, Michelangelo Lamonica, Pedro Ribeiro

UE23 PRESIDENCIA ESPAÑOLA CONSEJO DE LA UNIÓN EUROPEA

Project consortium

PROJECT COORDINATOR

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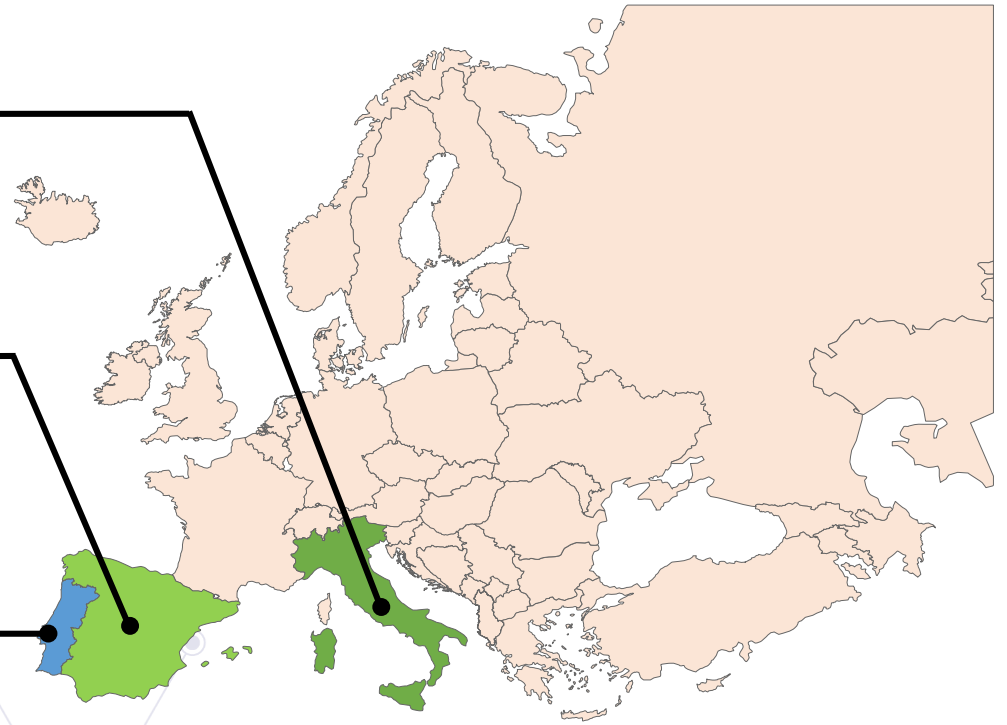

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Manuel Oñate
Communication and dissemination manager

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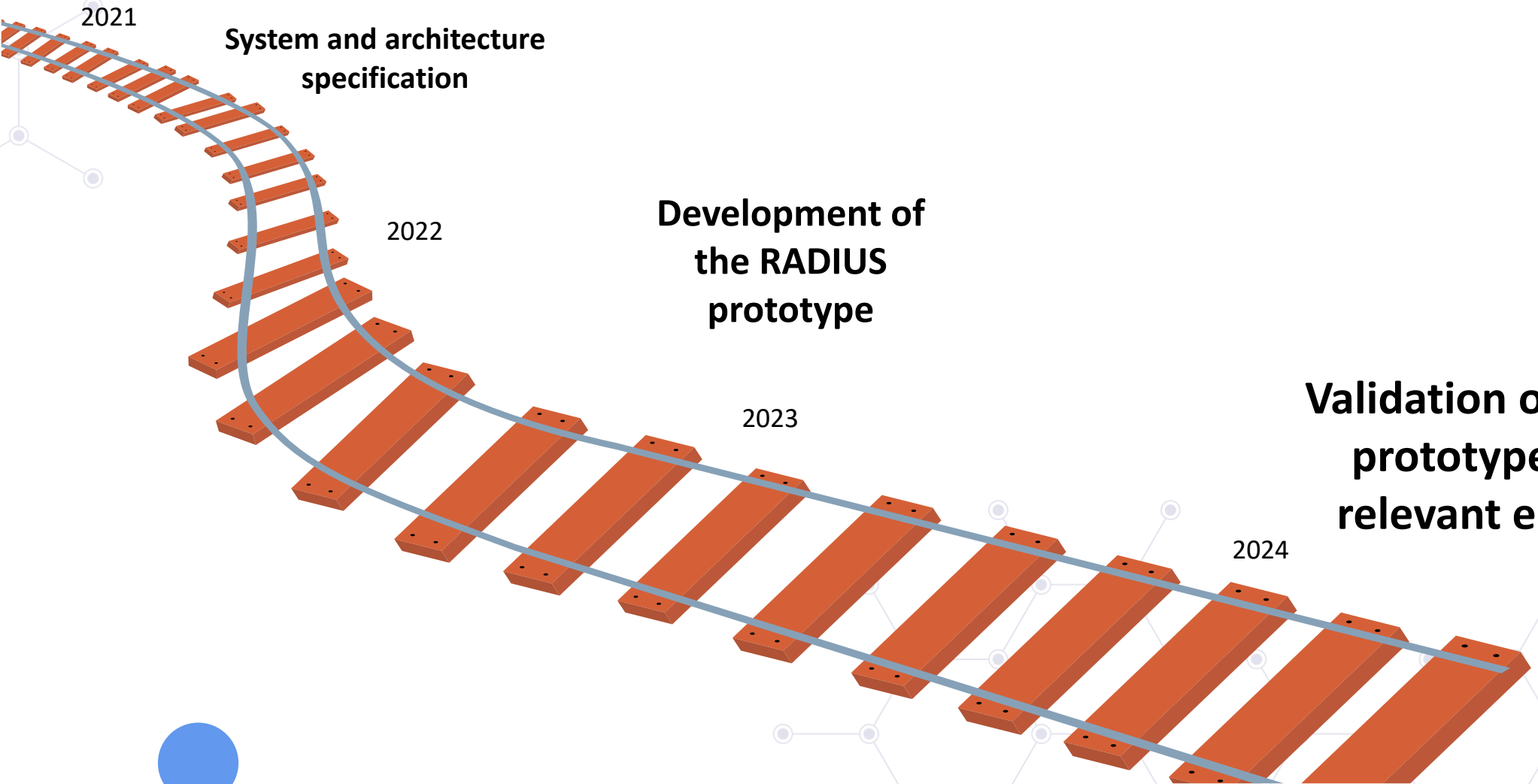
Project timeline



2021

System and architecture specification

2022

Development of the RADIUS prototype

2023

2024

Validation of the RADIUS prototype in railway relevant environment

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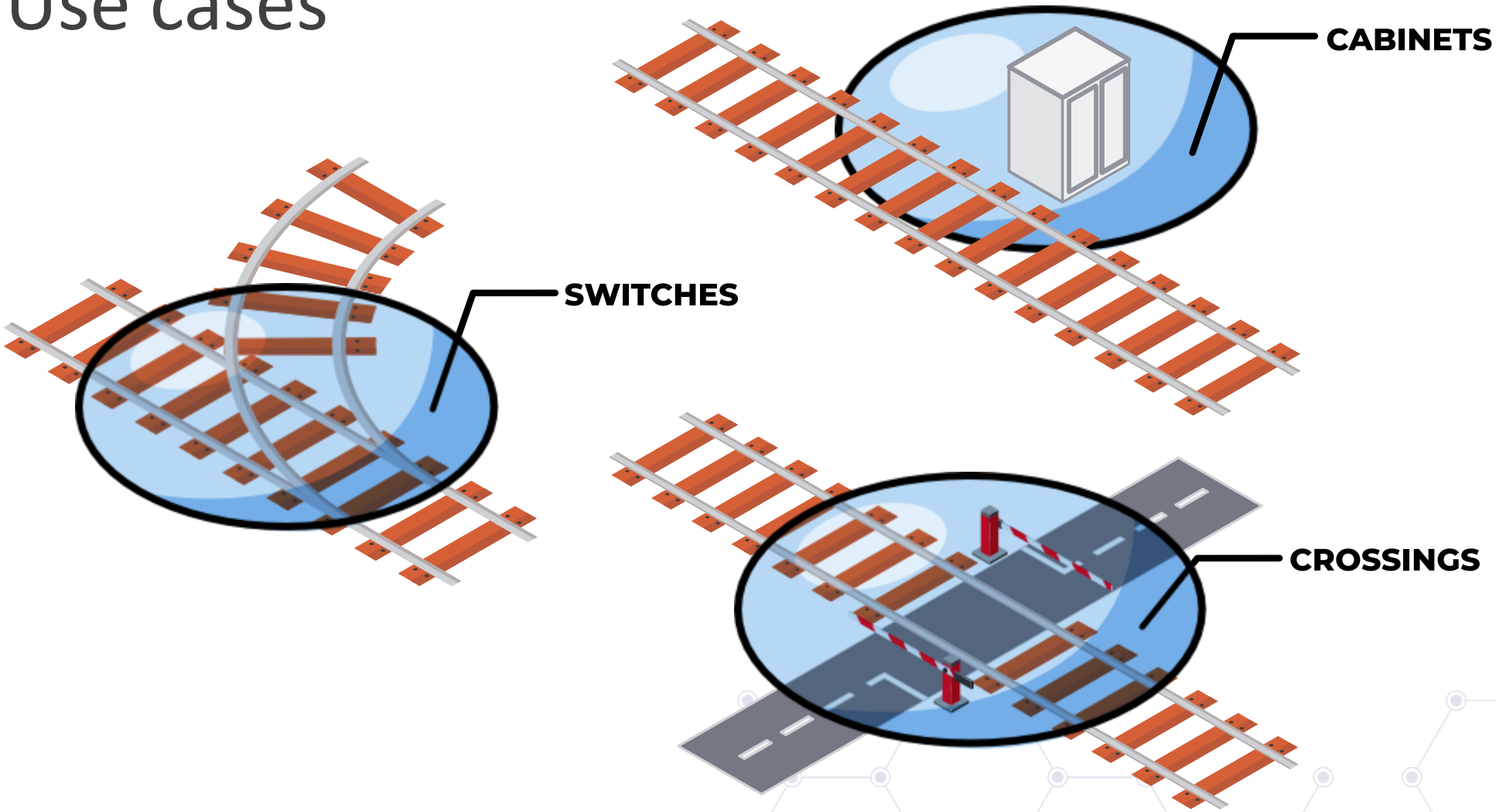
Use cases




radius

Project benefits

More frequent inspections

Increasing the frequency of inspections enables using preventive measures that increase the life span of signalling assets

Cost reduction

The RADIUS system will be easier to use and will reduce the initial investment and the running costs to maintain railway infrastructures

Safety increase

RADIUS will increase the safety of the maintenance operations and also the operational safety of the railways

New business models

The RADIUS concept can be extended to other activities and markets creating new service provision business models

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Michelangelo Lamonica
Worker Manager

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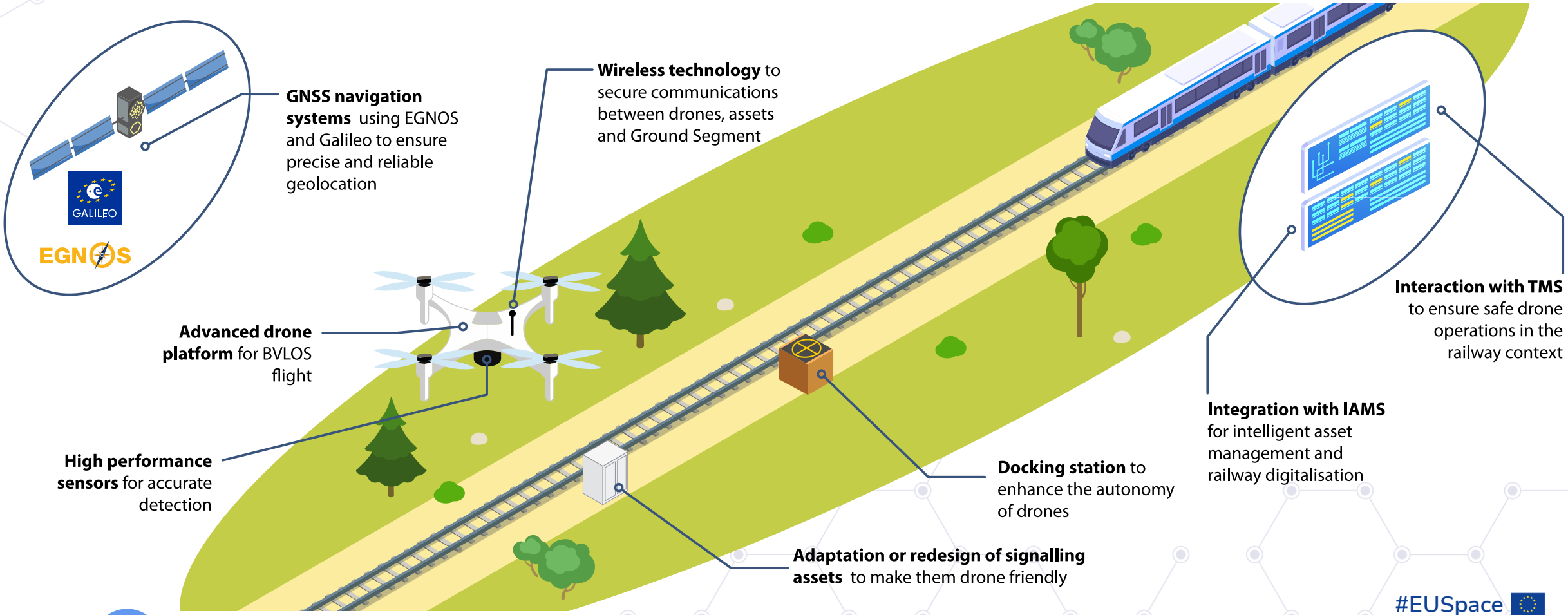
Key Technologies and Requirements



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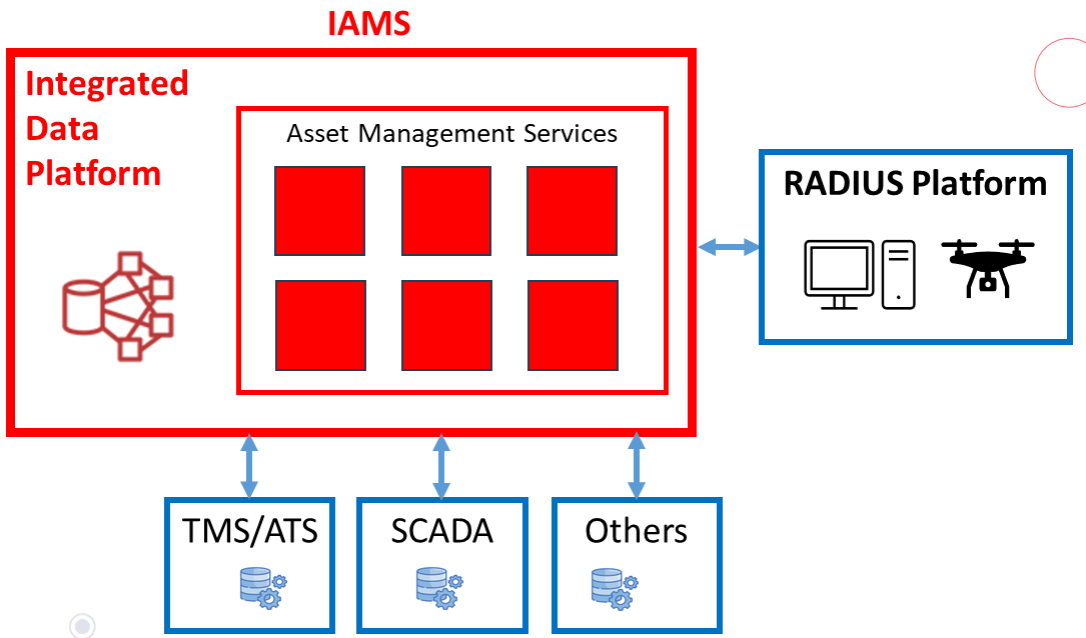
Integration with IAMS

The Intelligent Asset Management System (IAMS) is the Hitachi Rail digital solution designed to

- collect, store and process large volumes of data from different data sources;
- deliver results through specific applications to support reporting needs, maintenance activities and processes, and operations.

- Key Benefits & Contributions:

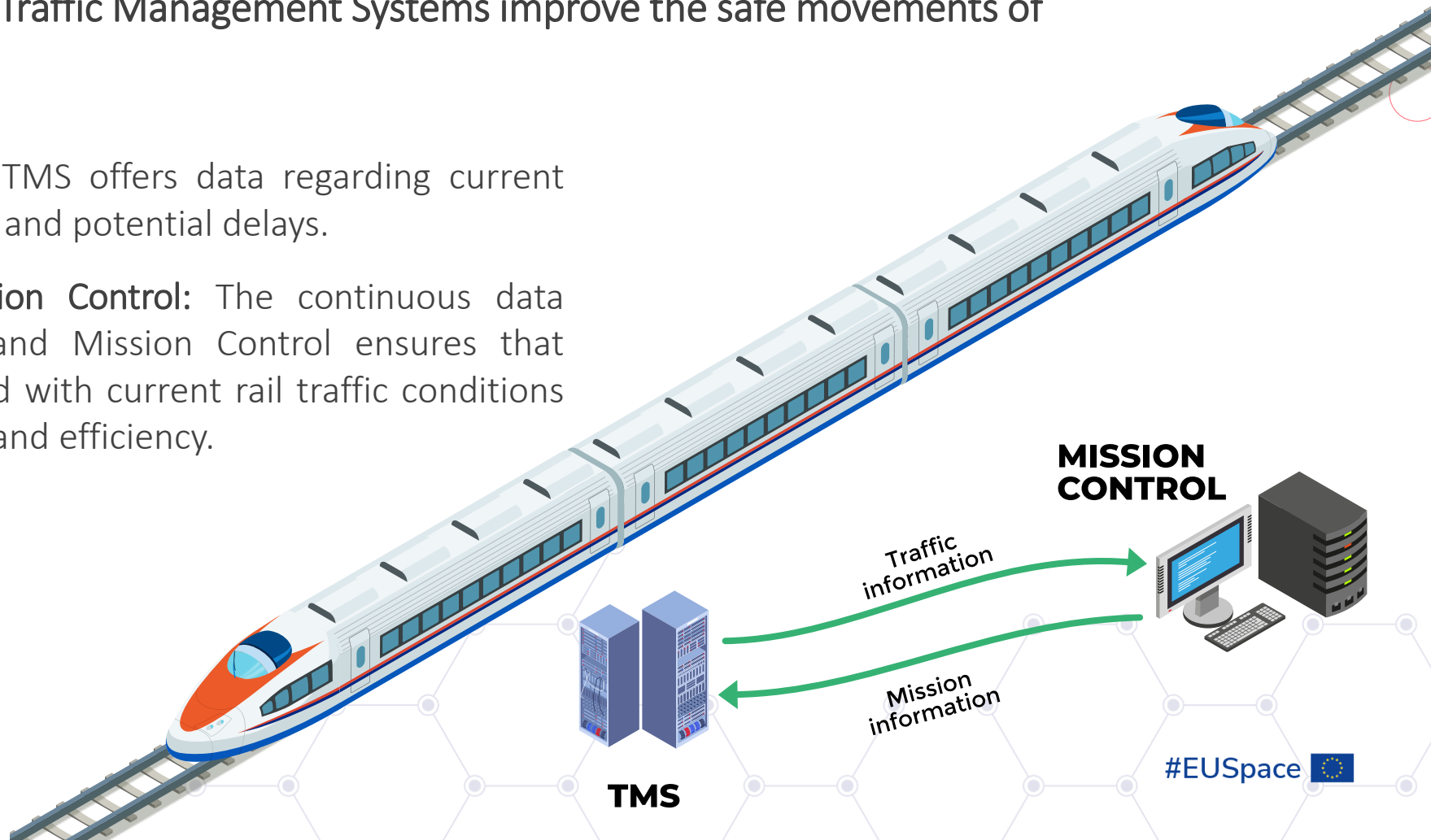
1. Seamless Integration: Ensures smooth integration of RADIUS outcomes in present-day railway maintenance.
2. Efficiency in Processing:
    1. Minimizes the processing power requirements within the RADIUS system.
    2. Leverages the offline processing capabilities of IAMS, alleviating the load on both the embedded Drone and the Ground Segment.
3. Railway Digitalization: Plays a key role in advancing the digital transformation of the railway sector.



Interaction with TMS

The interaction with current Traffic Management Systems improve the safe movements of drones within the railway

1. **Real-time Rail Traffic Info:** TMS offers data regarding current train occupancy, schedules, and potential delays.
2. **Synchronization with Mission Control:** The continuous data exchange between TMS and Mission Control ensures that drone missions are planned with current rail traffic conditions in mind, maximizing safety and efficiency.



GNSS navigation systems

- Given the complexity of the scenario in which the Radius project operates:
  - operational railway lines
  - high speed
  - high train traffic
  - proximity to populated areas
  - presence of railway infrastructure and vegetation
- It is essential for the development of the project that inspection operations are carried out safely.

Hence the need for a geolocation and navigation system that can guarantee high standards of availability, accuracy and integrity

Navigation and positioning solutions, such as EGNOS (SBAS) and GALILEO, improve drone flight control and movement safety in a complex railway operating scenario.

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Pedro Ribeiro
Chief Technology Officer

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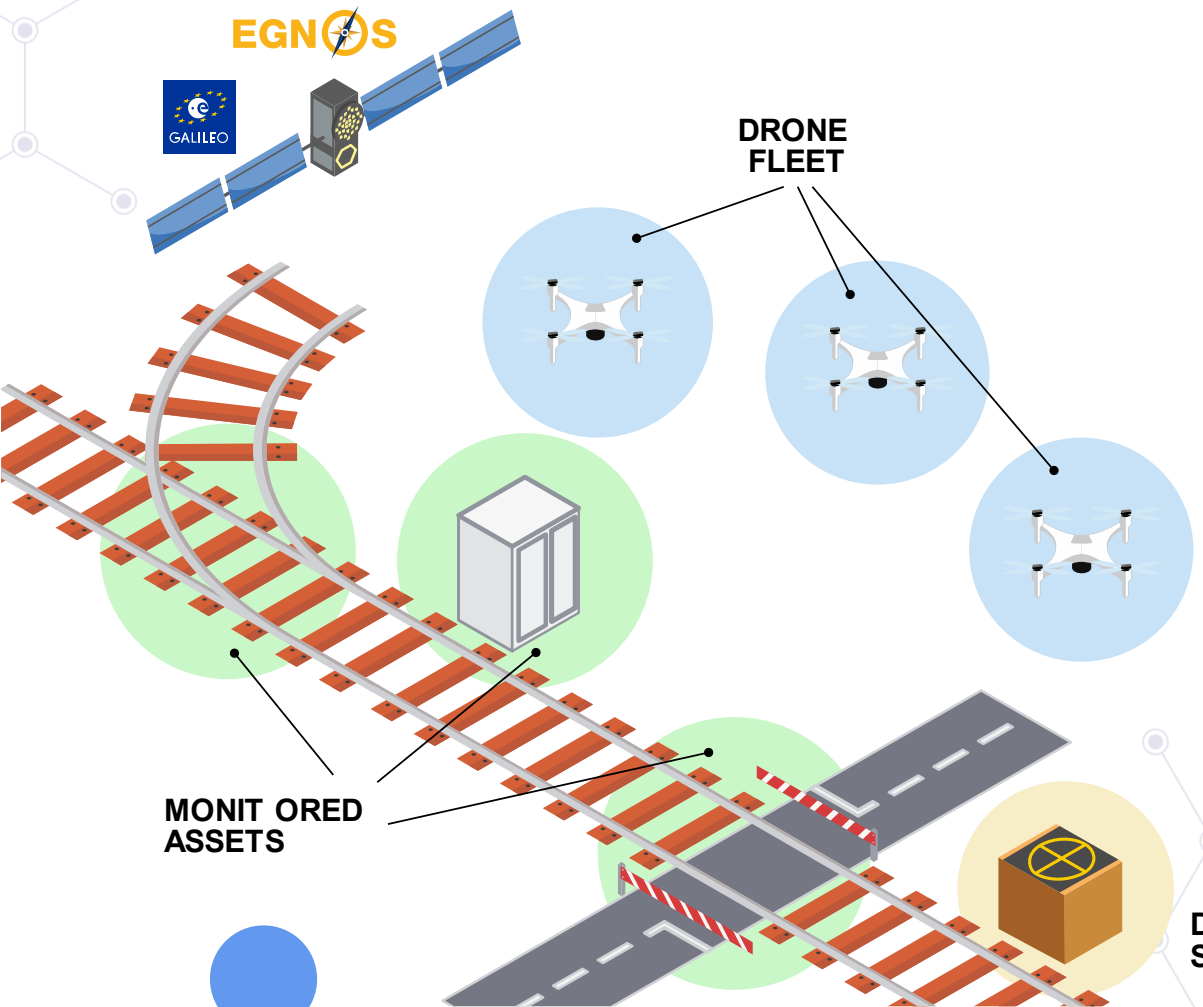
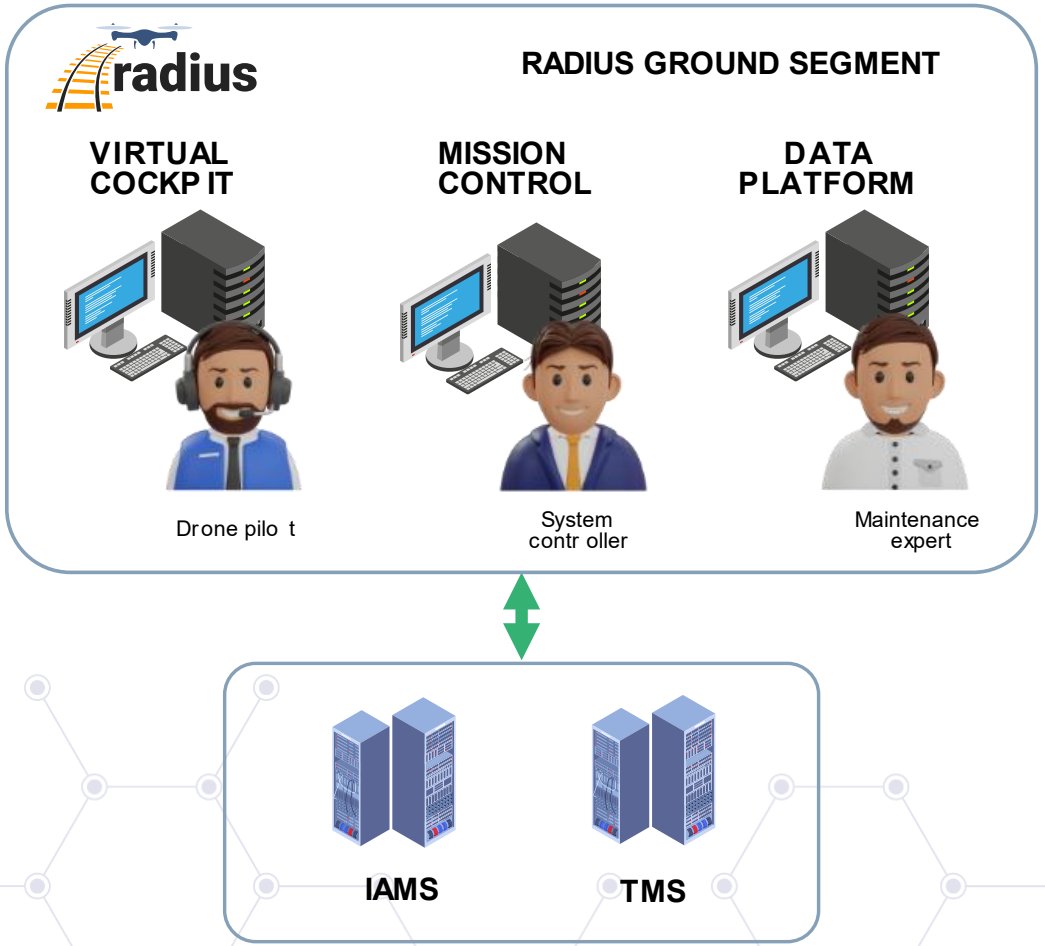
RADIUS System Architecture





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Search

- Fleet Dashboard
- Infrastructure
- Operations
- Maintenance
- Virtual Cockpit
- Export

Pedro Ribeiro
Admin

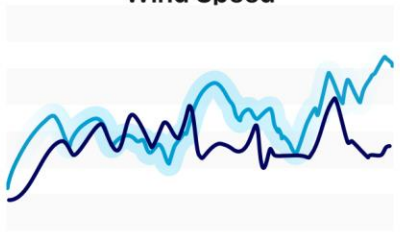
- Settings
- Log out

Fleet Models

Matrice30	12 units
Matrice300	8 units
Albatross	3 units
Mavic3	2 units

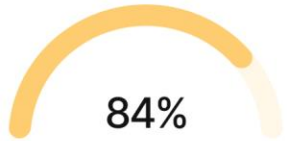
Fleet Report →

Wind Speed



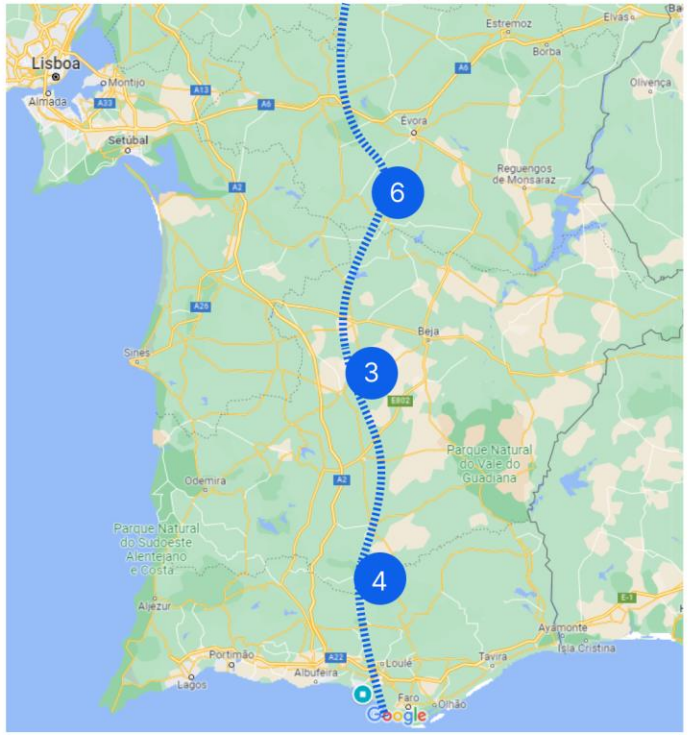
Constraints Report →

Daily Operations



Operations Schedule →

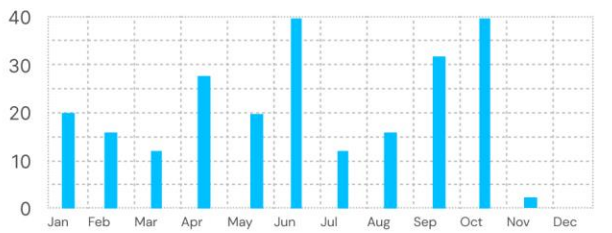
Maps



Detailed Map →

Assets Inspected

2023



Total Flights Distance

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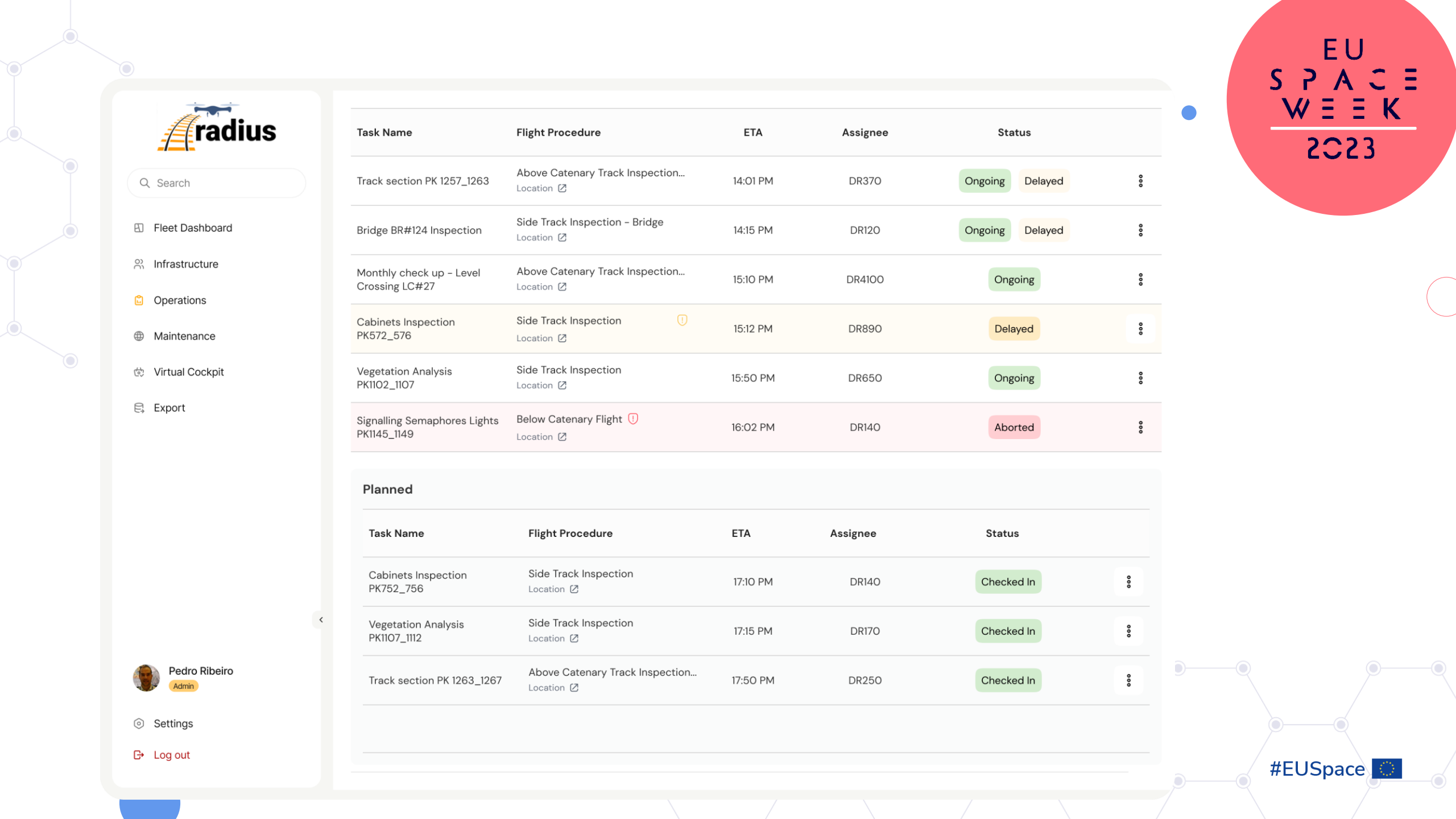

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Radius: Innovation Opportunities

- 3D GNSS Capabilities with improved position and altitude accuracy
- PPP (Precise Point Positioning) for centimeter-level accuracy
- Consistent and Stable readings to ensure predictable flight behaviour
- Enhanced anti-jamming and anti-spoofing capabilities in GNSS receivers can help protect drones from intentional or unintentional signal disruption.

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