



High integrity **E**GNSS **L**ayer for **M**ultimodal
Eco-friendly **T**ransportation

HELMET Project

RadioLabs



sogei



ITC

roboauto

Test Campaign on the Roma – Fiumicino highway
11 – 13 April 2022

Develop Satellite Navigation technologies for an *eco-friendly, smart and innovative* transport sector that makes the most of digitalisation and automation

Target applications

- Connected & driverless **CARS**
- **Train management & automation**
- **Drones** for surveillance roads and railways.



HELMET

Enabling Safety critical applications on road and rails

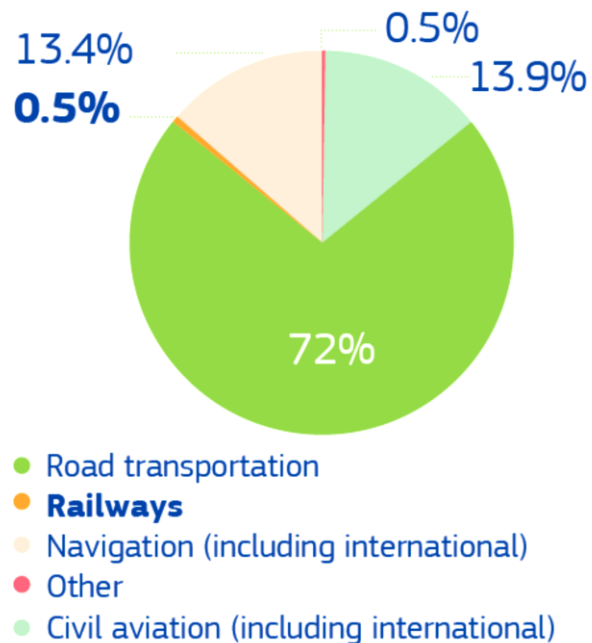


Make Transport safer, more sustainable, accessible and reliable by optimising new technological infrastructures

Synergy between **Train** and **Connected cars technologies will bring to** an economically-sustainable, safer ecosystem – a priority of the European Green Deal - leveraging on

- osmosis of best-practices from rail to automotive
- car market potential for a wide spread of GNSS in the transport

Greenhouse gas emissions from transport (EU-28, 2017)



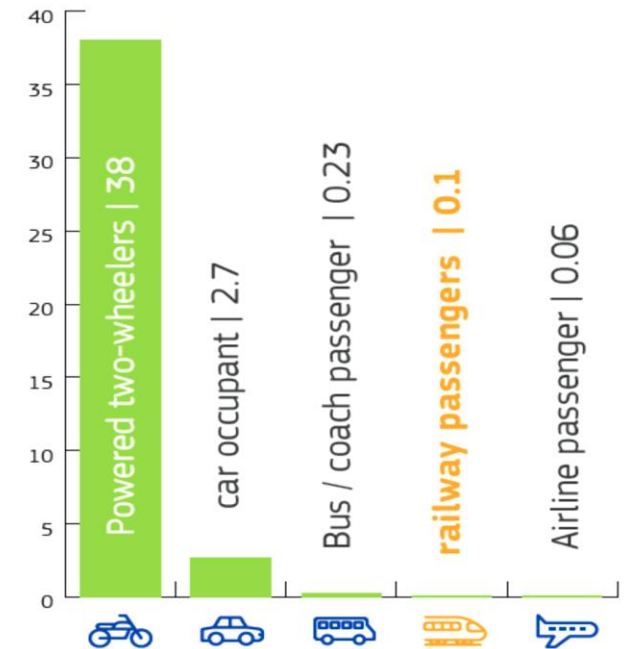
Strategic benefits

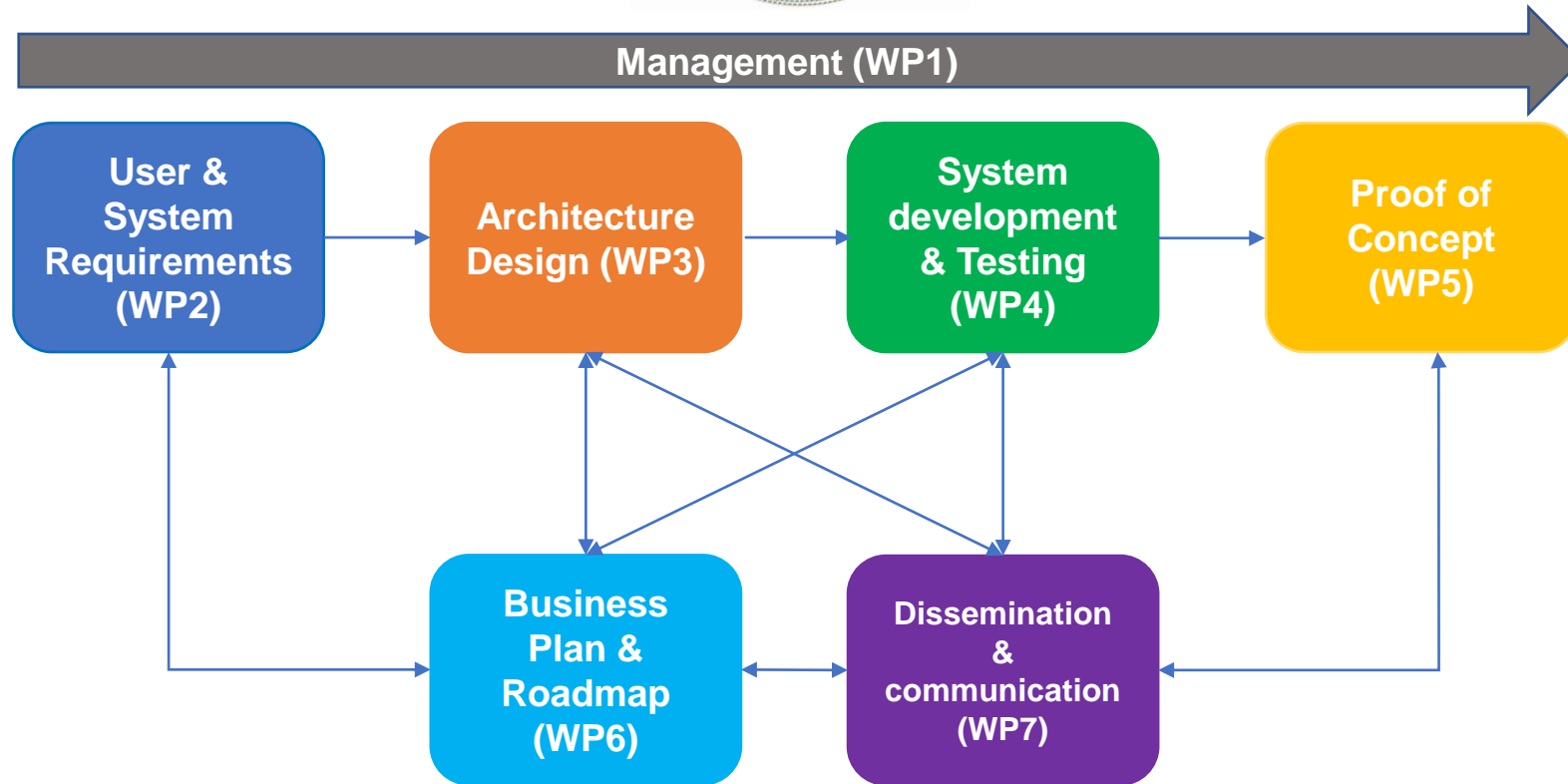
- ❑ increase modal shift from roads to rail
- ❑ Improve safety with connected cars

March 2020

#EUGreenDeal

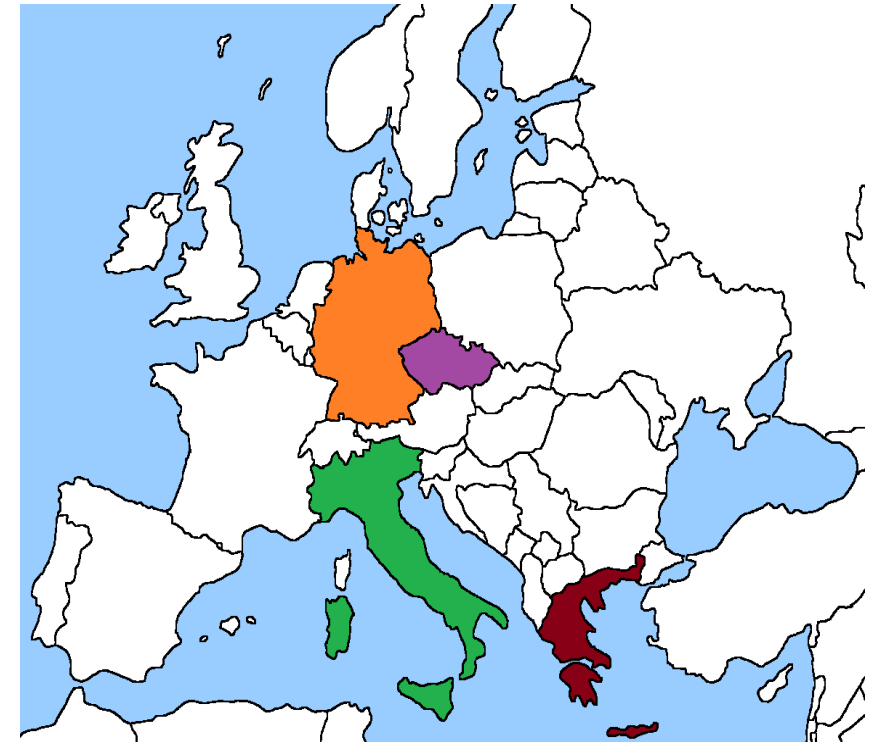
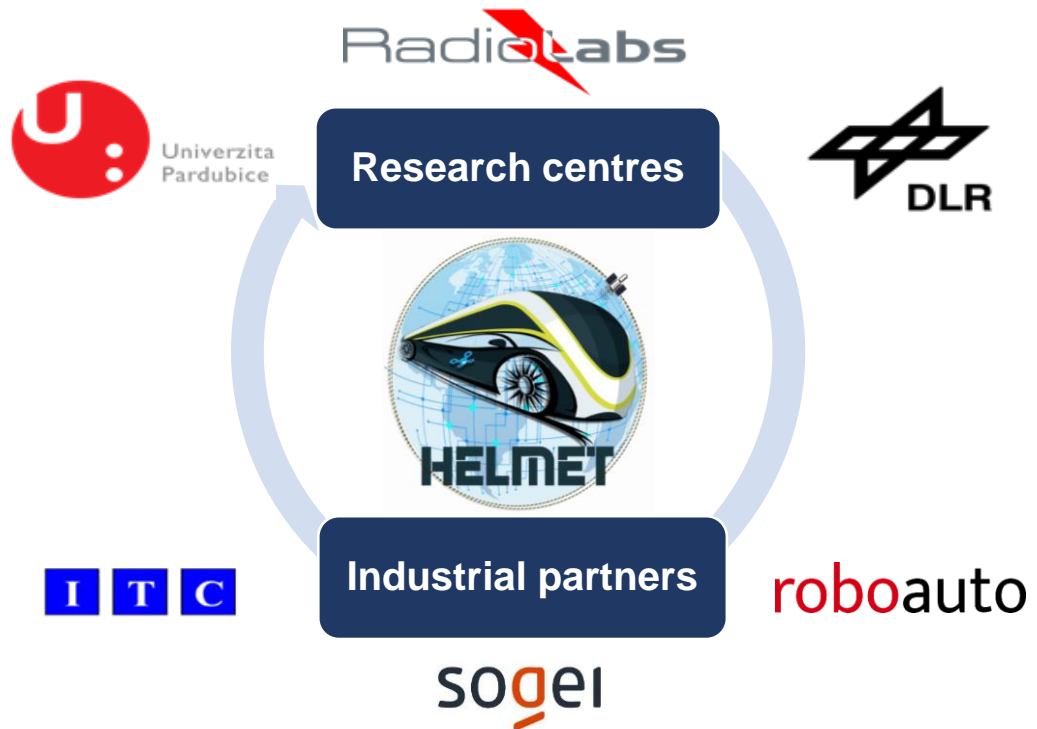
Fatalities per billion passengers/km 2011 - 2015

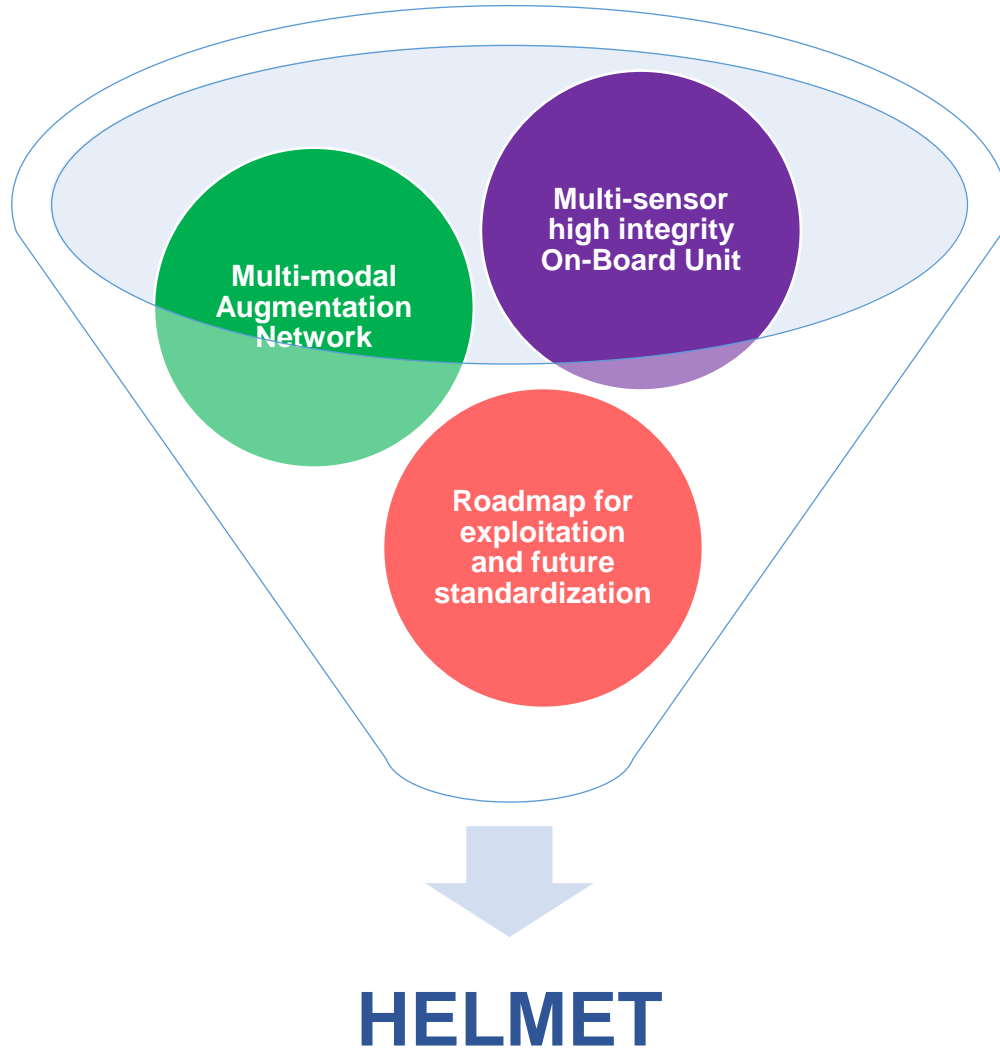




WP No	Del Rel. No	Title	Dissemination Level	Del. Date
WP1	D1.1	Project and Risk Management Plan	Confidential	01 Jul 2022
WP1	D1.2	Data Management Plan	Confidential	01 Jul 2020
WP1	D1.3	ORDP	Confidential	01 Jul 2020
WP2	D2.1	User Requirement Specifications	Public	01 Apr 2020
WP2	D2.2	HELMET CONOPs	Public	01 May 2020
WP2	D2.3	System Requirement Specifications (with traceability matrix)	Public	01 Jun 2020
WP3	D3.1	High level design document	Public	01 Sep 2020
WP3	D3.2	Functional Architecture Design Document	Public	01 Oct 2020
WP3	D3.3	Detailed Design Document	Confidential	01 Jan 2021
WP3	D3.4	Test Plan	Public	01 Jan 2021
WP3	D3.5	Development Plan	Confidential	01 Jan 2021
WP4	D4.1	Development Report	Confidential	01 Oct 2021
WP4	D4.2	Test Procedures	Public	01 Oct 2021
WP4	D4.3	Laboratory test report (with verification matrix)	Public	01 Jan 2022
WP5	D5.1	Proof of Concept Test Report (with verification matrix)	Public	01 Jun 2022
WP5	D5.2	Validation Report	Public	01 Jun 2022
WP6	D6.1	Business Plan Update	Confidential	01 Jul 2022
WP6	D6.2	Innovation Plan	Confidential	01 Jul 2022
WP6	D6.3	Roadmap for the exploitation	Public	01 Jul 2022
WP6	D6.4	Roadmap for the standardization and certification in land transportation	Public	01 Jul 2022
WP7	D7.1	Dissemination and Communication Plan	Confidential	01 Apr 2020
WP7	D7.2	Dissemination and Communication activities	Public	01 Jul 2022
WP8	D8.1	POPD - Requirement No. 1	Confidential	01 Apr 2020
WP8	D8.2	EPQ - Requirement No. 3	Confidential	01 Apr 2021

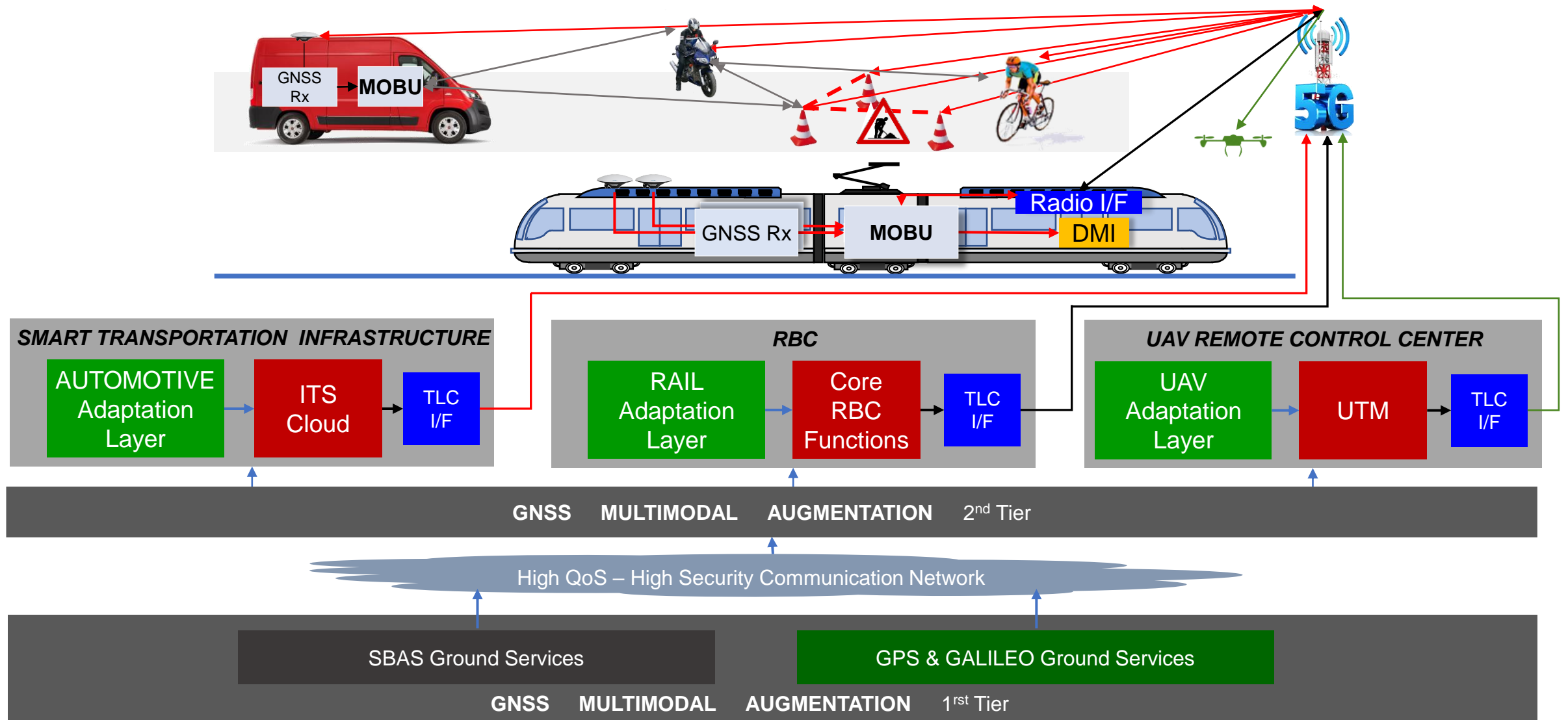
Multidisciplinary team including research centres and industrial partners





- Leverage of expertise, experience and cutting-edge technologies available in state-of-the art for designing high integrity and **high accuracy multimodal AIMN** for land transportation and UAV
- Design of high integrity and high accuracy **multi-sensor** algorithms based on **COTS** devices
- Contribution to draw an advanced **roadmap** for exploitation and future commercialisation of EGNSS solutions for land transportations;
- Contribution to the GNSS **certification** and authorization process into the ETCS/ERTMS and connected and semi-autonomous sectors
- Working collaboration methodology **Industry 4.0**

Multi-modal architecture

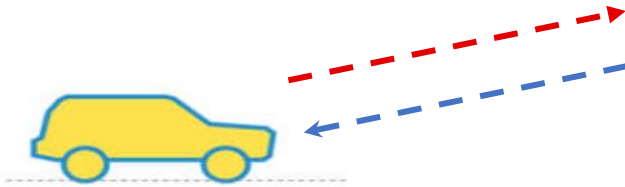


Achievements and future prospects



- **MULTI-MODAL AUGMENTATION PLATFORM** for Rail, Roads and Drones
- **SAFETY** framework for **ROAD** vehicles harmonized with avionics and rail best practices
- **MULTISENSOR On Board Unit** with advanced Integrity Monitoring Capabilities
- **TIGHTER INTEGRITY BOUNDS** incorporating (Statistical) Knowledge about **Local Hazards**
- Contribution to the standardization working-group **RTCM SC 134**

Identified *early adopters* in Italy



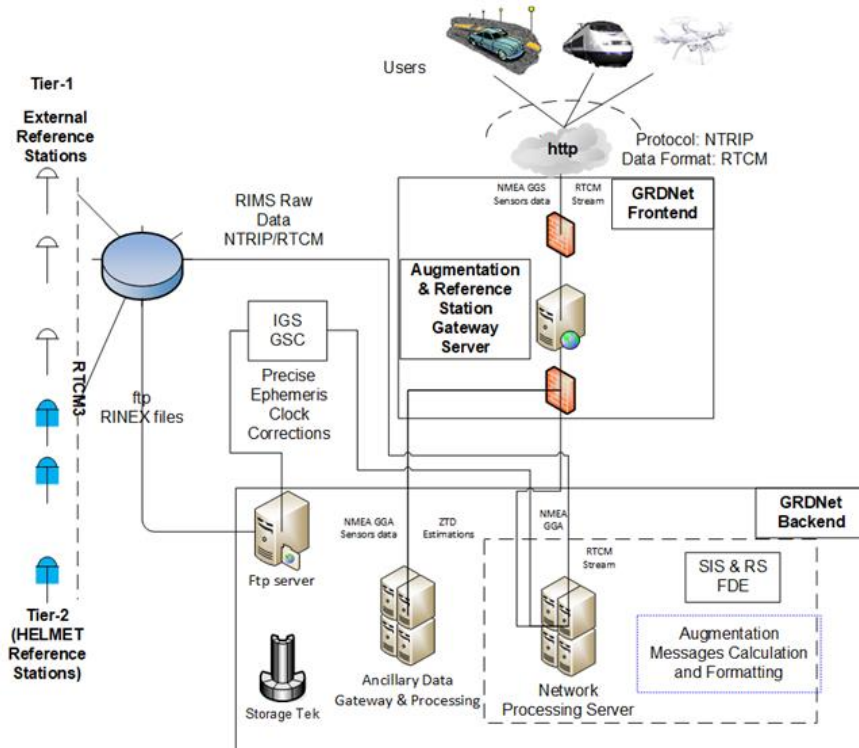
Smart Road - ANAS



ERSAT - RFI

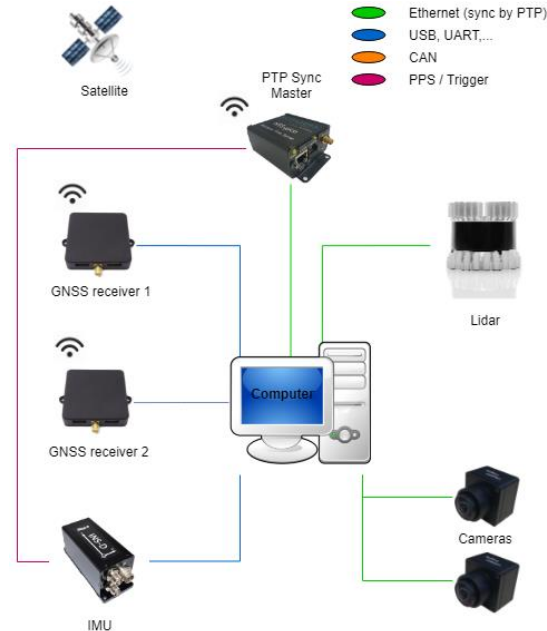
Monitoring Network (AIMN)

- Integrity
- Tropospheric corrections



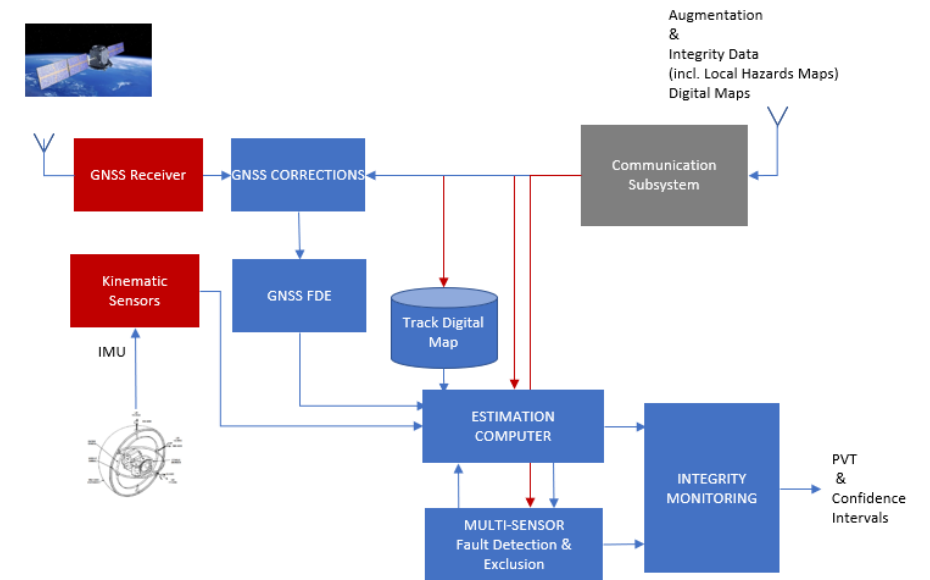
Automotive MOBU

- HW On-Bord-Unit
- Integrity algorithms
- Computer Vision algorithms



Rail

- Simulator for train and sensor data
- Integrity algorithms



WP5 objectives

- to perform system testing of the HELMET integrated platform;
- to carry out the final validation of the HELMET platform through an independent assessor



Stanford University

WP5 tasks

- test execution;
- test analysis;
- testing reporting;

Field test campaign activities

- Equipment and set up of vehicles for field tests
- Field Pre-test activities and data collection
- Joint demo on the A90 Rome-Fiumicino Highway



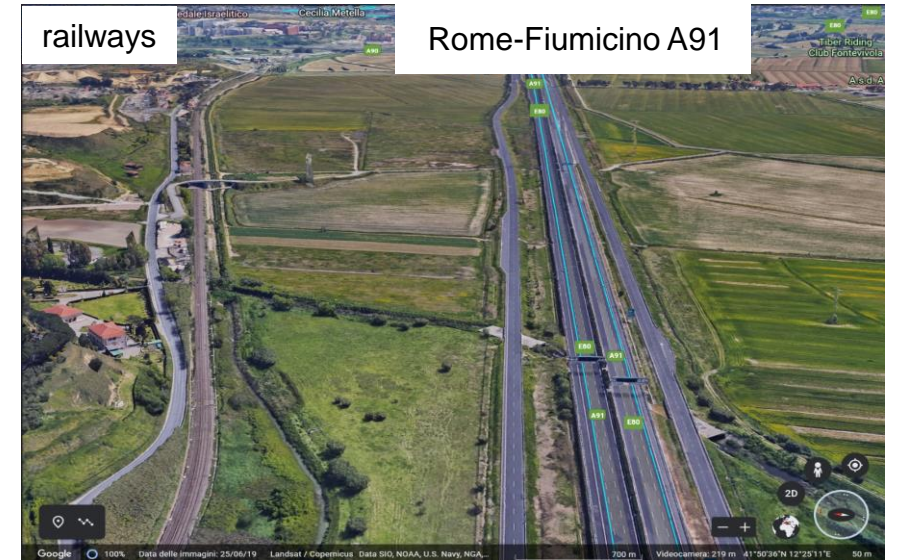
DEMO APPROACH FOR RAIL



Behavior of the train simulated by the vehicle with Track-constrained PVT calculation



TrackDB based on real data (first field test campaign on Rome-Fiumicino highway) and augmentation information from commercial service (RTK).



Rome-Fiumicino A91 highway (Test track)

Scheduling of activities

- First acquisition campaign for **trackDB creation** (April 7)
- Second acquisition campaign for **post processing analysis** on the PVT calculated by the OBU (April 12)
- Field test campaign for **real-time processing** of GNSS data + Sogei augmentation (April 12)

During the tests, environmental data from on-board cameras were collected for in-depth post processing analysis.

TEST EQUIPMENT

Rail MOBU

First acquisition campaign for trackDB generation

Field test equipment: GNSS receiver + cameras (GoPro).

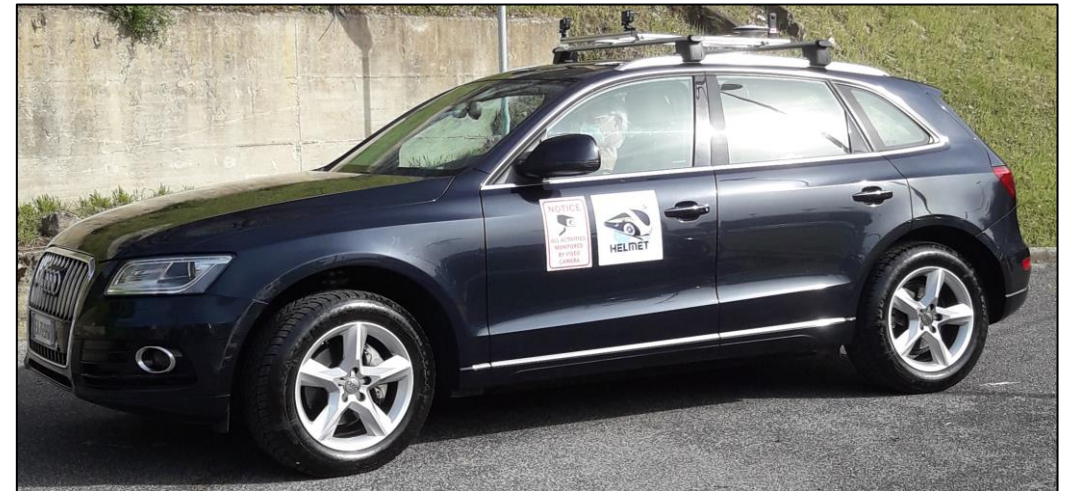
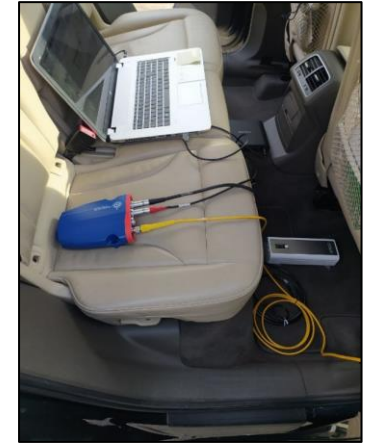
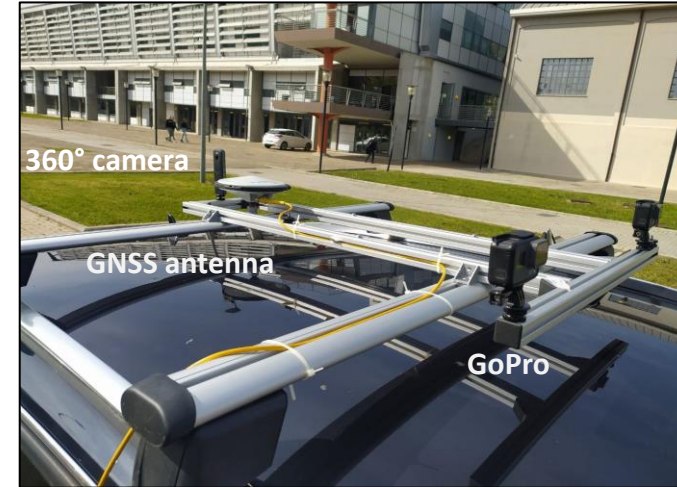
Post Processing analysis: HxGN SmartNet augmentation data + RTKLib for trackDB generation.

Second acquisition campaign for post processing analysis on the PVT calculated by the OBU

Field test equipment: GNSS receiver + cameras (GoPro + 360°).

Field test campaign for real-time processing of GNSS data + Sogei augmentation

Field test equipment: GNSS receiver (GPS, GALILEO) + cameras (GoPro + 360°) + Sogei augmentation network.



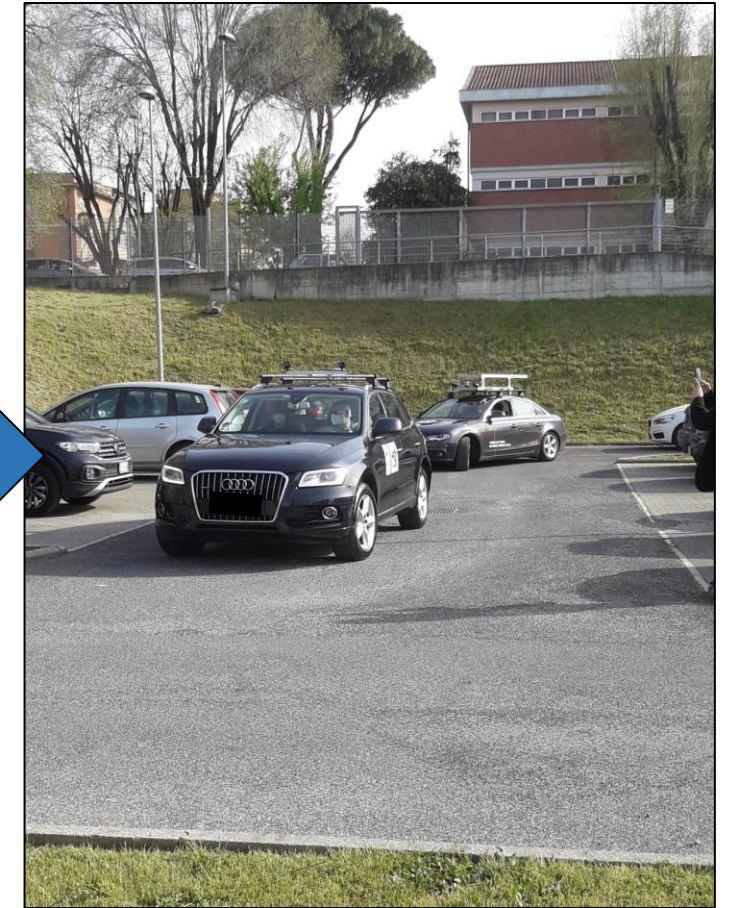
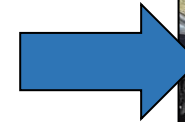
HELMET DEMO – ROME 11-13 APRIL 2022 – Automotive



Automotive MOBU



JOINT DEMO (RADIOLABS – ROBOAUTO/DLR)



Start/End Race - RomaTre University Parking



A91: Rome-Fiumicino highway



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➤ Visit us on HELMET website:

<https://www.helmet-project.eu/>