



#EUSpace 



MINISTERIO DE TRANSPORTES, MOVILIDAD Y AGENDA URBANA



# Francesco Rispoli

HELMET

High Integrity EGNSS Layer for Multimodal Eco-friendly Transportation



#Satellite4Rail



# Overview

GNSS platform to simultaneously support multiple user classes demanding safety requirements in addition to needing sub-meter accuracy for

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

*Using EGNOS, Galileo, local networks and the* Standard Messages formats for **GNSS Integrity Augmentation at User and Service Provider Level**, with a **Multimodal** Approach - RTCM, SC 134 standard (mid 2024)



# Synergy with automotive applications



## Synergies between Railways and Road Transport

Common vision:

- Integrated
- Connected
- Resilient
- Automated

Common traffic management and mobility as a service

The automotive industry has been an economic success story for Europe.



Prosperity and growth

**> €1 trillion**  
Contribution to EU GDP in 2022

**~7%**  
of EU GDP



Employment

**13.8 million**  
jobs in auto industry

**6.1%**  
of total EU employment



Innovation

**~€60 billion**  
annual spending on R&D

**~30%**  
of total EU R&D spending

Note: Due to data sourcing considerations for continental Europe as a whole, EU data was used for key figures. Source: ACEA; Brand Finance; Eurostat; McKinsey analysis

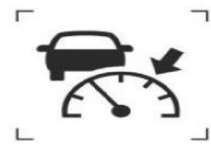
McKinsey & Company



María-José García, HELMET Workshop



Adaptive Cruise Control



ISO 7000-2580

GNSS & video to update the vehicle speed limit to reduce speed excess which today causes around 30% of fatal crashes



Mandatory for all new cars by July 2024

#Satellite4Rail



# Highlights

## GNSS Augmentation for high integrity/accuracy positioning

- ERTMS, ATO
- Connected Cars, Smart Roads
- Drones for surveillance and delivery of goods flying above roads and railways

## Interface with customer's OBU

COTS/custom receivers

RTCM SC134 std. being finalized with receiver manufacturers

#Satellite4Rail



Sharing GNSS and  
Telecom infrastructures  
to reduce capex/opex

### Current Status

- Project concluded with tests on train & car and economical sustainability analyses
- Initial roll-out planned in Italy

# Service levels

Service Level	Augmentation	95% Accuracy	1 - 10 <sup>-7</sup> Protection Level
1(a)	DF GPS + Galileo SBAS (EGNOS)	0.3 – 1.0 m	5 – 25 m
1(b)	(add) DF LADGNSS	0.15 – 0.4 m	2.5 – 10 m
2	(add) PPP-AR	0.02 – 0.10 m	0.5 – 2.5 m
3	(add) RTK/NRTK	0.01 – 0.05 m	0.2 – 1.0 m

**ERTMS with EGNOS V2 & Local network + Galileo 2014**

[European GNSS in Action: the ERSAT EAV project | EU Agency for the Space Programme \(europa.eu\)](http://europa.eu)



*HELMET Assessment and Future Prospects, Sam Pullen Stanford University, Stanford, CA, USA*

# Performance

## Train and Line

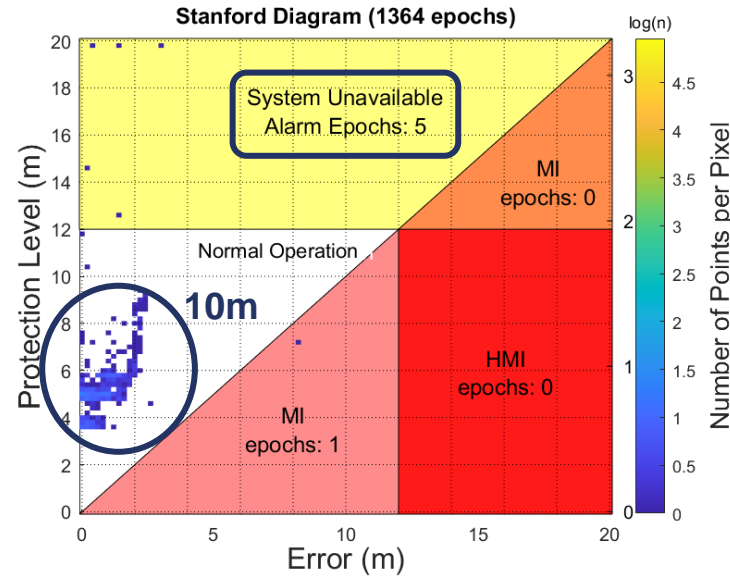


Commercial train: Aln 668-3136  
Cagliari – Decimomannu Line:

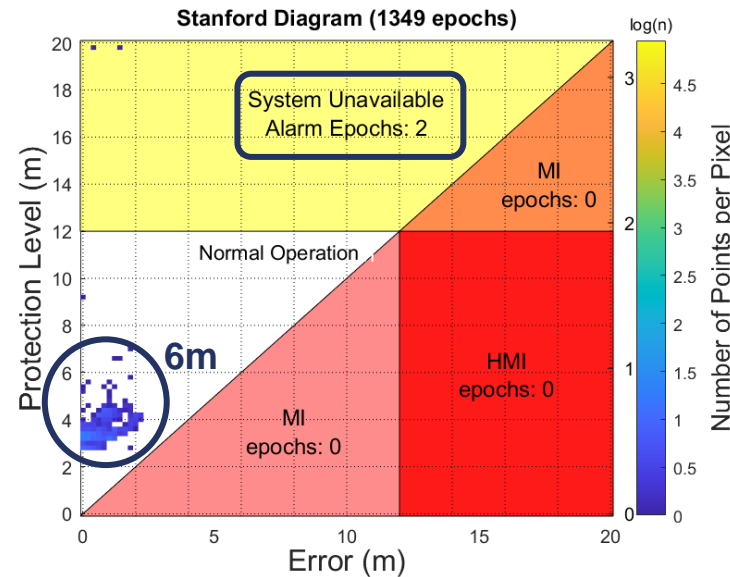
- Double Track line
- Maximum speed 150 km/h



Single frequency  
GPS + EGNOS  
Solution Separation



Single frequency  
GPS + GALILEO + EGNOS  
Solution Separation



HELMET Test campaign on RFI Test Bed

#Satellite4Rail

# Looking beyond HELMET

- Certification procedures and safety cases for mature augmentation tiers
- Deployment of a Test-Bed in Italy for ERTMS and Smart Road applications
- Virtual-testing Laboratory to support the certification of multi-sensor OBU
- Improvements: multipath errors, PPP-RTK, cyber-security, Galileo HAS
- Examine use of Solution-Separation RAIM as the final check on OBU integrity
- Contribution to Europe's Rail plan

[HELMET PROJECT – HELMET \(helmet-project.eu\)](https://helmet-project.eu)

[Q: How can GNSS augmentation services be combined to simultaneously support multiple user classes with demanding but varied requirements? - Inside GNSS - Global Navigation Satellite Systems Engineering, Policy, and Design](#)

[ESA - ESA-backed autonomous driving lab set for Italy](#)



# Francesco Rispoli

General Director RadioLabs, Manager National Cluster of Transports. From 2011-21, with Ansaldo STS, Hitachi Rail STS responsible satellite operations and referent with space agencies. Previously in Telespazio, Head of New Initiatives, Alenia Spazio, Vice-president Multimedia Business Unit and Contraves. Degree of Electronic Engineering, Polytechnic of Turin 1978, Master on Applied Electromagnetism, University La Sapienza Roma 1980. Innovation prize, Finmeccanica 2012.

