



GNSS Automated Virtualized Test Environment for Rail

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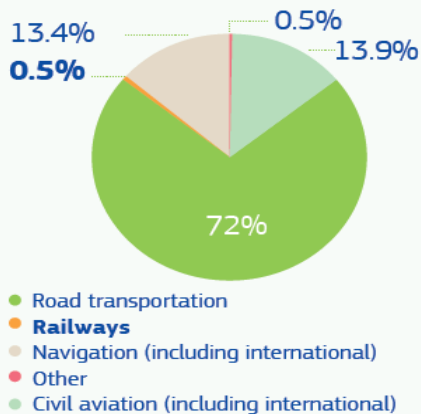


The railway context relevant to GNSS innovations



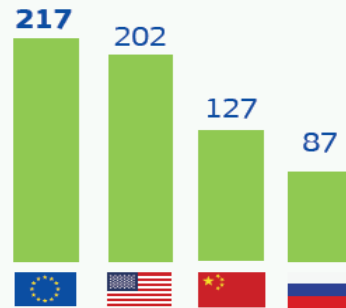
Rail is sustainable

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



Rail connects people

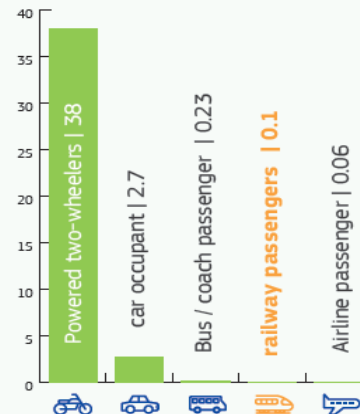
Length of railway lines in use, in 1000 km



Source: Statistical Pocketbook 2019

Rail is safe

Fatalities per billion passengers/km 2011 - 2015





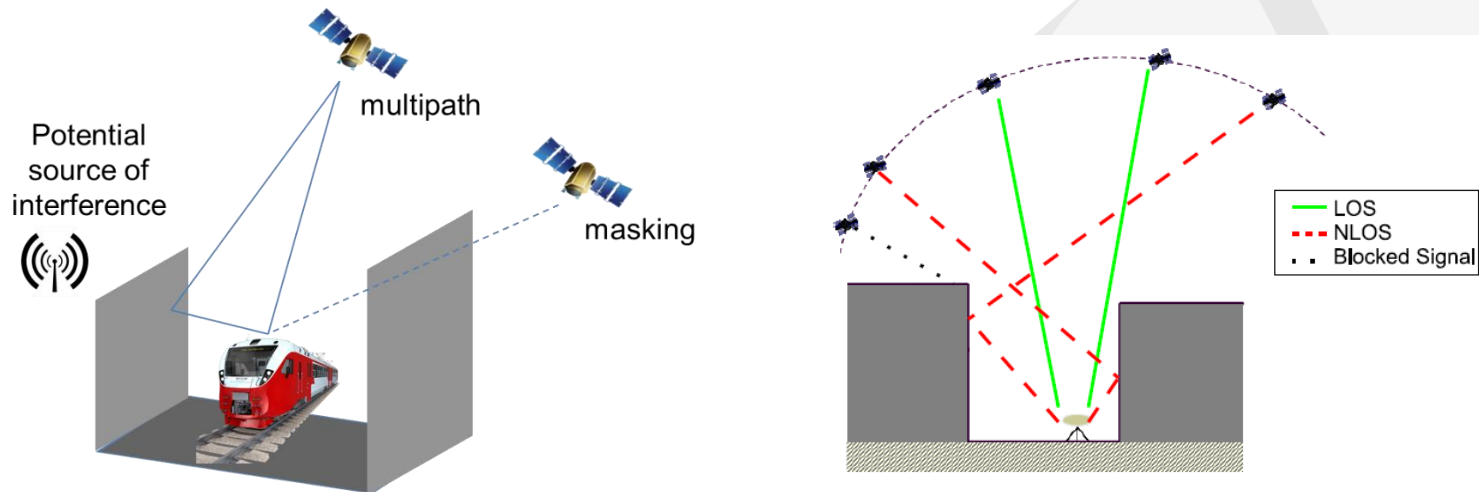
GATE4Rail Project

- **GATE4Rail** provides a **LABORATORY TEST ARCHITECTURE** capable of simulating **railway scenarios for GNSS-based ERTMS applications** by integrating different simulation blocks and by defining their interfaces in order to cover a global simulation chain.
- **GATE4Rail** has been driven by a consortium composed of the **main actors** involved in current and recent state of the art projects, concerning GNSS introduction in ERTMS and evaluation tools.



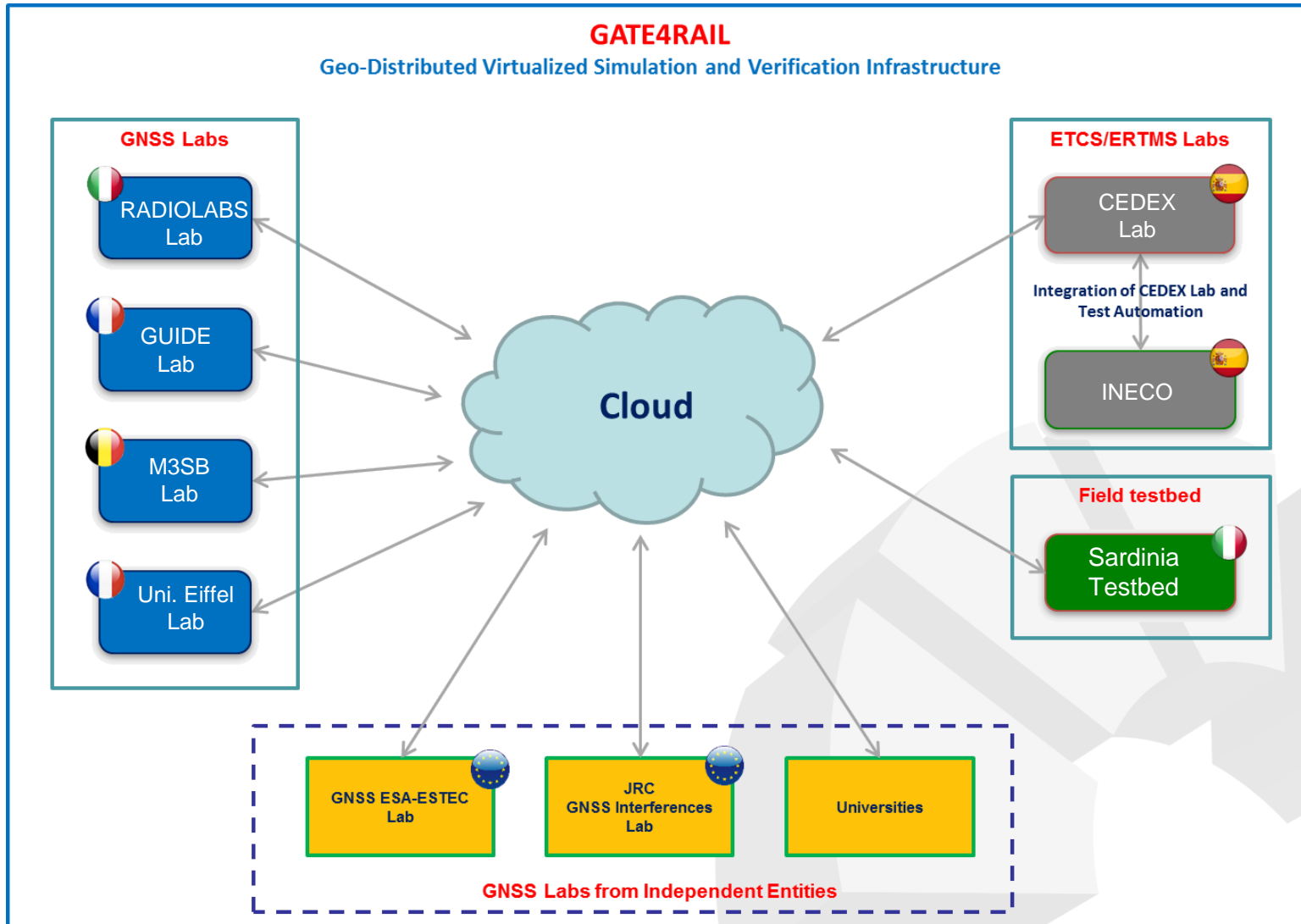
Main objectives

- Identification, modelling and simulation of GNSS reception along a railway line, focusing in particular on **MULTIPATH** and **INTERFERENCES** effects
- Definition of **TEST SCENARIOS**, considering both rail operations and GNSS
- Simulation of GNSS signal reception in **NOMINAL MODE** and in presence of **FAULTS**
- Contribution in the development of the **S2R simulator** and its verification





Geo-distributed Infrastructure Concept





The Zero on-Site Test Approach

DIGITAL TWIN

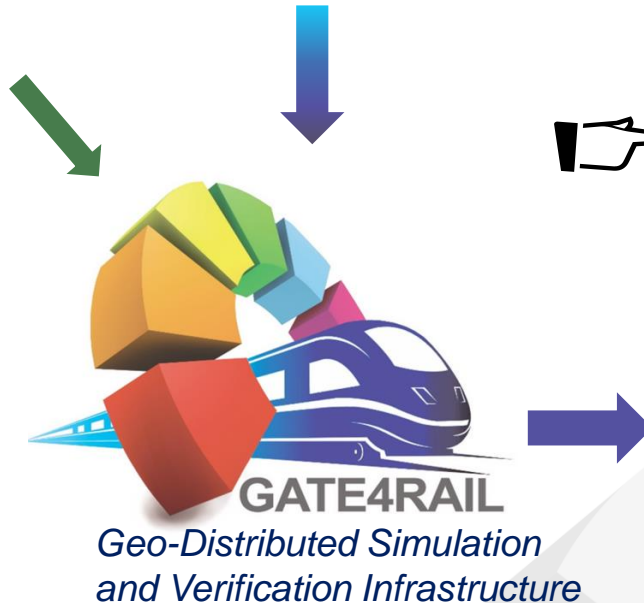
of the system under test

railway EM environment for different market segments

global and local
HAZARDS
MODELS

Operational
scenarios

Line characteristics



LOWER CO2 EMISSION

KNOW-HOW on

- GNSS behaviour in the railway environment
- impact on the Train Control System (VB detection)

CAPABILITIES

- simulate **rare events**
- simulate various **configurations** encountered in the railway operational environment.
- assess the safety level of a solution with a far **larger data sets** than what could not be obtained by field tests
- Use methods and tools for test environment accounting for a **set of common requirements for notified body approval**

REDUCTION of

- Experimentation costs (**Test before Invest**)
- Certification cost
- Time to market





CONCLUSIONS

**Smaller
CAPEX**

**Increased
line capacity**

Simulation architecture
in line with latest
evolutions and
slow obsolescence

**Faster and
harmonised**
European approval
process

Better
EM railway
environment
characterization

Reduced cost of
tests of innovative
products and
services

SIMPLER
pros/cons
analysis

Lower costs and
improved efficiency for
testing technologies.



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