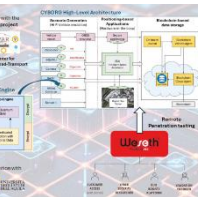
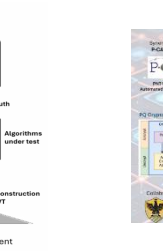
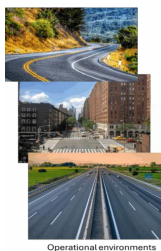


Radiolabs



2025

A year of great progress, innovation and cooperation for a safer resilient and eco-sustainable Rail, Automotive, Roads and Maritime transports

Radiolabs partner of I-PoCARS for the autonomous car

11/12/2025



I-PoCARS is focused on vehicle's positioning and brings together telecom and satellite players, and renowned academic and research institutions from the United Kingdom and Italy, with the leading car manufacturer **Jaguar Land Rover (JLR)**. I-PoCARS aims to revolutionize **vehicle localization** and positioning for connected and **autonomous vehicles**. By integrating onboard systems with terrestrial and space-based navigation sources, the project seeks to deliver a robust architecture that enhances positioning accuracy and resilience. Furthermore, by leveraging on **5G, satellite connectivity** and cutting-edge **AI** technologies, I-PoCARS will develop a **test-drive facility design** for the next-generation autonomous driving capabilities.

This new project while recognizes the capabilities of Radiolabs, represents an opportunity to exploit its **P-CAR laboratory**, funded by ASI as a strategic infrastructure to test, validate and support the certification of GNSS-based positioning solutions for the connected and autonomous cars. And in perspective also for the services offered by the **RAN National Augmentation Network** commissioned by ASI for the Automotive and Rail applications with GNSS-based positioning solutions.

The Laboratory of Radiolabs, specialised on automotive applications and located at the **Tecnopolo in L'Aquila** in the Abruzzo Region, will be involved in experimental campaigns including the gathering and processing of **Galileo High Accuracy Services – HAS** data along selected roads representative of the autonomous driving scenarios. As a matter of fact, I-PoCARS will be extending the **European collaborations** in the innovation ecosystem created by Radiolabs with the University of L'Aquila in the Region Abruzzo. This ecosystem, unique in Europe, is developing the synergies and osmosis of technologies between the Rail and Automotive applications for their complementary primacies respectively on safety and mass-production to make autonomous driving technologies safe and accessible to everyone.

Radiolabs innovations at World Congress of Rail Research (WCRR)

10/12/2025



Held every three years, the World Congress of Railway Research (WCRR) is the world's largest international congress on railway research, gathering researchers, technical experts and industry leaders on innovation. At this edition Radiolabs has contributed to the selected theme on **"Inspiring innovative and resilient railways"** with three papers relevant to new R&D projects to showcasing the benefits of adopting satellite technologies for the evolution of the ERTMS/ETCS train control. **The RAN Project – Nation-wide**

Augmentation Network – funded by ASI, the Italian Space Agency – is developing a ground network to correct the GPS and GALILEO signals in order to improve the performance and safety of GNSS-based positioning systems. With a novel multi-layer architecture reusing existing infrastructures as EGNOS designed for aviation, GALILEO HAS- High Accuracy Services and Local networks – the proposed architecture is unique to provide highly resilient services for the Rail and Automotive applications. The latest DGNSS, RTK, PPP-RTK technologies made available by the space industry are the core technologies used by the RAN for supporting the highest possible accuracy of the vehicle compatible with the safety level requirements. Radiolabs, that has been the first to introduce the novel multilevel architecture, has now developed a new Multilevel Fault Detection and Exclusion algorithm platform to detect SiS and RAN components faults and to manage the corrections for ensuring the position of the vehicle be always within the specified confidence interval.

Furthermore, RAN will adopt the incoming RTCM SC134 standard for commercial GNSS receivers. This standard properly conceived for high integrity and high accuracy of train, car and ship applications defines the process to manage the messages broadcasted by the RAN. Based on these informations, the rail and automotive industries are liable to determine autonomously the vehicle's position and its confidence interval. A demonstrator of the RAN system will be realised and verified in 2026. A train and a car will be equipped with their positioning device for a test campaign using the RAN network as a bench-mark for the SIL-4 and ASIL-D safety requirements respectively for the ERTMS-ETCS and the CCAM standard.

The VICE4RAIL project – Transforming Rail Safety and Efficiency: A Certification Methodology for GNSS Integration into ERTMS Using a Hybrid Virtualized Testing Environment –

This article explores the certification challenges currently hindering the integration of Global Navigation Satellite Systems (GNSS) into the European Rail Traffic Management System (ERTMS-ETCS), with a focus on train positioning applications. The work is framed within the European project VICE4RAIL (Hybrid Virtualized Testing for Certification of EGNSS in Railway Train Positioning), funded by EUSPA and coordinated by RFI. Radiolabs contributes the hybrid virtualized testing methodology, HyVICE, to combining real-world testing with a Model-in-the-Loop (MIL), Hardware-in-the-Loop (HIL), and Software-in-the-Loop (SIL) testing methodologies. This unique environment enables comprehensive and repeatable measurements to assess rare faults caused by the GNSS under operational scenarios that otherwise would require extensive

and not exhaustive field tests. The VICE4RAIL architecture has been conceived to become standard, scalable and interoperable with the ERTMS-ETCS laboratory such as the CEDEX in Spain that is partner of the project. Radiolabs is developing a generalised GNSS-based train positioning, first to be tested at the RFI San Donato and to create a digital twin that afterwards will be integrated into the CEDEX ETCS simulator to assess the overall performance in any possible operational scenario in order to support the certification process.

The Role of Continuity Attribute for Train Positioning Technologies Based on GNSS and ERTMS

This research is a further contribution to the Vice4Rail project. In fact, one of the main challenges to meet the ERTMS-ETCS reliability requirements facilitating the smooth adoption of GNSS is the utilization of an aeronautical safety-critical GNSS attribute called continuity, which is new in railway technology. The main attribute is the integrity of GNSS positioning, although the time over which integrity is guaranteed without interruption, defined by continuity, which is the most demanding requirement for aeronautical applications, has not been sufficiently investigated for rail and other modes of land transport. The aim of this research is to close this gap by clarifying: 1) where the requirement for GNSS continuity comes from, 2) why GNSS continuity is needed in land transport, and 3) how GNSS-based applications can be made more reliable when needed. Using a comparative analysis, the continuity requirements in aviation, rail, maritime, and road transport have been investigated showing their importance for railways and automotive control. One of the main findings, through Markov modelling, is the improvement of the Mean Time to System Failure (MTTF_{sys}) that for the railway safety-of-life applications can be significantly increased from about 521 h up to 5×10^5 h.

Radiolabs at S5LECT event with rail and satellite stakeholders

[25/11/2025](#)



The **S5LECT** project – **SatCom and 5G Link, Edge and Cyber securiTy** – funded by EUSPA – Horizon Europe – and coordinated by SNCF with partners Railenium, Hitachi Rail, Radiolabs and CEIT, is addressing the utilisation of LEO Satcom, 5G terrestrial networks for the FRMCS – the next generation communication standard technology-independent to replace the legacy GSM-R. The two-day event (Oct. 22-23, 2025) in San Sebastian, Spain, was an opportunity to share the project's progress and learn on the satcom

and railways plans to discuss the role of satellites in the railway sector, with ERA, ERJU, ADIF, CNES, and SNCF Réseau.

The FRMCS roadmap envisages the use of different technologies including satellite communications and cellular networks that have the advantage to reduce the investments for connecting the trains, avoiding to building dedicated infrastructures. The integration of non-terrestrial connectivity as the new LEO satellite constellations presents a significant opportunity toward enhancing the capabilities and coverage of terrestrial mobile networks.

Furthermore, the Rail community may benefit from the Automotive sector that is already working with the telecom sector. In fact, thanks to the alignment with global standards is now possible to optimizing technical parameters of user terminals, and securing appropriate spectrum, cooperating to realize the vision of space-connected vehicles on the railways and roads that share almost the same requirements. In this respect, Radiolabs is already working with the main Rail and Automotive stakeholders in Italy to maximising these synergies and to make their investments more sustainable.

In the meantime, the S5LECT consortium is paving the way toward hybrid telecom architectures integrating LEO satcom to realise a truly economical and sustainable digitalised and connected rail ecosystem.

Safer and more efficient construction sites with digitalization and remote management

[05/11/2025](#)



The **digitalization of road construction sites** represents a fundamental step toward the development of connected infrastructures and the realization of the smart roads of the future. The integration of IoT technologies, hybrid communications, and satellite connectivity is today an essential element to ensure the safety, robustness, and efficient management of road and railway works within the increasingly demanding context of connected and automated mobility. The **AS-ITc (Advanced System IoT by construction)** project, coordinated by TIM in partnership with Radiolabs, Eagleprojects, ADPM Drones, Nitel, and Autostrade per l'Italia, aims to design and implement an integrated platform for the digitalization and intelligent management of road construction sites. Funded by the European Space Agency (ESA) under the ARTES 4.0 programme, AS-ITc was launched in February 2025 and has an overall duration of 21 months.

The project leverages a set of advanced technologies — **5G networks, satellite communications, and IoT systems** — to enhance the safety and operational efficiency of construction sites, enabling real-time monitoring and data-driven decision-making processes.

AS-ITc is based on a modular and scalable architecture that integrates edge computing and **multi-bearer connectivity** components. The system includes:

- a 3D visualization platform for remote supervision of site activities;
- a mission planner for autonomous management of drones and inspection robots;
- artificial intelligence modules for automatic detection of anomalies, risks and critical operating conditions;
- a system for collecting, processing and standardizing traffic data.

Within the project, Radiolabs is responsible for the design and development of the **subsystem dedicated to traffic data management**. This module processes data collected from IoT sensors installed across the construction site, integrating them with static information describing site activities. The processed data are then converted into Safety-Related Traffic Information (SRTI) messages compliant with the DATEX II standard, ensuring full interoperability with external traffic management systems and alignment with European paradigms for **Cooperative, Connected and Automated Mobility (CCAM)**.

A distinctive aspect of AS-ITc is the **synergy between the road and rail domains**: the developed solutions and architectural principles are designed to be scalable and transferable to different infrastructure contexts, fostering technological convergence between rail and automotive. This approach contributes to Radiolabs' strategic goal of creating a unified platform for smart, safe and sustainable mobility.

The AS-ITc project successfully passed the **Critical Design Review (CDR)** phase, confirming the technological maturity of the solution and compliance with the requirements set by ESA.

The CDR validates the robustness of the system architecture and the readiness of the platform for the subsequent integration and field validation phase.

Radiolabs at EXPO Ferroviaria

[07/10/2025](#)



Radiolabs has participated to **Expo Ferroviaria 2025** taking place from September 30 to October 2, 2025, at Fiera Milano Rho in Milan, Italy. This exhibition, showcasing the latest innovations in the railway industry, has been an opportunity to unveil a software-defined, hybrid connectivity platform to fuelling a new era of smart, scalable, and secure communications including the Future Railway Mobile Communication System (**FRMCS**).

FRMCS is the next-generation global communication standard for railways, developed by the International Union of Railways (UIC) to replace the aging GSM-R system. Unlike GSM-R, which is based on 2G technology, FRMCS is built on 5G principles, offering ultra-reliable, low latency, and high-bandwidth communication. It is not just a technical upgrade, it is the foundation for a fully digital, automated, and intelligent railway ecosystem.

The new project – based on the exploitation of **Low Earth Orbiting (LEO) satcom & 5G cellular** networks – represents a follow-up of projects developed by Hitachi Rail and Radiolabs , including the **S5LECT** project, to provide infrastructure-less connectivity. In fact, the connected

device landscape is changing fast, and legacy networks can't keep up with the digitalisation of a sustainable ecosystem.

The result will be a Smart Platform powered by a set of core technologies and architectural principles designed to ensure flexibility, resiliency, technology's independency and a reduction of dedicated equipments along the railways with the advantage of lower costs and CO2 emission:

- **Use of AI/ML**-driven control logic for intelligent multi-bearer routing, enabling dynamic selection and management of heterogeneous communication links and for realising the reference patterns for simulating the performance of the network in operational scenarios.
- Integration of **Terrestrial Networks (4G/5G) and Non-Terrestrial Networks (NTN), including LEO satcom** with the new Device-to-Device (D2D) services to ensure interoperability between different satcom networks and a direct connection between the trains and the Radio Block Center (RBC).
- **Enhanced cybersecurity** for the transition from wired networks (intrinsically secure) to wireless solutions (potentially vulnerable) by implementing authenticated encryption mechanisms with **post-quantum cryptography** and **Blockchain**.
- **V2X technology** for the connected and autonomous car.

Designed to last, because standardised 5G terrestrial and non-terrestrial systems will become more and more integrated, the new state-of-the-art platform will target three specific applications, capitalising the experience of Radiolabs on multi-bearer and V2X technologies:

- **Migration to the FRMCS**, offering a complementary solution to manage satellite and 5G connectivity for replacing the GSM-R infrastructure.
- **Migration from wired to wireless, with an IoT** secure and flexible access network for trackside fixed communications of the Smart Wayside Object Controllers (**SWOCs**).
- **Connectivity for the autonomous Tram** by leveraging on the V2X standard for the connected cars and the FRMCS principles.

Thanks to the new platform, the users can benefit from the huge investments to building LEO satellite networks to provide low-cost, low-latency connectivity to rural and underserved regions lacking terrestrial infrastructure or where ground-based systems are impractical. Among them, there is **IRIS2** (Infrastructure for Resilience, Interconnectivity and Security by Satellite) the future constellation representing the European Union's answer to pressing challenges ahead, offering enhanced communication capacities mainly to governmental users and critical infrastructures to closing the digital gap and give to Europe an independent telecom infrastructure as the Galileo system for the geo-localisation.

Radiolabs at the forefront of secure positioning based on massive data

29/09/2025



As future cars will likely become a supercomputer on wheels powered by AI massive data-collection and traditional roads will evolve to smart infrastructures with mobility services provided to the drivers, processing tools are the new engine for trusted vehicle's positioning, that is undoubtedly the gatekeeper to adoption.

A remarkable progress in the fields of Automatic Driving Systems (ADS), together with mounting interest for machine learning (ML) and artificial intelligence (AI) technologies, have increased the importance for massive data-driven applications to assess a trusted positioning of the car for the partial or complete control of safety-critical operations. In this context a great importance regards the ability of the ADS positioning function of a car to safely execute its task, which is challenged on how the integrity of the position data is guaranteed whatever is the operational environment, the weather and road conditions. A trusted position of vehicles is also the pre-requisite for the road infrastructure manager to provide smart road services that are a unique cross-sector ecosystem bringing together vehicle manufacturers, service providers, public authorities, and associations to transform vehicle-generated data into life-saving insights. By sharing real-time safety-related traffic information European roads will become safer contributing to the EU's Vision Zero ambition.

In the realm of modern automotive testing and validation, the integration of sophisticated data processing and simulation systems is paramount to ensure the safety of ADS, which must rely on the knowledge of the position of the car and the surrounding environment. Positioning and Sensing are both dependent on the car sensor system and the processing process which in turn depends on the data gathered on the field.

STEV – Satellite Testbed for Egnss based vehicle localization Validation – supports this integration, allowing advanced positioning modules to be tested under controlled yet highly realistic conditions. The system conceived by Radiolabs is a sophisticated framework designed for the rigorous testing and validation of algorithms to fusing data from different sensors. The

system comprises three main components: a multi-sensor On-Board Unit, a Central Computing Unit and a Replay Unit. Together, these components form an interconnected architecture that supports the post-test analysis. The system's ability to simulate real-world conditions and to perform thorough verifications under controlled environments significantly enhances the reliability and performance of the algorithms being tested. The goal is the design and validation of the positioning algorithms for meeting the SAE level 3 of automation (the first to allow autonomous capability with a driver ready to take control in case of ADS disconnection) up to level 4 and 5 where the presence of the driver is not necessary.

The multi-sensor On-Board Unit is responsible for gathering data from various sensors within the vehicle, including GNSS receivers, Inertial Measurement Units (IMUs), LiDAR and Camera sensors that contribute to the accurate localization and monitoring of vehicle dynamics. These data are then transmitted to the Central Computing Unit, to undergo extensive processing and analyses. The Central Computing Unit acts as the brain of the STEV system, employing advanced algorithms and computational techniques for the generation of test patterns to be used to evaluate the performance of the modules under test. Finally, the Replay Unit allows for the reproduction and detailed examination of specific test scenarios, enabling engineers to scrutinize the system's responses and identify any potential areas for improvement.

The STEV project has successfully passed the Critical Design Review – CDR, meaning that the selected architecture is ready for the implementation phase. The CDR data package is a comprehensive blueprint, guiding the seamless integration and operation of various subsystems, ensuring they work harmoniously to achieve the desired performance and safety standards. The roadmap has been frozen for planning the system completion with rigorous testing and reliable validation processes, forming the backbone of the STEV system.

The project has been commissioned by ESA – under the GSTP programme funded by ASI -and is coordinated by Radiolabs, with Intecs as partner. ANAS – the Italian Road Infrastructure manager with 32,000 Km of roads – is contributing to STEV with their use cases and by supporting the test campaign with their vehicles collecting data on selected roads that are representative of their Smart Road Initiative. Honda Italia too is contributing to the project to improve the safety of motorcycles and a motorcycle, will participate to the test campaign. Both vehicles provided by Anas and Honda Italia will be equipped with the multi-sensor on board unit and the data collected are processed by the central computer unit.

STEV is a pillar of the Radiolabs strategic plan for developing and validating the enabling technologies for the connected and autonomous vehicles, contributing so far to an eco-sustainable, safer and more efficient transportation system in line with the priority of Europe to reduce road fatalities by 30% in 2030 and zero fatalities in 2050.

Made-in-Italy innovations for autonomous positioning of trains and cars

05/09/2025



The **ION GNSS+** event, held September 8-12, 2025, in Baltimore, Maryland, USA, is the largest technical event and exhibition of GNSS technology, products and services in the world. In this year's edition, Radiolabs presents two incoming projects: **VICE4RAIL**, **RAN**, and two **innovative techniques** that confirm its vision and plans to drive developments in connected and autonomous vehicle technologies and make a contribution to achieve a dedicated ecosystem in Europe that complies with standards and regulatory requirements.

The VICE4RAIL project is developing an innovative testing environment for assessing and certifying the **ASTP – Advanced Safe Train Positioning** device that has been defined by the rail stakeholders to be included into the train on-board system. The ASTP – already part of the roadmap for establishing the new interoperability standard – aims to enhance train positioning capabilities, potentially leveraging multi-sensor fusion including GNSS, IMUs, and other inputs like Digital Maps and GNSS Augmentation services. VICE4RAIL is funded under the **HORIZON-EUSPA-2023-SPACE Call** and is developed by a European team led by **RFI – the Italian Railways Infrastructure manager**. Radiolabs is responsible of the **HyVICE** – a hybrid platform based on simulations in the laboratory and tests on the field, with the objective to maximize virtual tests towards the objective of a zero on-site testing capability. The goal is to replicate in the laboratory the operational scenarios to evaluate the effects of rare GNSS hazards that having a low occurrence probability becomes difficult and costly to assess only with tests on the field. The envisaged next step is an open and standard testing infrastructure – connected with the ERTMS accredited laboratories – as the one of CEDEX in Spain (one of the partners of VICE4RAIL) where ASTP products of different suppliers can be validated and certified for guaranteeing the compatibility with the ERTMS system. [Hybrid-Virtual Test Environment to Validate GNSS-Based Train Positioning for the ERTMS Train Control System | Technical Program – ION GNSS+ 2025](#)

The other project, RAN – National Augmentation Network – has been conceived and funded by **ASI – the Italian Space Agency** to provide the **Rail and Automotive** users with the data for augmenting the GNSS signals to achieve the required positioning with high accuracy and

Integrity. RAN, inheriting the results of the previous **ERSAT EAV** and **HELMET** projects funded by EUSPA, is stepping to a demonstrator for the rail and automotive application of a future operational system to support the new applications in Italy and to contributing to a standardizable solution in Europe. A novelty of RAN is the simultaneous use of **DGNSS, RTK, PPP-RTK technologies and reusing the SBAS, GALILEO** infrastructures including the recent **GALILEO-HAS** service. This multi-level architecture, that includes also Local networks, makes the system robust, resilient, avoiding a dependency from a single technology, while at the same time it will offer to the rail and automotive users differentiated data in relation to the specific requirements of their application. Yet, RAN will adopt the incoming standard **RTCM SC 134** tailored for high accuracy – integrity rail, automotive and maritime applications based on standard messages and data applicable to COTS GNSS receivers. RAN project is managed by Leonardo with Radiolabs, RFI and Sogei partners. [RAN, the Italian Augmentation and Integrity Monitoring Network for High Accuracy and High Integrity Positioning for Rail and Road Applications | Technical Program – ION GNSS+ 2025](#)

Looking to the future, accurate and reliable environment perception is becoming crucial for the safe operation of automated train control systems. The paper **Fault Detection and Exclusion for LIDAR-Camera Fusion in Railway Positioning: Enhancing Localization in Adverse Environments** shows the results obtained with a multi-sensor fusion approach combining Camera with LiDAR data to enhance scene understanding in complex railway environments. We evaluated the robustness of state-of-the-art 2D and 3D object detectors under environment-induced data degradation, highlighting the trade-offs between computational efficiency and detection accuracy, placing emphasis on system-level integrity. The results of a test campaign have confirmed the suitability of these sensors, already adopted by cars, for the rail environment. [Fault Detection and Exclusion for LIDAR-Camera Fusion in Railway Positioning: Enhancing Localization in Adverse Environments | Technical Program – ION GNSS+ 2025](#)

The paper **Conditional Path Planning for Collaborative GNSS Positioning** investigates a cooperative GNSS positioning strategy allowing multiple vehicles to share their positioning data to improve individual accuracy and robustness against inevitable degradations when travelling in challenging environments as urban canyons, tunnels and forested areas. The identified strategy is to integrate path planning tools with cooperative positioning to enhance the overall navigation performance. As a result, it has been demonstrated how path planning algorithms can be empowered with more robust and reliable GNSS positioning through cooperative strategies. [Conditional Path Planning for Collaborative GNSS Positioning | Technical Program – ION GNSS+ 2025](#)

Radiolabs among Founding Members of DAAB – Abruzzo Aerospace District

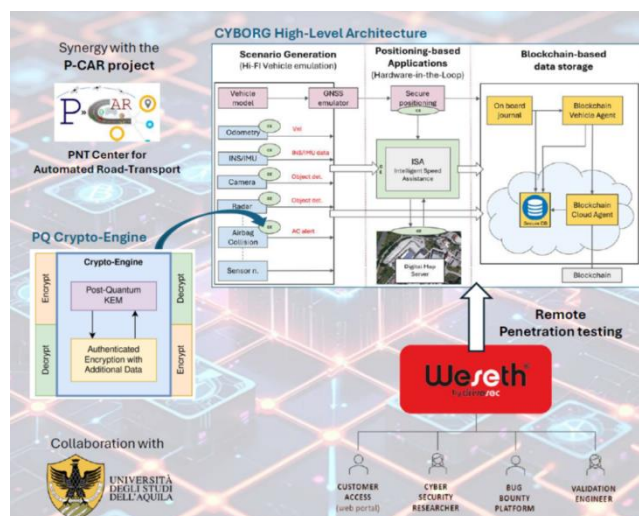
18/07/2025



Radiolabs has joined the recently established DAAB among companies, universities, and research centers to promote innovation in the Abruzzo Region through its laboratory specialized in satellite technologies for autonomous driving at the **Tecnopolo dell'Aquila**.

CYBORG project developed a cyber-secure vehicle's positioning system

11/07/2025



Resilience to cyber-attacks is becoming increasingly important for connected and autonomous vehicle location systems. Radiolabs is strengthening its expertise in this area, and through the CYBORG project, awarded by the Cyber4.0 – Cybersecure Competence Center following a competitive bidding process, a new milestone has been reached in protecting data that impacts safety, traffic efficiency and even decarbonization.

Smart road applications and autonomous driving systems require high-integrity

positioning data derived from data fusion algorithms to combine GNSS with IMUs, odometers, cameras and LiDAR sensors. CYBORG has developed and validated a **cyber-secure architecture** and appropriate techniques to ensure reliable vehicle positioning and continuous monitoring of on-board data for forensic analysis and third-party services. Specifically, CYBORG, leveraging Radiolabs' P-CAR facility and the **Crypto-Engine** developed under the Shine-On project, has:

1) developed and tested a distributed **cyber protection architecture for in-vehicle data encryption and digital signatures**, focused on the specific use case of secure and high-precision vehicle localization.

2) implemented on a software platform an advanced architectural and algorithmic solution aligned with the principles of **post-quantum cryptography**.

3) developed a blockchain-based digital ledger to record the sequences of data streams exchanged between vehicle **ECUs and in-vehicle systems**.

A Security Audit Report has been performed by Drivesec, partner of the project and responsible for the remote penetration tests. The results of CYBORG have confirmed the expectations and turn useful also for the rail and maritime sectors, sharing with the automotive sector the same positioning requirements. Yet, CYBORG will contribute to enhance the capabilities of the P-CAR laboratory to assess the robustness of positioning and telecom solutions developed for the connected and autonomous vehicles.

Webinar | Mobility: emerging trends, market needs and strategic responses

[09/06/2025](#)



Radiolabs is one of the partners of the HD-MOTION project, which was created to support the mobility sector in its transition to more digital, sustainable and innovative models. The mobility sector today is experiencing a phase of profound transformation. Traditional paradigms are giving way to new models based on digitization, sustainability and increasingly innovative and flexible modes of use. Businesses, in order to meet these challenges, need to quickly navigate change, intercepting emerging trends and concrete market needs.

Concrete strategies to address the digital transition

The reflection will be enriched by a clear and operational overview of the services made available by HD-MOTION, with particular reference to funded solutions and specialized technology consulting, which will concretely illustrate how companies can be successfully accompanied on the path to innovation and digitization. This will be a must-attend event for

those working in the mobility sector. A meeting designed for those who wish to interpret the present with awareness and look to the future with the ability to anticipate scenarios and opportunities.

Radiolabs presents P-CAR at the 16th European ITS Congress

04/06/2025



The **16th European ITS Congress** held in Seville June 2-4 was an outstanding edition that brought together more than 3,000 participants in the field of Autonomous Mobility and Intelligent Transport Systems, with the goal of accelerating the implementation of Intelligent Transport Systems-ITS across Europe. Francesco Valentini of Radiolabs participated in the panel addressing PNT challenges for CCAM (cooperative and connected driving) through the ESA NAVISP program, with a talk focusing on the validation and certification process of multi-sensor devices with the P-CAR Center.

More automated vehicles and smarter road infrastructure technologies are evolving rapidly, paving the way for new cost-effective ways to validate technology before putting vehicles on the road. With the European Space Agency's NAVISP – 3 program, Radiolabs is developing P-CAR, a Virtualized Test System to validate and support certification of PNT solutions for connected vehicles and smart roads. The new Phase 2 of P-CAR, funded by the Italian Space Agency, will extend the capabilities of this facility-under construction in the city of L'Aquila-beyond the validation of PNT devices to include telecommunications and cybersecurity solutions to jointly ensure a safe autonomous vehicle that is always connected and protected from possible cyber threats.

A key factor in the design was the creation of hybrid test environments fully representative of operational scenarios. This approach-highly recommended by stakeholders-will minimize the need to test vehicles on the road, instead combining simulations and introduction of possible failures with the Everything-in-the-Loop(*XiL*) approach and a controlled, repeatable digital twin of operational environments. These features make the P-CAR center unique in Europe, paving the way for its recognition as an independent laboratory for automobile manufacturers, Tier 1 equipment suppliers, and satellite technologies. In particular, to evaluate the effects of possible very rare malfunctions that can occur with GNSS, V2X and digital maps, which are difficult to detect with road tests alone but must be mitigated as they affect safety.

These distinctive features of the P-CAR Center and its ability to operate remotely by connecting facilities in L'Aquila with end users and other laboratories are being addressed through the ESA NAVISP Program with the contribution of the ASI. This collaboration is critical as we are facing a crucial challenge with huge market potential for satellite technologies related to the production of connected driving-enabled vehicles that are safe and secure and in line with the European Commission's Action Plan for the European Automotive Industry.

A Europe's first test bed for ERTMS with GNSS technologies

[14/01/2025](#)



EGNSS – the European Global Navigation Satellite System – is one of the game-changing technologies for the evolution of the ERTMS train positioning and for the digitalization and optimization of the European Rail system. Before the adoption of the EGNSS technologies, a standard validation process is needed to comply with the ERTMS safety requirements.

VICE4RAIL (Hybrid Virtualized Testing for Certification of EGNSS in Railway Train Positioning), funded by the European Space Programme Agency (EUSPA) focuses on one of the European Union's strategic objectives to accelerate the integration of satellite technologies into the European rail traffic management system, ERTMS, to increase its safety, interoperability and efficiency.

The kick-off of this new project took place in Prague on November 19th at **EUSPA** premises. The purpose of this project is to fill the gaps still preventing the utilisation of the EGNSS for the ERTMS. RFI (FSI group) is the VICE4RAIL project coordinator with SNCF, Italcertifer, Bureau Veritas, CEDEX, Sogei, the University of Pardubice, the University Eiffel and Radiolabs members of the consortium.

A novelty of VICE4RAIL is HyVICE, a hybrid test environment that combines real data collected on the Bologna San Donato railway circuit with laboratory's simulations and system performance assessment performed at the CEDEX's ERTMS accredited laboratory in Madrid. This architecture – scalable and standardizable – represents a follow-up of the GATE4Rail project coordinated by Radiolabs in the frame of the Shift2Rail Joint Undertaking, who at the end of the project has claimed the importance to exploit the results through an higher TRL project, having recognised GATE4Rail a key project of their multi-annual action plan.

Radiolabs main responsibility on VICE4RAIL are the development and deployment of the Hybrid Virtualized Testing Certification platform and the dissemination tasks (involving in particular **Europe Rail R2DATO** consortium) and in synergy with the on-going **P-CAR project** dedicated to the connected and autonomous cars. In fact, these technologies – common to both sectors – must be evaluated with a set of standard tools to manage the validation process in all the foreseeable scenarios in which the positioning device must operate. Once completed, the new validation and certification ecosystem can be used by Rail Infrastructure Managers, Rail Signalling industries, Satellite system integrator, GNSS positioning suppliers and Notify Bodies.

Once completed, the new validation and certification ecosystem can be used by Rail Infrastructure Managers, Rail Signalling industries, Satellite system integrator, GNSS positioning suppliers and Notify Bodies.

VICE4RAIL is part of the outstanding **Radiolabs roadmap to exploit the EGNSS technologies** for Rail applications leveraging on the synergies with the automotive and ships applications both requiring a comprehensive evaluation of the EGNSS rare threats which impact on the safety and are difficult and costly to assess only with field tests.