unife
THE EUROPEAN RAIL INDUSTRY

Research *& Innovation*

Published in 2024, Brussels, Belgium

UNIFE - the European Rail Supply Industry Association

Avenue Louise 221
B-1050 Brussels, Belgium
Tel: +32 2 626 12 60
www.unife.org | general@unife.org

X: @UNIFE | LinkedIn: The European Rail Supply Industry

Hard copies of the UNIFE R&I brochure are available at UNIFE's offices.
This publication is also available online at **www.unife.org**

Foreword

by UNIFE Director General Enno Wiebe

Rail is central to modern European life, as its dense networks link Member States across the continent, which allow citizens to access resources in their community, build their businesses and enjoy safe, reliable, accessible and sustainable transport on a daily basis. Europe's rail supply industry, composed of manufacturers of all sizes and employing over 650.000 in the EU, generates and provides transport solutions that will prove to be essential to creating a decarbonised network in a digital age. As the overwhelming provider of European rail products, and a global leader internationally, the European rail supply industry relies on research and innovation (R&I) to remain at the forefront of transportation needs. Doing so allows European rail suppliers to overcome competitive challenges our industry faces in an increasingly contested global economy, while improving our attractiveness to passengers and end users, which is critical to inspiring a modal shift compatible with the mounting need for climate action.

Demonstrating its commitment to next generation technology, the European Rail Supply Industry – including significant contributions from the growing small- and medium-sized enterprises (SMEs) that represent a growing segment of the community – reinvests about 4% of its annual revenue to R&I activities. This tangible commitment to research allows UNIFE members to remain the vanguard of the international rail supply market, through the creation of innovative, high quality and cutting-edge mobility solutions.

Understanding the importance of staying ahead of the curve on emerging technologies has informed all of UNIFE's activities.

Our industry was an earlier adopter of automated train automation and a driving force in implementing driverless metros and ERTMS. Our members continue to push the envelope on the integration of geospatial technology, artificial intelligence, digital twins and big data into their platforms and throughout the design process. Additionally, they are actively contributing to key European R&I projects focusing on key priorities like the evolution of European Rail Traffic Management System (ERTMS), the development of the Future Railways Mobile Communication System (FRMCS), and the Digital Automatic coupling (DAC). As research and innovation is always a collaborative effort, UNIFE and its constituent companies were proud to spearhead the creation of the Shift2Rail Joint Undertaking in 2014 and – after its 2021 completion – its continuation

as Europe's Rail Joint Undertaking through the EU Research Framework Programme 'Horizon Europe'. The former, effectively tripled the EU budget for rail research and was initial confirmation of the significance of public-private collaboration in creating the technological progress that will enable the future Single European Railway Area (SERA).

With the Europe's Rail Joint Undertaking, our sector's research and innovation efforts at this moment have the potential of enhancing mobility networks across the continent, and positioning our mode of transport as central for Europe to go carbon neutral by 2050, as called for in the EU Green Deal.

In this brochure, you can find a full catalogue of UNIFE's past, present and future contributions to rail R&I. I would like to take this moment to voice my appreciation of the cooperation of the European institutions and the EU Member States tireless commitment to further developing Europe's rail transportation offerings. Our association and our members look forward to further fruitful collaboration with these bodies and remain driven to realising the EU's ambitious mobility, sustainability and resiliency objectives.

Enno Wiebe
UNIFE Director General


About
UNIFE

Based in Brussels since 1992, UNIFE represents the European rail supply industry at both European and international levels and is a trusted partner of the European Union institutions in all matters related to rail and transport.

UNIFE represents the interests of more than 120 small, medium and large sized companies in the rail supply industry. These UNIFE member companies are involved in the engineering, design, manufacture, maintenance and refurbishment of rail transport systems, subsystems and related equipment. All segments of the rail industry are represented within the membership: system integrators, railway infrastructure and energy suppliers, rolling stock manufacturers (including subsystem suppliers), signalling suppliers and railway engineering companies. UNIFE members have an 84% market share in Europe and supply more than 46% of the worldwide production of rail equipment and services UNIFE also brings together 12 national rail industry associations from across Europe.

Our members are committed to providing the best technology to meet the challenges arising from climate change and growing transport volumes. Furthermore, UNIFE, which is one of the supporting bodies of the Europe's Rail Joint Undertaking, the European Union Agency for Railways, the European Union Agency for the Space Programme and the European Rail Research Advisory Council, works on interoperability standards and coordinates EU-funded research projects that work towards the technical harmonisation of railway systems.

System Integrators

UNIFE system integrators provide turnkey railway and urban rail systems-comprising infrastructure, rolling stock and signalling components-throughout the world.

Rolling Stock and Subsystems

UNIFE members produce regional, intercity and highspeed trains, electric and diesel locomotives as well as freight wagons for all types of cargo. UNIFE members also produce tramways, metros and Light Rail Transport systems. UNIFE also represents subsystem manufacturers from wheels to pantographs including door systems, couplers, Heating, Ventilation and Air Conditioning units, on board signalling equipment and all the necessary equipment for trains.

Infrastructure and Energy

UNIFE members offer the world's best rail infrastructure/energy products and services: from the supply of rail, track and energy components, installation and maintenance equipment to the provision, building, maintenance and renewal of integrated track and energy systems. Suppliers and contractors deliver and maintain high-quality track infrastructure and energy systems in Europe and around the world.

Signalling and Telecommunication

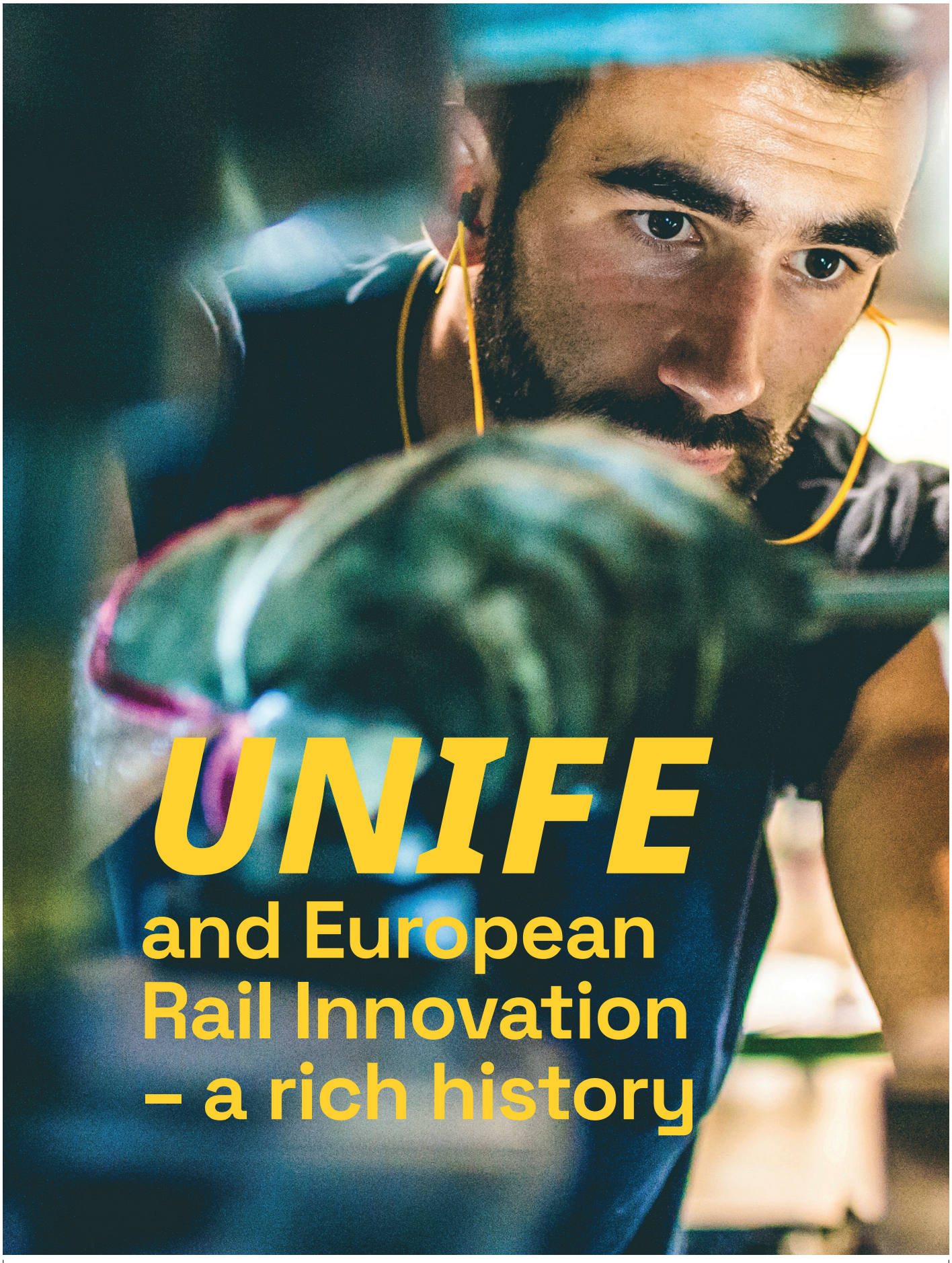
UNIFE members also produce signalling and telecommunication systems that help increase the capacity of the railway system. They are equally committed to developing European Rail Traffic Management System, a European system that will help overcome the differences between national signalling systems. They also developed actively the Future Railway Mobile Communication System (FRMCS).

For more and up-to-date information on ERTMS, please visit **www.ertms.net**.

For more and up-to-date information on FRMCS, please visit **https://www.unife.org/committee/unitel-committee**

Railway Engineering

UNIFE members also provide engineering expertise (e.g. planning, design and supervision works) for rail and urban transport.



UNIFE and European Rail Innovation – a rich history

UNIFE has an extensive and diverse experience with European research and innovation (R&I) projects. During our 33 years of operating in Brussels, this association has served as both an advocate for increased EU funding for rail research and as a partner and coordinator of dozens of projects dealing with various railway subsystems such as rolling stock, infrastructure, signalling, energy, freight and more. We are actively involved in the **European Rail Research Advisory Council's** (ERRAC) secretariat, our sector's European Technology Platform and a trusted partner of the **European Commission.** UNIFE's Research & Innovation Committee is trusted with steering our R&I activities and delivering vital results for the membership.

Perhaps in its most impactful research and innovation accomplishment to date, UNIFE helped initiate the first European rail research public private partnership: the **Shift2Rail Joint Undertaking.** At the time, in 2014, it was the first time that such a European rail R&I partnership was established to bring together various sectoral stakeholders to advance new technologies and solutions for our mode of transport.

Based on the successes of Shift2Rail, UNIFE advocated for the establishment of its successor – now known as the **Europe's Rail Joint Undertaking** (EU-Rail) - within the framework programme for Research & Innovation **Horizon Europe 2021-2027.** EU-Rail was officially launched at the end of 2021, with a budget of roughly €1,2 billion after its official regulation was adopted by **the Council of the European Union**. At the present, 12 UNIFE members are involved in the Joint Undertaking as Founding Members.

Since 2024, UNIFE is advocating for the establishment of the Europe's Rail Joint Undertaking successor within the future **Framework Programme for Research and Innovation FP10**. UNIFE is working with its members to promote the European Rail Supply Industry R&I priorities.

Regarding rail R&I, UNIFE seeks to:

- **Advocate for sufficient European funding** for collaborative research
- **Advise members on all European Level R&I opportunities,** including providing relevant information on Horizon Europe, Europe's Rail and other R&I programmes concerning satellite technologies, batteries, cybersecurity and digital applications
- **Coordinate EU R&I projects** essential for the European Rail Supply Industry
- **Facilitate discussions between stakeholders** interested in setting up research consortia
- **Represent the rail supply industry** within ERRAC and foster communication between members and railway undertakings, infrastructure managers and academia

UNIFE is also involved in standardisation and regulation activities. Our association aims to sync European research projects and their outputs with the activities of the **European Union Agency for Railways** (ERA), **CEN/CENELEC** and **International Standardisation Organisation** (ISO). UNIFE is a "representative body" of the former and a trusted partner of the later institutions. These cooperative relationships enable UNIFE to ensure that the results of relevant projects are known by these important regulation and standardisation bodies.

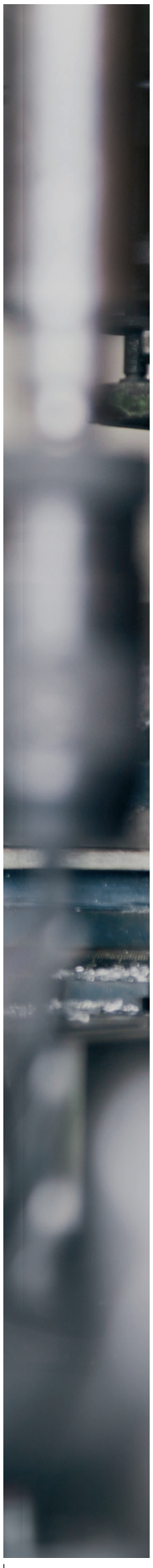
UNIFE is also an active member of the Europe's Rail System Pillar Steering Group contributing to the European Strategy to better link R&I with the evolution of the European rail Technical Framework. Last but not least, UNIFE is a member of the Europe's Rail Deployment Group, which aims at speeding-up the deployment of new innovations.

UNIFE Research & Innovation Committee:

The UNIFE Research & Innovation Committee steers the association's technical activities pertaining to the European research framework. The committee is actively defining the rail supply industry's EU level R&I priorities and monitoring progress made at Europe's Rail, Horizon Europe and ERRAC. This committee is composed of technical directors from UNIFE's system integrators and subsystem suppliers.

Horizon Europe, Europe's Rail Joint Undertaking

and other opportunities



Europe's Rail Joint Undertaking

Europe's Rail is the second large-scale European rail research joint undertaking to seek to focus research efforts and accelerate the creation of market-driven solutions, by integrating new and advanced technologies into novel innovative rail solutions. The joint undertaking will support the development of a strong and globally competitive European rail industry by contributing to the achievement of the **Single European Railway Area** (SERA).

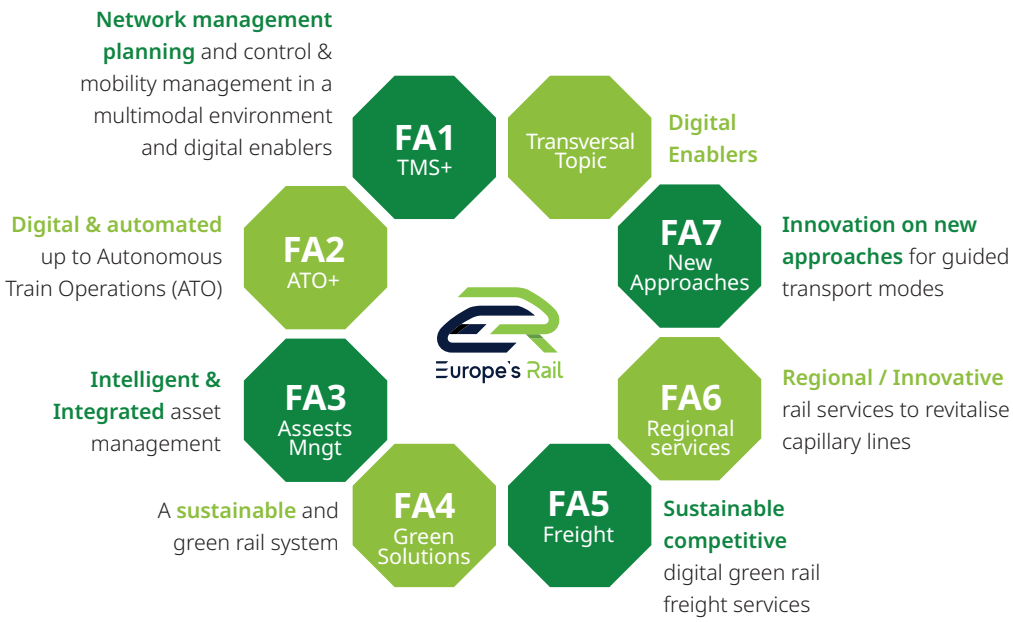
The Europe's Rail Joint Undertaking's objective is to deliver a high capacity, integrated European railway network by eliminating barriers to interoperability and providing solutions for full integration, covering traffic management, vehicles, infrastructure and services. The aim is to achieve quicker market uptake and deployment of projects and innovations originated in the programme. Exploiting these deliverables has huge potential for digitalisation and automation that will reduce costs, increase capacity and enhance flexibility and reliability across the rail sector.

Research and innovation initiatives conducted by Europe's Rail seek to achieve the project's overall objectives by working on new technologies that will be tested and applied across the entire rail system. To achieve such system-wide developments, the Joint Undertaking's work is structured into two distinct pillars: The **Innovation Pillar** and the **System Pillar**.

Europe's Rail offers all interested stakeholder – both members and those not officially affiliated with the Joint Undertaking – the opportunity to participate in regular and competitive Open Calls. Their purpose is to contribute to the work planned in the Europe's Rail Multi Annual Work Programme and deliver new technologies, solutions and services.

Innovation Pillar

The Innovation Pillar steers the Joint Undertaking's R&I activities and is organised into 7 Flagship Areas:



System Pillar

The System Pillar aims to deliver a unified operational concept and a functional, safe and secure system architecture. Its architects have designed the pillar with due consideration paid to cybersecurity aspects. They also placed focus on the European railway network to which *Directive 2016/797* applies for integrated European rail traffic management, command, control and signalling systems, including automated train operation to ensure that research targets both commonly agreed upon and shared customer requirements and operational needs. The programme has also positioned itself to be open to evolution.

It is organised into four "Tasks": **Railway System, CCS, TMS/CMS** and **DAC/FDFTO**.

Members

Europe's Rail is composed of 25 Members and the European Union.
EU-Rail's membership includes:

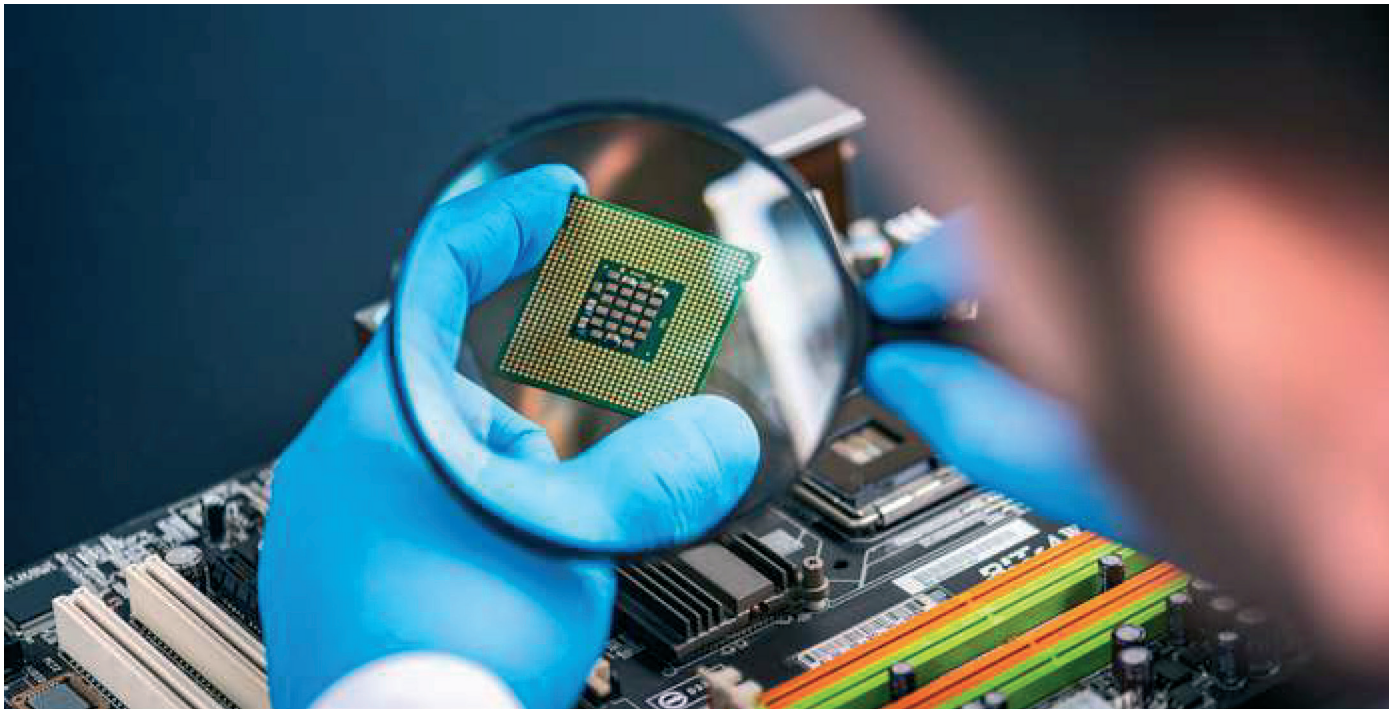
adif
ALSTOM
AŽD PRAHA
CAF
ceit MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE
CD
DB
DLR
ESGR European Smart Green Rail
Faiveley Transport A Wabtec Company
FERROVIE DELLO STATO ITALIANE
Hitachi Rail STS
indra Talgo
Jernbane-direktoratet
KNORR-BREMSE
mermec AN ANGEL COMPANY
ÖBB
PKP
ProRail
SIEMENS
SNCF
Strukton Rail
THALES
TRAFIKVERKET
RAILWAY SYSTEMS by voestalpine

Other Horizon Europe opportunities

Outside of Horizon Europe's Joint Undertakings, the European Commission adopts a new work programme every second year. These agendas outline updated objectives and specific topic areas that will receive European funding.

UNIFE regularly informs its members about calls opportunities that emerge from these developments - especially ones created under Horizon Europe's Cluster n°5 on "Climate, Energy and Mobility".

Thanks to the interest of UNIFE members, our association assesses multiple, concurrent possibilities with various stakeholders to prepare proposals in different fields of expertise ranging from cybersecurity and satellite positioning to telecommunications and batteries.



UNIFE

R&I services for its members

Joining UNIFE will help your company

- **Actively contribute** to the rail system's evolution and accelerate its digitalisation
- **Get the inside track** on Europe's Rail Joint Undertaking and Horizon Europe, including advance notifications on how they plan to support the development of emerging rail technologies
- **Be supported** in the bid management activities, such as monitoring funding opportunities and offer preparation
- **Join EU-funded research** projects that contribute to the technical harmonisation of railway systems

As the association is representing the European rail supply industry, UNIFE is proactively involved in Horizon Europe – including Europe's Rail – Open Calls and supports its members by playing three crucial roles in this process:

Info-Point	Facilitator	Coordinator
▶ UNIFE ensures the active involvement of its members in Horizon Europe Open Calls, strengthening the supply industry's role in the development of rail transport.	▶ Draw from its significant experience in European research and its robust stakeholder network that includes Operators, Infrastructure Managers, Industry, Academia, research Institutes, ERRAC and more.	▶ UNIFE directly participates in relevant Open Calls - either as a coordinator or a partner - to promote the involvement of its members and advance their interests.
▶ We encourage our members' participation by offering a platform for discussion and information exchange to inform the preparation of their proposals.	▶ UNIFE facilitates communication and the creation of work channels between its members and external stakeholders interested in the Open Calls.	▶ As a coordinator, UNIFE is responsible for the preparation and submission of proposals with the support of the consortia's partners.
▶ Our association provides its members with general information (ex. financial, administrative, etc.) to support them during the Open Calls' preparatory phase.	▶ On its members' behalf, UNIFE collaborates with other key European rail sector actors on joint proposals.	▶ As a partner, UNIFE contributes to the preparation of proposals by providing its extensive expertise.

Research & Innovation Projects

CLUG 2.0

CLUG 2.0 (**CLUG Demonstration of Readiness for Rail**) is a project funded by EUSPA which continue the activity started in the CLUG project. The main objective remains the same as the one identified in CLUG, ***the development and demonstration absolute safe train positioning by applying the existing and future European Global Navigation Satellite System (GNSS) and the European Geostationary Navigation Overlay Service (EGNOS) and multi-sensor functionality for train localization.***

CLUG 2.0 system architecture aims to complement the existing European Train Control System (ETCS) odometry system by using GNSS to enable absolute safe train positioning whilst also transforming the way of train localisation is done today by demonstrating a GNSS based multi-sensor fusion architecture.

The project completed the activities related to the **Localization On-board (LOC-OB) system definition and requirements specification** and the **Preliminary Hazards Analysis (PHA) of the LOC-OB system.** The final objective of the CLUG 2.0 LOC-OB

Want to find out more about CLUG2.0? Visit the project website at **clug2.eu**

If you require further information, reach out to UNIFE Technical Affair Manager Jose Bertolín at **jose.bertolin@unife.org**

is to provide the safe train front-end localization data to the standardized interface of the European Vital Computer (EVC) of the ERTMS/ETCS system to safely control and navigate the train, based on the experience gained in previous projects.

CLUG 2.0 will showcase a robust demonstrator to the rail community, developed by major players. The project targets a maximum TRL of 7 for part of the prototyped functions.

DACcord

DACcord project is the continuation of the DACcelerate project, with updated goals still under the framework of the European DAC Delivery Program (EDDP). The overall goal of the DACcord project is to support Europe's Rail Joint Undertaking in the preparation of the migration and implementation of DAC in Europe, with the following objectives:

- Enable a coordinated and efficient roll-out of DAC in Europe
- Set up a detailed migration and implementation plan for DAC
- Ensure political support for the implementation of DAC throughout Europe, by disseminating and communicating on the technology, and participating in or organising events

Want to find out more about DACcord? Visit the project website at **https://rail-research.europa.eu/european-dac-delivery-programme**

If you require further information, reach out to UNIFE Technical Affair Manager Hugo Tabouret at **hugo.tabouret@unife.org**

DAYDREAMS

DAYDREAMS (Development of prescriptive analytics based on artificial intelligence for IAMS) was a project within Shift2Rail's *3rd Innovation Programme (IP3)*.

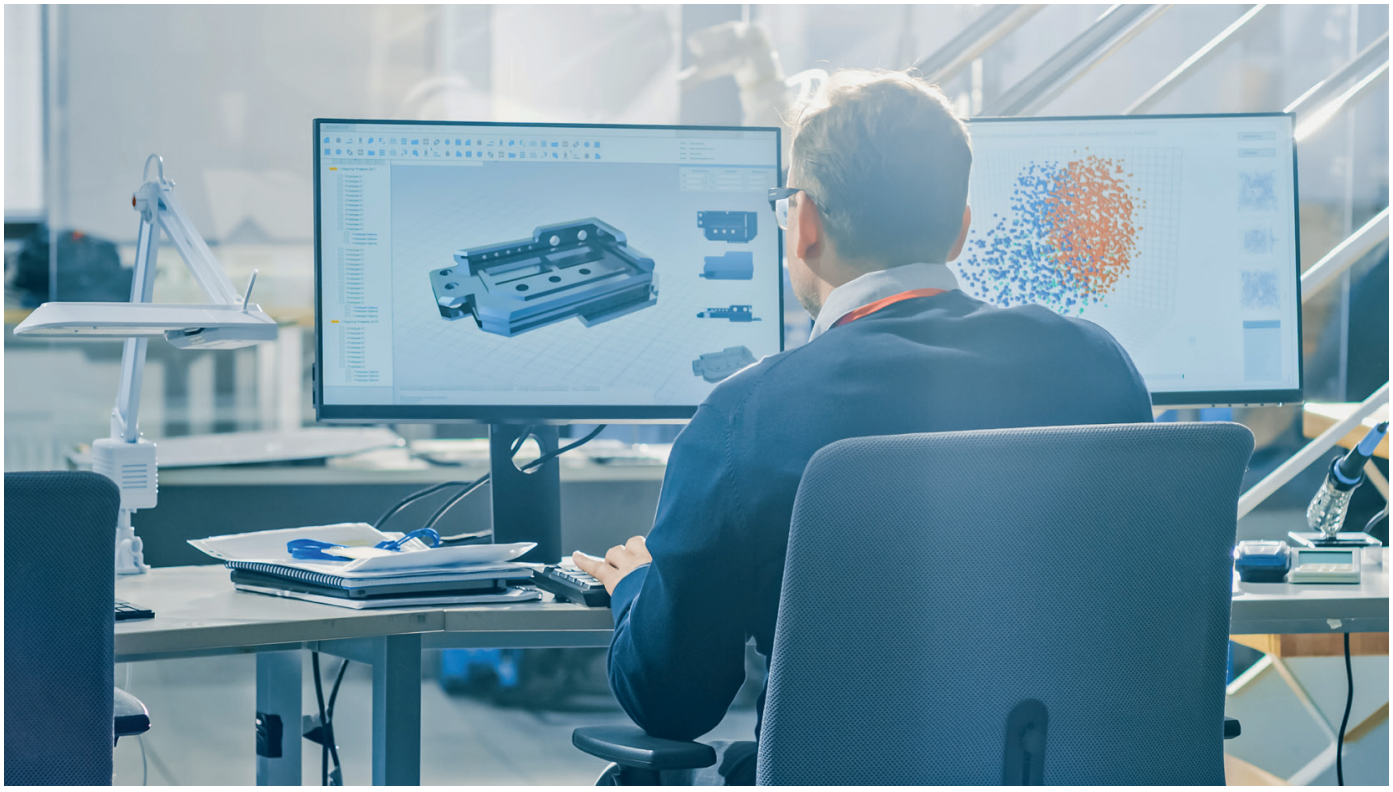
DAYDREAMS's overall objective was to advance on the integration and use of data and artificial/human trustworthy intelligence, together with context-driven **Human Machine Interface** (HMI) for prescriptive **Intelligent Asset Management Systems** (IAMS) in railway by:

- Advancing the maintenance approach by moving from preventive and predictive asset management towards prescriptive asset management
- Largely improving the decision-making process by developing multi-objective decision optimisation approaches that take into account all possible, and often conflicting, implications of IAMS decisions in the railway environment
- Reinforcing the role of the person-in-the-loop by designing and developing advanced context-driven HMIs to allow context- and risk-aware multiple-options decision-making processes

Read more about this important project at **daydreams-project.eu**

Want to know more about DAYDREAMS? Please contact UNIFE Technical Affairs Manager Stefanos Gogos at **stefanos.gogos@unife.org**

While previous projects involving DAYDREAMS partners, such as **IN2RAIL** and **IN2DREAMS**, have successfully addressed condition-based and predictive maintenance approaches that improved traditional reactive and preventive maintenance methodologies, DAYDREAMS exploited state-of-theart technologies to tackle complexity and exploited the business value of prescriptive approaches already used in other industrial fields. DAYDREAMS also increased trust by utilising blockchain and smart technologies.



GATE4RAIL

GATE4RAIL (GNSS automated virtualized test environment for rail) was a project within S2R JU's *2nd Innovation Programme* (IP2) that ended in February 2021.

GATE4RAIL aimed to define, design and develop a geo-distributed simulation and verification infrastructure to evaluate the GNSS performances in the railway environment. GATE4RAIL also identified methodologies and tools aimed at simulating GNSS behaviour in different railway scenarios and situations and automated updating of tests environment.

Final achievements and results are summarised as follow:

- A simulation and verification platform for the evaluation of the GNSS performances in the railway environment had been designed, developed and tested
- The consortium performed an investigation, selection and test of different methodologies for automated update of test environment
- The partners also performed an investigation, selection and test of concepts and methodologies definition for continuous integration, automated test and repetition and evaluation

For more information about GATE4RAIL, please visit **gate4rail.eu**

If you wish for further insights, please contact UNIFE Technical Affairs Manager Jose Bertolín at **jose.bertolin@unife.org**

GEARBODIES

The **GEARBODIES** project developed new methods and technology for the inspection of new materials in carbody applications, as well as to employ innovative approaches for developing novel concepts with enhanced lifetimes for key running gear components.

GEARBODIES worked towards the development of cost-efficient and reliable trains through two dedicated work streams:

- Work Stream 1: Inspection methods for carbodies using new materials to develop effective and affordable solutions for inspecting carbodies that are using new lightweight materials

- Work Stream 2: Innovative approaches for developing running gear components, which aim to employ innovative approaches, tools and methods for developing novel concept designs of running gear components with extended lifetime, and low LCC, whilst maintaining or reducing current levels of reliability, noise emissions, and track damage

Interested in this research and want to hear more, please visit **gearbodies.eu**

For more information about this project's status, please contact UNIFE Technical Affairs Manger Stefanos Gogos at **stefanos.gogos@unife.org**

IN2ZONE

IN2ZONE (The next generation of railway transition zones) was a Shift2Rail *Innovation Programme 3* (IP3) project that seeks to enable infrastructure to boost the economic viability, sustainability and resilience of the European rail network.

IN2ZONE's objective was to design and test a prototype next generation transition zone solution that provides a step-change in track support conditions, resulting in a drastic reduction in maintenance interventions.

For more information,
please visit the project's website at **in2zone.eu**

To get further updates
concerning IN2ZONE,
please contact UNIFE Head of Technical Affairs Nicolas Furio at
nicolas.furio@unife.org

IP4MaaS

IP4MAAS was a project under S2R JU's 4th Innovation Programme (IP4).

Within IP4, more than 10 projects have created a wide array of technologies which address various aspects of the traveller experience. Those technologies tackle the interoperability of **Transport Service Providers'** (TSPs) services, travel shopping, booking & ticketing, trip tracking, travel companion technologies and business analytics. Various tools have been tested in multiple locations around Europe to retrieve user feedback and improve upon those critiques. IP4 had a large toolset of proven technologies that needed to go to the next level and be implemented in large scale products.

To that end, IP4MAAS assisted IP4 projects in demonstrating the technologies at an unprecedented level, at 6 different locations in Europe and with the cooperation of more than 10 transport operators (Public Transport and Mobility-as-a-Service), authorities and agencies. IP4MaaS developed the scenarios for the demonstrations and a thorough assessment strategy that evaluated both the performance and impact of the technologies on users and the environment in urban and suburban setups.

Interested in this research and want to hear more, please visit **ip4maas.eu**

For more information about this project's status, please contact UNIFE Technical Affairs Manger Stefanos Gogos at **stefanos.gogos@unife.org**

NEXTGEAR

NEXTGEAR (Next generation methods, concepts and solutions for the design of robust and sustainable running gear) was a Shift2Rail *Innovation Programme 1* (IP1).

The project contributed to the development of a new generation of running gear. To make a step change towards this end, NEXTGEAR was:

- Updating the **Universal Cost Model** (UCM) developed by the Roll2Rail project
- Suggesting new ideas on the use of new materials and manufacturing methods
- Designing the wheelset of the future by proposing hybrid carbon fibre/metallic wheelset design

Interested in NEXTGEAR?
Visit the project website at
nextgear-project.eu

Looking to discuss NEXTGEAR?
Please contact UNIFE Technical Affairs Manager Jose Bertolín at
jose.bertolin@unife.org

OPTIMA

OPTIMA (Communication platform for traffic management demonstrator) was a Shift2Rail Innovation Programme 2 (IP2).

OPTIMA addressed the design and development of a Communication Platform to manage the link with different services, or "multimodal operational systems", supporting Traffic Management System (TMS) applications.

The platform linked TMS applications with Traffic Management, Traffic Control, Maintenance/Energy Management and signalling field infrastructure systems.

A strong collaboration with complementary Shift2Rail projects **X2Rail-4** and **FINE-2** was established, particularly for activities concerning the CDM and integration of the TMS applications into the platform.

Become better acquainted with this project by visiting its dedicated website: **optima-project.eu**

For more information about OPTIMA, please contact UNIFE Technical Affairs Manager Jose Bertolín at **jose.bertolin@unife.org**

RAILGAP

RAILGAP (Railway ground truth and digital map) is a **Horizon 2020** project. It is tasked with developing innovative **High Accuracy, High Precision Ground Truth and Digital Maps**, essential elements of an EGNSS train positioning system and a Validation &Verification Environment.

During the project, the consortium was dedicated to analysing user needs and sorting them into functional and non-functional requirements for the development of the Ground Truth and Digital maps.

Additionally, the project prepared and executed a measurement campaign based on the review of the state-of-the-art of selected technologies and development done within the project. Work was also done on the characterisation of technologies in railways. It was mainly focused on the obtention and validation of the necessary error models and the performance of sensor fusion solutions for railway precise and robust position/trajectory determination.

To learn about train positioning initiatives, visit **railgap.eu**

Want to hear more about mapping? Please write to UNIFE Technical Affairs Manager Jose Bertolín at **jose.bertolin@unife.org**

RECET4Rail

RECET4Rail (Reliable energy and cost-efficient traction system for railway) was a project under S2R JU's *1st Innovation Programme* (IP1).

The RECET4Rail research project was meant to introduce new emerging and disruptive technologies to rail traction systems in order to improve the overall rail system performance from all points of view, while reducing the overall lifecycle exploitation cost.

Its ambition was to provide essential knowledge and competence that can lead to the improvement to high Technology Readiness Levels (TRL) of Shift2Rail traction demonstrations developed in the Shift2Rail **PINTA-3** project.

The project was structured around four workstreams:

- 3D additive manufacturing and new manufacturing technologies
- Wireless Dynamic Charging for urban vehicles based on silicon carbide (SiC) semiconductors and high power lithium ion batteries sizing
- Investigations on reliability of traction components and lifetime mechanisms
- Big Data, Artificial Intelligence (AI) for smart and predictive maintenance of traction systems

Visit the project's website, **recet4rail.eu**, for more details

For further inquiries, contact UNIFE Head of Technical Affairs Nicolas Furio at **nicolas.furio@unife.org**

RIDE2RAIL

RIDE2RAIL was a project directly linked to S2R JU's *4th Innovation Programme* (IP4). The project started in worked to develop solutions and tools that will facilitate the efficient combination of ride-sharing and scheduled transport services - for example, bus and rail. By making it easier to compare and choose between multiple transport options and services, RIDE2RAIL seeked to make ride-sharing a (more) attractive way to move passengers towards public transportation while fighting both congestion and pollution.

RIDE2RAIL aimed to integrate multiple public, private and social data sets and sources with existing transport platforms to promote effective ride sharing practices by citizens.

RIDE2RAIL designed, developed and tested in real demonstrators a set of software components for the IP4 ecosystem, including advanced Travel Companion features and a crowd-based Transport Service Provider.

Learn more about the future of multimodality by visiting RIDE2RAIL's website: **ride2rail.eu**

You can also direct any questions to UNIFE Technical Affairs Manager Stefanos Gogos by writing him at **stefanos.gogos@unife.org**

SAFE4RAIL-3

Safe4Rail-3 (Advanced safety architecture and components for next generation TCMS in railways) was a Shift2Rail IP1 research project that seek, in collaboration with the Shift2Rail **CONNECTA-3** project, to increase the flexibility and reliability of the **Train Control and Monitoring System** (TCMS) communications.

Safe4Rail-3's activities are based on the development of **three technological pillars** aimed at advancing the maturity of technologies and devices for the next generation of TCMS needed to achieve TRL 6/7:

- Development of the **Drive-by-Data** (DbD) devices in the train network
- Development of high TRL wireless devices and antennas that are suitable for Wireless Train Backbone and Consists domains (Wireless TCMS), along with analysis of antenna installation
- Integration of a Heating, Ventilation and Air Conditioning (HVAC) functionality on top of a Functional Distribution Framework platform and a DbD communication layer that takes full advantage of the expertise obtained from **AUTOSAR**

To read more about this project visit its website: **safe4rail-3.eu**

Additionally, please contact UNIFE Technical Affairs Manager Jose Bertolín at **jose.bertolin@unife.org** for further details

SILVARSTAR

SILVARSTAR (Soil vibration and auralisation software tools for application in railways) was a 2-year collaborative project that fits into the "Cross-Cutting Activities" category of Shift2Rail.

This project seeked to provide the railway community with software tools and methodologies best suited to assessing the noise and vibration environmental impact of railway traffic on a system level.

The project's main ambition was to prove software tools for application in soil vibration and in auralisation within the railway sector.

For more information,
please visit the project website at **silvarstar.eu**

For further details
on SILVARSTAR, contact UNIFE Head of Technical Affairs Nicolas Furio at **nicolas.furio@unife.org**

STREAM

STREAM (Smart tools for railway work safety and performance improvement) was a S2R JU IP3 project dedicated to delivering a resilient, consistent, cost-efficient and high capacity European rail infrastructure.

The project's activities were focused on delivering two methods – or Work Streams - to improve competitiveness in railway maintenance and construction operations:

- The **first work stream** involved the development of a control platform designed to convert traditional heavy-duty hydraulic machines (e.g., excavators) in robotic systems

- The project's **second work stream** was focused on creating a modular, wearable, active exoskeleton to reduce the risk of injury due to physical overload

For more information,
please visit the project website at **streams2r.eu**

To have even more details,
please contact UNIFE Head of Technical Affairs Nicolas Furio at **nicolas.furio@unife.org**

TRANSIT

TRANSIT (Train pass-by noise source characterization and separation tools for cost-effective vehicle certification) was a research and innovation project being conducted within the wider S2R JU's "Cross-Cutting Activities".

TRANSIT provided the railway community with a proven set of innovative tools and methodologies for reducing rail's environmental impact and improving the level of interior acoustic comfort of railway vehicles. Vehicle certification and homologation require extensive measurement UNIFE Research & Innovation Activities 43 campaigns on dedicated test tracks, leading to high cost and time expenses. In the future, conducting these processes virtually should reduce these expenditures.

The project developed accurate and robust source characterisation, separation methods and techniques, and exterior noise simulation tools to facilitate virtual testing and more costeffective vehicle certification and homologation methods. Regarding interior acoustic comfort, innovative material designs needed to increase sound transmission loss and absorption are being developed. Their creation and deployment will lead to improved interior sound quality while not exceeding weight constraints.

For more information please visit the project website at **transit-prj.eu**

Interested in noise and vibrations? Please contact UNIFE Head of Technical Affairs Nicolas Furio at **nicolas.furio@unife.org**

5GRAIL

5GRAIL (5G for future RAILway mobile communication system) was a Horizon 2020 EU-funded project, under the responsibility of DG CONNECT, with the main focus of the project being the Future Railway Mobile Communication System (FRMCS).

FRMCS is seen by the railway sector not only as the GSM-R successor, but also as the enabler of train digitalisation, and consequently as one of the major "Game Changers" for railway Command-Control System evolution.

5GRAIL, has helped to build the first set of FRMCS specifications, by developing and testing prototypes of the FRMCS ecosystem, for both trackside infrastructure and on-board.

Regarding on-board, 5GRAIL aimed to reduce specific equipment costs and installation engineering time by combining all train-to-ground communications, with an on-board setup based on standardised interfaces and including mainstream 5G components, called TOBA (Telecom On-Board Architecture).

Want to find out more about the future of rail telecommunications? Visit 5GRAIL's project website at **5grail.eu**

If you require further information, reach out to UNIFE Technical Affairs Manager Stefanos Gogos at **stefanos.gogos@unife.org**

Our members


ABB
AKKODIS
ALSTOM
ALTPRO
Ardanuy
ASTRA
AXTONE
PRAHA
Bentley
Advancing Infrastructure
BVV
SEIT 1842
BODE
Die Tür
Bodet
Time
BONATRANS
CAF
camlin rail
CEG
cellnex
driving telecom connectivity
CENTRALP
Embedded electronic systems
Clear CinCom
Cellular Network Services
comesvil spa
AUTOMATION SYSTEMS
Constellium
Continental
ContiTech
CYLUS
DAKO-CZ
BRAKE SYSTEMS
DELLNER
DIGAS
DualInventive
Ubiquitous Rail
EKE
elcowire rail
ELMA
Your Solution Partner
ELPA
enyse
éolane
ERICSSON
ErvoCom
COMMUNICATIONS SYSTEMS
EVIDEN
evopro
EXPRESS SERVICE
Faiveley Transport
A Wabtec Company
FOGTEC
FIRE PROTECTION
FRAUSCHER
FREQUENTIS
FOR A SAFER WORLD
Fujikura
funkwerk
Gerflor
theflooringgroup
GESTE
MOBILITY & SAFETY
GHH-RADSATZ
GREENBRIER
EUROPE
HACON
HARTING
HASLERrail
HIMA
SMART SAFETY
HIRSCHMANN
A BELDEN BRAND
Hitachi Energy
HITACHI
Inspire the Next
HOPPECKE
POWER FROM INNOVATION
ICF
ikos
indra
IVM
Kalthoff
KNORR-BREMSE
KONI
kontron
KONUX
LEONARDO
LIPPERT
GROUP
LUCCHINI RS
masats

Associate members


unife.org
unife
THE EUROPEAN RAIL INDUSTRY
UNIFE - The European Rail Supply Industry Association
@UNIFE
general@unife.org
+32 2 626 12 60
UNIFE_Rail
Avenue Louise 221, Brussels, Belgium, B-1050