Cámara de Comercio Alemana para España
Deutsche Handelskammer für Spanien

MITTELSTAND GLOBAL
MARKTERSCHLIESSUNGS-PROGRAMM FÜR KMU

**Jornada Hispano-Alemana sobre el Sector Ferroviario – un viaje hacia una movilidad más digital y sostenible**

**Jueves, 21 de noviembre de 2024, 9:00 – 14:00h**

**Hotel ILUNION Suites Madrid - C. de López de Hoyos, 143, 28002 Madrid**

# TRENDS IN RAILWAY MOBILITY AND ASSOCIATED TECHNOLOGIES

in-move by Railgrup
Cluster de Movilidad y Logística Multimodal

**Vicent Pastor**
Technical Project Office
otp@railgrup.net

## IN-MOVE: KEY DIFFERENTIATING FACTS

## THE RAILWAY SECTOR AND THE 2030 CLIMATE AND ENERGY GOALS

## THE RAILWAY SECTOR AND EMERGING TRANSVERAL SOLUTIONS: THE WAY FORWARD

## Founded in 2002
**Barcelona, Europe**

Networking and contacts
Management of knowledge
Cooperative projects
Market trends
International events
Innovation Breakfasts
Access to finance
Support for start-ups
Divulgation
Internationalization
Specialized training
Fairs & congress

## Contact Information


c/ Còrsega 270, 5è - 08008 Barcelona
company/railgrup
@Railgrup
www.railgrup.net
otp@railgrup.net

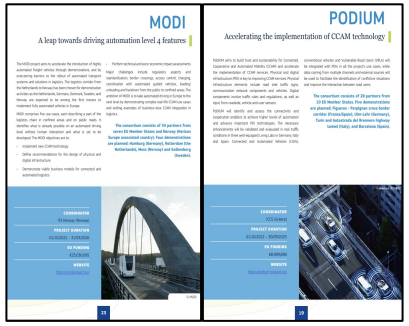

# in-move by Railgrup
Cluster de Movilidad y Logística Multimodal

Formerly known as Railgrup, IN-MOVE was founded in 2002 and is based in Barcelona. It is a Sustainable Mobility and Multimodal Logistics CLuster, with +120 associated companies.

Members include the main OEMs, Public Operators, Private Operators, Engineering, Energy, Consultancy, Railway and Logistics Stakeholders in Spain.


**Join IN-MOVE by Railgrup Community and enjoy full access to:**

- Selective Networking at Managerial Levels
- Networking Events, Workshops and Techdays
- Specialized Training
- Preferential Access to the Most Important Spanish, European and International Fairs and Congresses in the Railway / Mobility sector
- Up-to-date Market Information and Information about Tenders and EU Projects
- Promotion of Shift2Rail and EU Projects and Access to International Bids
- Open Innovation Scouting
- Access to More than 2.200 Companies within ERCI
- Workgroups on Data Science, Conditioned-Based Maintenance, Smart Mobility,
- Advanced Materials-Technologies, Interiors, Cybersecurity, Eco-Innovation, Multimodal logistics, etc.







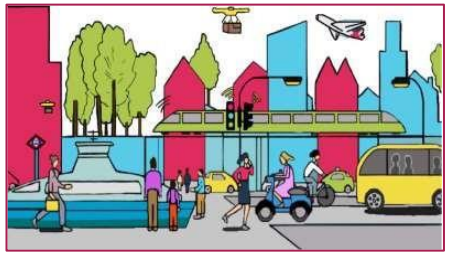
# Our Activitites

IN-MOVE has become a benchmark cluster not only in the railway ecosystem but in the mobility and logistics sector in general. It helps its members to improve their competitiveness through innovation, technological excellence, cross-sectorial knowledge, and the development of joint projects.

IN-MOVE is a co-founder of the ERCI (European Railway Clusters Initiative) with an outreach of 16 countries and +2,000 businesses, through which it participates in EXXTRA and STARS EU projects.

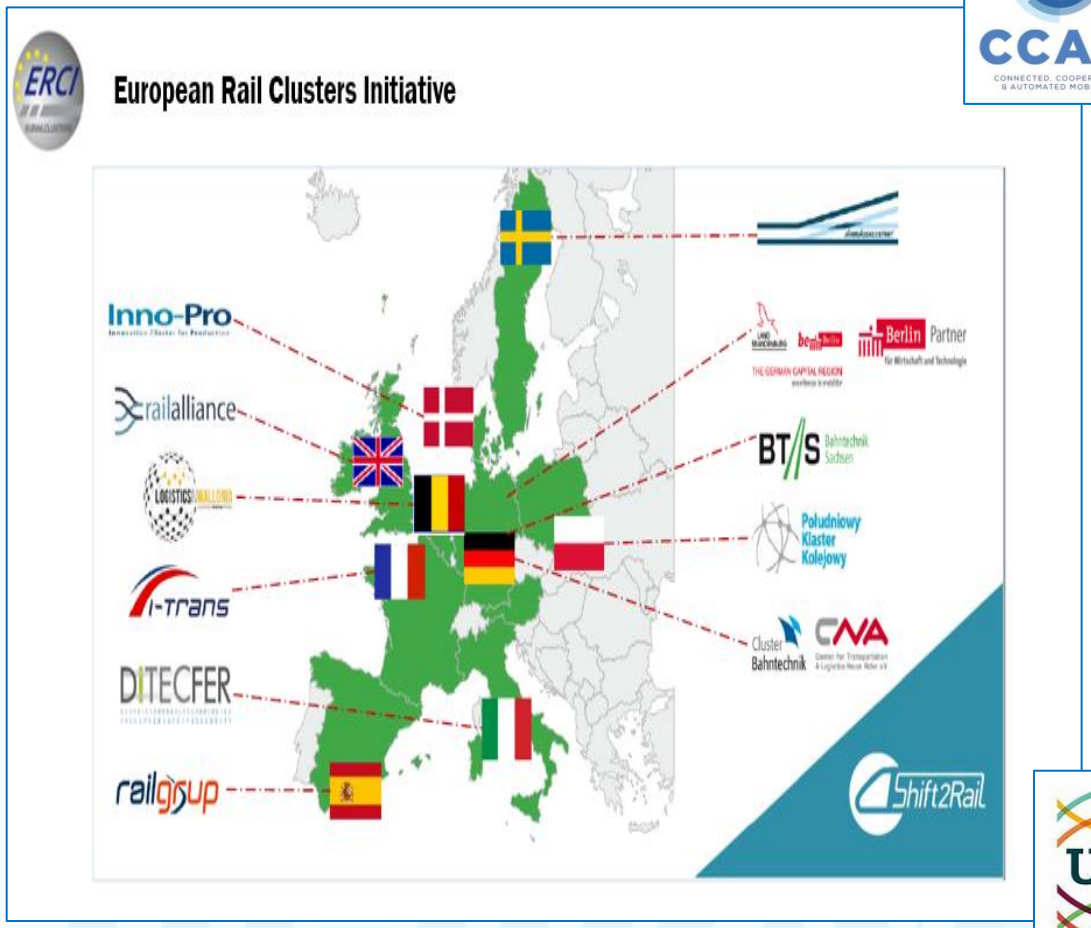
IN-MOVE is also partner of the large-scale EU project MODI, launched within the Connected, Cooperative and Automated Mobility (2021-2027 Horizon Europe).

Interest in Singapore market: Establish new B2B, B2C and R&D&I cooperation in Mobility, Logistics (CCAM, PDI) and Energy (H2)






# Partnerships, alliances and networks


CCAM
CONNECTED, COOPERATIVE & AUTOMATED MOBILITY

UITP ADVANCING PUBLIC TRANSPORT

# IN-MOVE's value chain

renfe

ALSTOM

HUPAC

Talgo

STADLER

SIEMENS
Ingenio para la vida

TMB
Transports Metropolitans
de Barcelona

CAF

Port de Barcelona

CAPTRAIN

TRAM

Wabtec
CORPORATION

ayats
Ayats

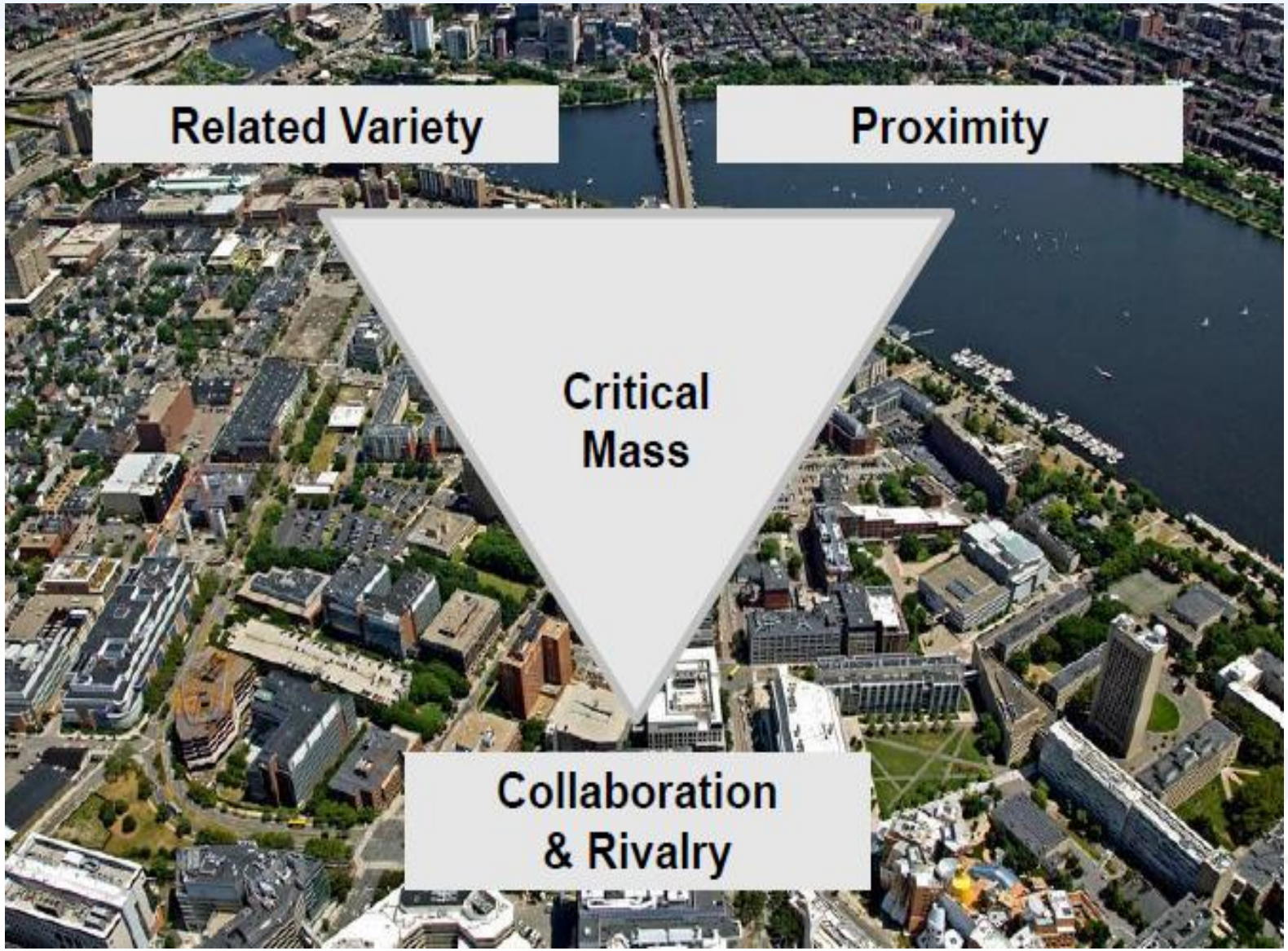
TMB
Transports Metropolitans
de Barcelona

globalvia

MMM
Group

TVS
Supply Chain
Solutions

# Competitiveness Upgrading in Turbulent Times




Dr. Christian H. M. Ketels
Harvard Business School
Chair, TCI Advisory Board

*Catalan Cluster Managers*
*Cambridge, MA*
*17 May 2022*

WORKSHOPS/EVENTOS CO-DISEÑADOS CON TARGET CLIENTE FINAL

CREACIÓN GRUPO TRABAJO ALTO NIVEL AI GENERATIVA

PROYECTOS EU DESARROLLOS B2B

CLUSTER DISSEMINATION EU's LEVEL via ERCI – METACLUSTER

# RAILWAY IS THE FUTURE YET...

## Sostenible.... Seguro → Eficiente y Orientado al Usuario

in-move by Railgrup

**Safety** — Security Monitoring → **Efficiency** — Road & Network Control → **Operation Optimization** → **Experience** — Public Service Push


Intelligence

**Smart Applications**
Business Digitalization


Cognition

**Digital Platform**
Data Convergence + Service Enablement

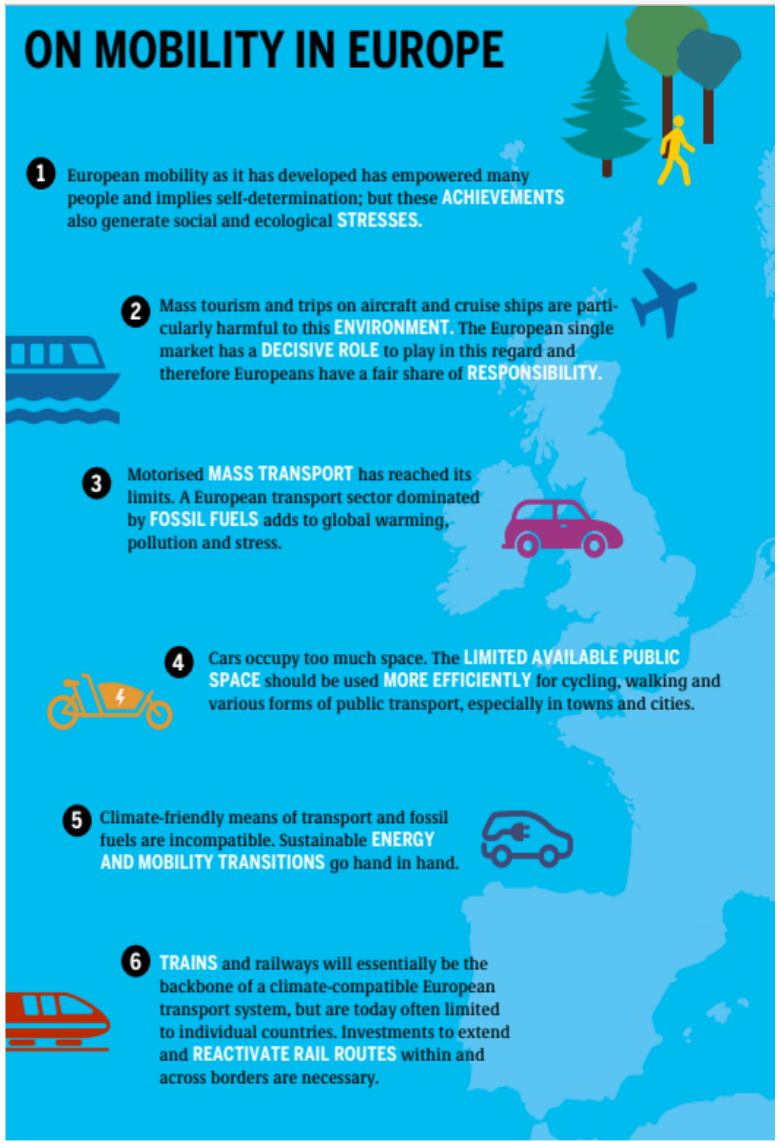

Perception

**All Things Connected**
Infrastructure Digitalization

**Connected People** | **Connected Vehicle** | **Connected Road**

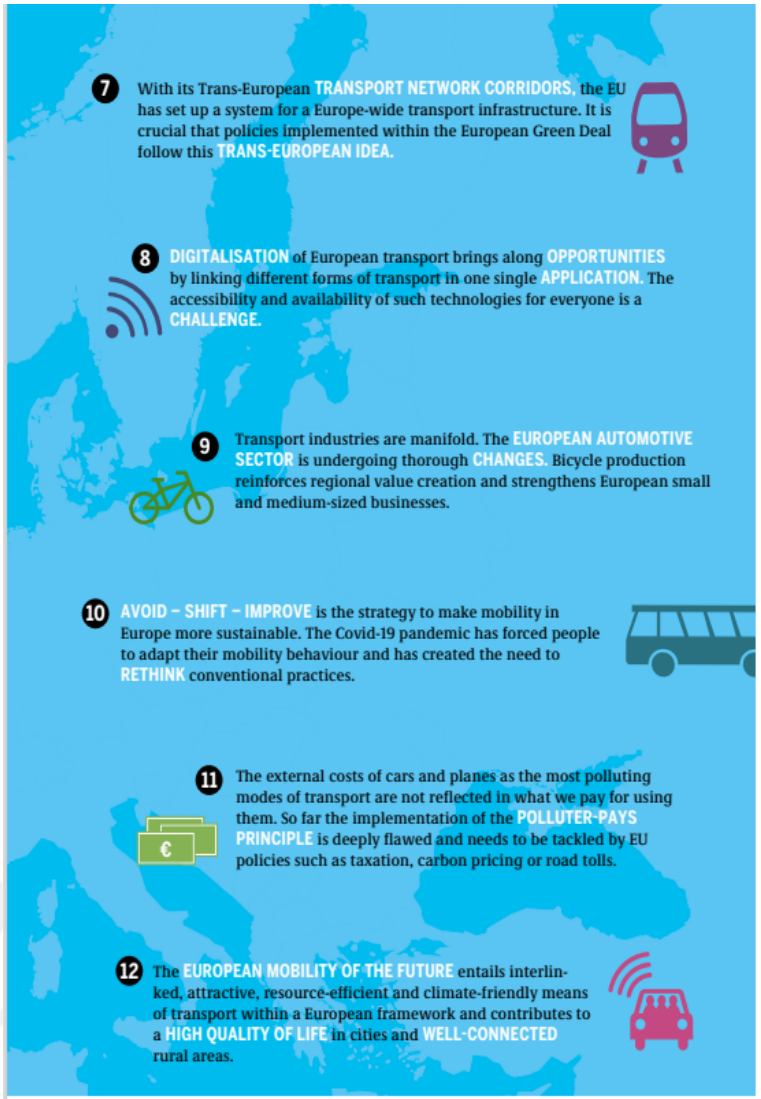
# RAILWAY SHOULD BE THE BACKBONE OF A SUSTAINABLE MOBILITY FREIGHT AND PASSENGERS' EU – IT'S NOT YET…

## INFRAESTRUCTURE DRIVEN WORLD…





Transport amounts for more than 30 percent of greenhouse gas emissions in Europe. Mobility is a key element of the interconnected European Union and its neighbours. Rail is (?) and has been the way to connect Europe sustainably.




ERRAC 2030
https://eu.boell.org/en/European-Mobility-Atlas-2021-PDF

# KEY DRIVERS for RAILWAY EU

in-move by Railgrup

## "Door to Door" Mobility Ecosystem

The usage of real-time information and data sharing will provide an accurate status within the full transport system and allow an overall optimization of the transport offer. **The emergence of new transports- and communication possibilities allows cities and regions to propose multimodal mobility-as-a-service solutions** (focus on shared and on demand) to address the traffic congestion issue and enhance the attractiveness of the public transport. The development of tools for public administration also provides valuable information to optimize the layout of stations and to refine the procedures for incidents. **With rapid development and disruptive solutions**, we can also expect both simpler and cheaper solutions than the now established technology.

## Roadmap for a New Mobility Model

MaaS ALLIANCE

| Disruptor | Digital Asset Market | Efficiency Play | Goal |
|---|---|---|---|
| New digital businesses built beyond public transport collective foundation with nondigital vested assets | New regulatory and organizational frameworks based on multimodal mobility value chain<br><br>Customer convenience<br><br>Agility | Efficiency-Flexibility<br><br>Frictionless in modal change<br><br>Multimodal e-Ticketing<br><br>Fight fragmentation | MaaS for the Common Good<br><br>MaaS gets where Public Transport not reaches<br><br>Less congestion<br>Less pollution<br>Less private car |

**ONE** job in railway transport creates more than **ONE** other job in indirectly dependent economic activities.


**RaaS:** an example of how public transport is reinventing itself

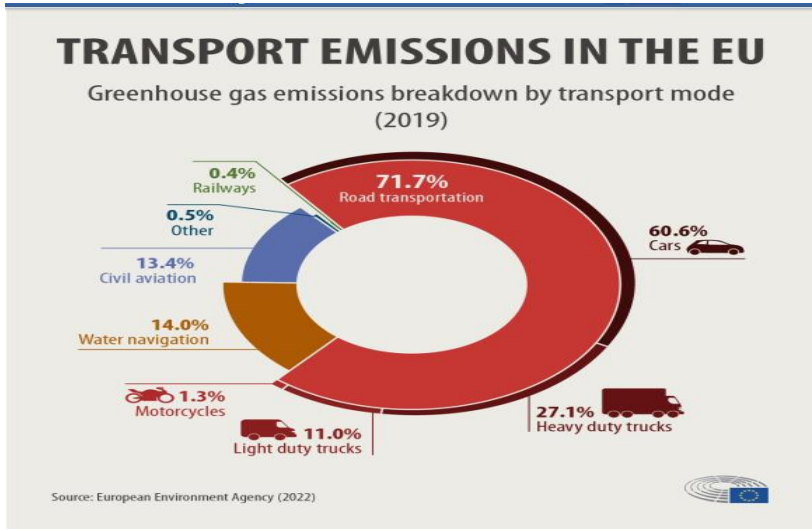
# KEY DRIVERS for RAILWAY EU - LOW EMISSIONS LOGISTICS – BUSINESS & TECHNOLOGY OPPORTUNITY

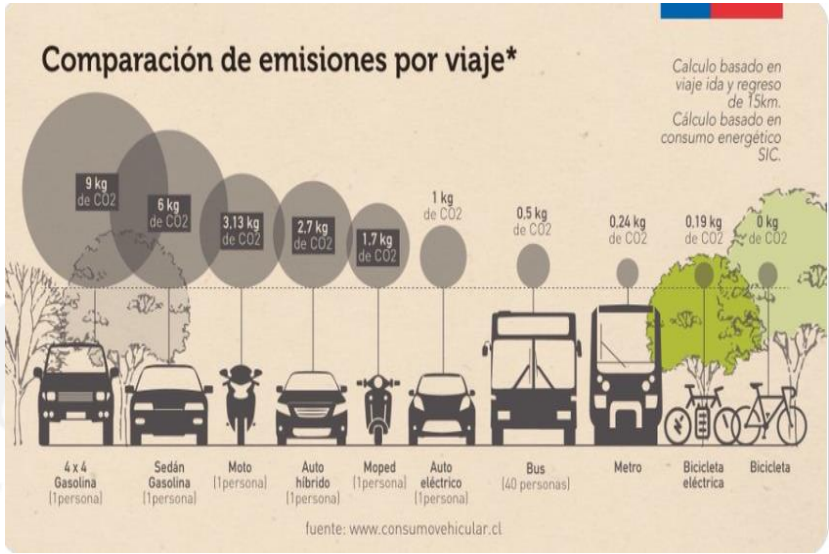
in-move by Railgrup

## Environmental Sustainability and Carbon Free Mobility

**As the railway is the cleanest mode of transport**, promoting modal shift towards rail will support the reduction of emissions. But this is not enough, and rail will implement new light materials, new technical solutions for non-electrified lines and further increase its energy efficiency. **Improving the integration of transport systems in populated areas by reducing noise, vibration and carbon emissions** will be essential to increase social acceptance in urban environments and beyond. Indeed, rail systems are contributing to mitigating the climate change challenge.

Additional research and innovation actions will improve the current situation from the environmental perspective. For instance to develop smart energy infrastructure. On board and line-side energy storage technologies and charging technologies will make it possible to recover a big amount of the braking energy and will support balancing the flow of energy. Electricity supply using SMART Grid technologies coupled with increasing the residence and variety of supply resources (e.g. main grid, local renewable, recovered, etc.), can be applied not only for rail traction systems but also for road usage and stations. Another example is the necessity of work from an early phase on the adaption of regulation and standards to consider (and even favour) the use of the cleanest technology being developed.

# CCAM & PDI
# -Connected, Cooperative, and Automated Mobility-

# CCAM & PDI – The opportunity

CCAM+PDI is a trend promoted from Brussels, with a horizontal character ergo affecting different verticals, and which understands that digitalization (i.e., CCAM) is key to improving the competitiveness, safety and **sustainability** of the new mobility.


Actions

- Knowledge sharing
- Participation in workshops, fairs, and events CCAM
- B2B meetings with CCAM stakeholders at EU & International level

Return

- Niche and business opportunities scouting
- Positioning of IN-MOVE and associates as key players in CCAM projects
- New client's development and access to CCAM spectrum

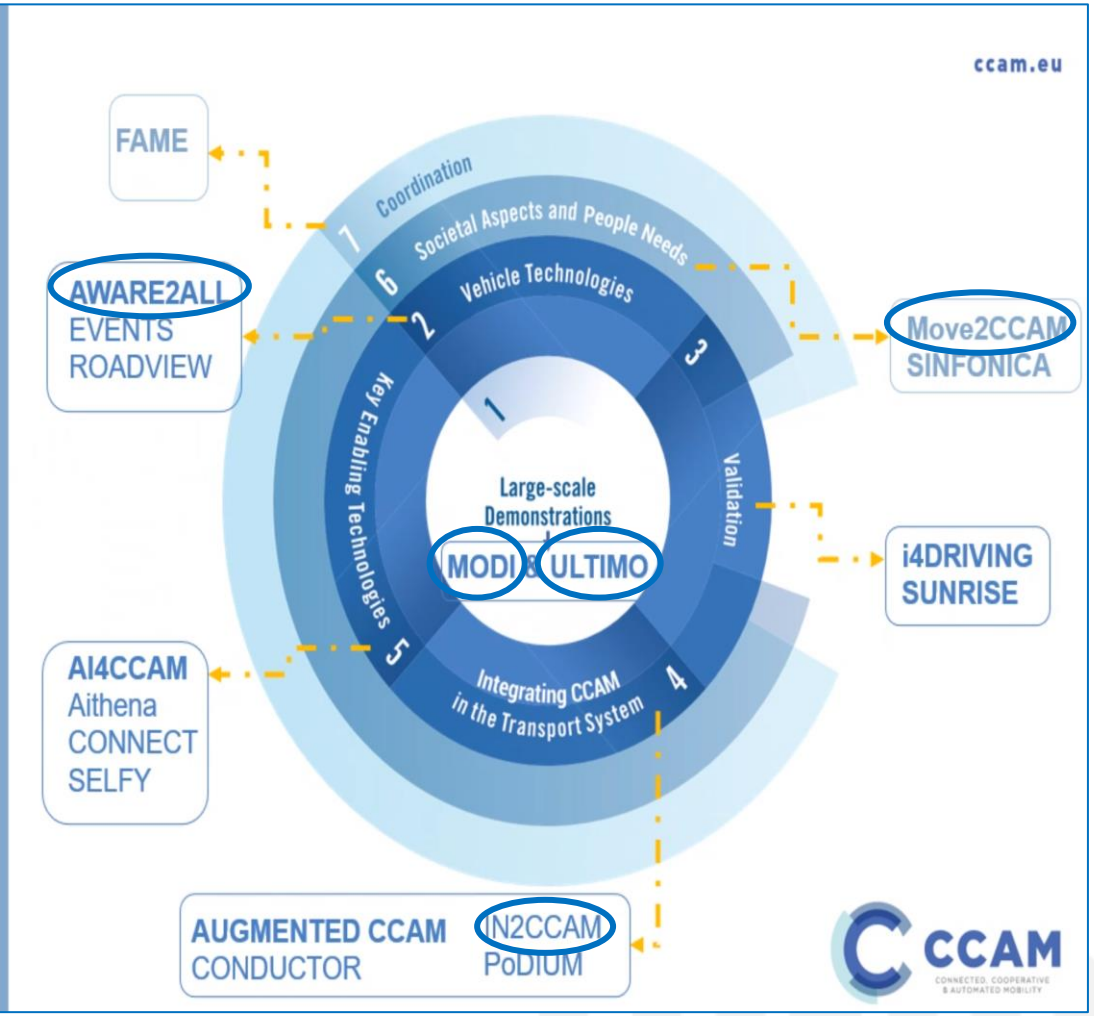
**Insights & business creation [€€€]**

# CCAM running initiatives

Horizon Europe Cluster 5 WP

**Destination 6 Transport and Smart Mobility services**

Calls 2021 & 2022 Projects




- +110M € raised by IN-MOVE and its associates in EU CCAM Projects.
- MODI & PoDIUM projects have been generated in cooperation of the cluster's value chain.
- Other initiatives: Augmented CCAM, metaCCAZE.

in-move by Railgrup

# International Impact

## MODI

### A leap towards driving automation level 4 features

The MODI project aims to accelerate the introduction of highly automated freight vehicles through demonstrations, and by overcoming barriers to the rollout of automated transport systems and solutions in logistics. The logistics corridor from the Netherlands to Norway has been chosen for demonstration activities as the Netherlands, Germany, Denmark, Sweden, and Norway are expected to be among the first movers to implement fully automated vehicles in Europe.

MODI comprises five use cases, each describing a part of the logistics chain in confined areas and on public roads. It identifies what is already possible on an automated driving level without human interaction and what is yet to be developed. The MODI objectives are to:

- Implement new CCAM technology
- Define recommendations for the design of physical and digital infrastructure
- Demonstrate viable business models for connected and automated logistics
- Perform technical and socio-economic impact assessments

Major challenges include regulatory aspects and standardisation, border crossings, access control, charging, coordination with automated guided vehicles, loading/unloading and handover from the public to confined areas. The ambition of MODI is to take automated driving in Europe to the next level by demonstrating complex real-life CCAM use cases and setting examples of business-wise CCAM integration in logistics.

**The consortium consists of 34 partners from seven EU Member States and Norway (Horizon Europe associated country). Four demonstrations are planned: Hamburg (Germany), Rotterdam (the Netherlands), Moss (Norway) and Gothenburg (Sweden).**

**COORDINATOR**
ITS Norway (Norway)

**PROJECT DURATION**
01/10/2022 – 31/03/2026

**EU FUNDING**
€23,030,095

**WEBSITE**
https://modiproject.eu/

© MODI

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## PODIUM

### Accelerating the implementation of CCAM technology

PoDIUM aims to build trust and sustainability for Connected, Cooperative and Automated Mobility (CCAM) and accelerate the implementation of CCAM services. Physical and digital infrastructure (PDI) is key to improving CCAM services. Physical infrastructure elements include road side traffic signs, communication network components and vehicles. Digital components involve traffic rules and regulations, as well as input from roadside, vehicle and user sensors.

PoDIUM will identify and assess the connectivity and cooperation enablers to achieve higher levels of automation and advance important PDI technologies. The necessary enhancements will be validated and evaluated in real traffic conditions in three well-equipped Living Labs in Germany, Italy and Spain. Connected and Automated Vehicles (CAVs), conventional vehicles and Vulnerable Road Users (VRUs) will be integrated with PDIs in all the project's use cases, while data coming from multiple channels and external sources will be used to facilitate the identification of conflictive situations and improve the interaction between road users.

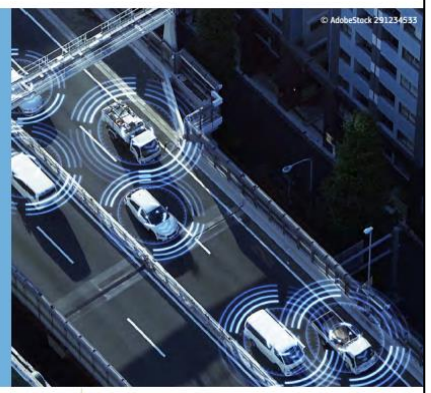
**The consortium consists of 28 partners from 10 EU Member States. Five demonstrations are planned: Figueres - Perpignan cross border corridor (France/Spain), Ulm-Lehr (Germany), Turin and Autostrada del Brennero highway tunnel (Italy), and Barcelona (Spain).**

**COORDINATOR**
ICCS (Greece)

**PROJECT DURATION**
01/10/2022 – 30/09/2025

**EU FUNDING**
€8,999,890

**WEBSITE**
https://podium-project.eu/



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Extracto de brochure oficial CCAM de CINEA (enlace)

- MODI & PoDIUM projects generated within IN-MOVE!
- Other Projects where IN-MOVE's associates participate : ULTIMO, AWARE4ALL, MOVE2CCAM…
- Top 18 initiatives in Horizon Europe – CINEA!

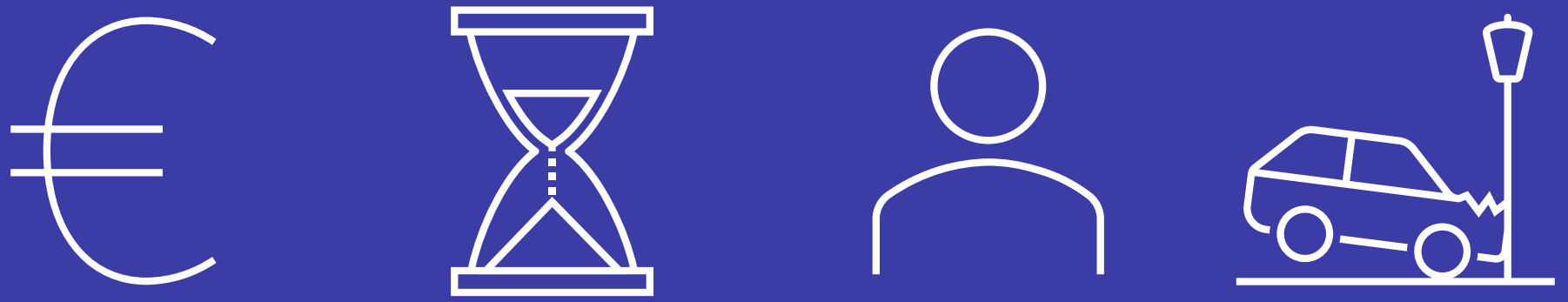
# International impact

**CNN International highlights the benefits of the MODI Project!**

# MODI

A LEAP TOWARDS
SAE L4 AUTOMATED
DRIVING FEATURES

# Automated transport  is crucial to overcome freight transport challenges



MODI

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

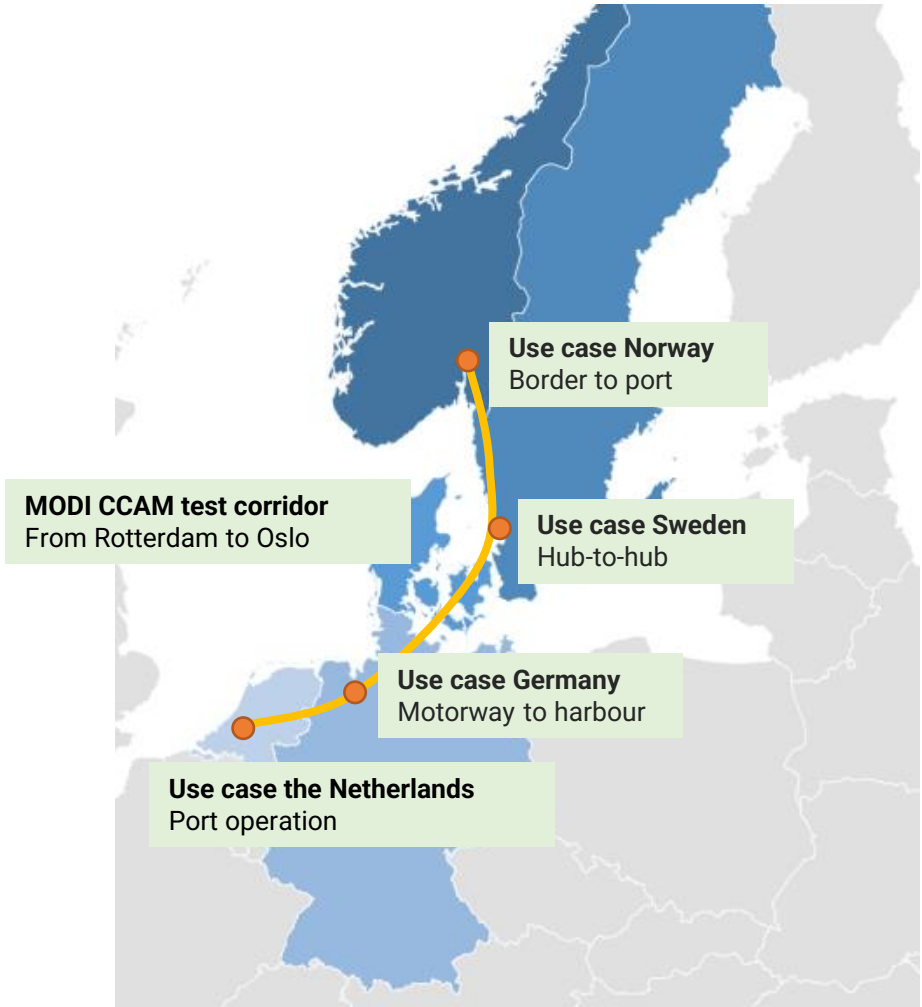
Co-funded by the European Union

# Overview

- **Logistic** corridor from Rotterdam to Oslo
- Identify and largely resolve barriers on this corridor, in **confined areas** and on **public roads**

Leveraging with other projects

ENSEMBLE
MOVE 21
AWARD
C-ROADS
ULTIMO
Orchestra
AUTOPILOT
levitate
AVENUE
connected automated driving.eu
SONRISE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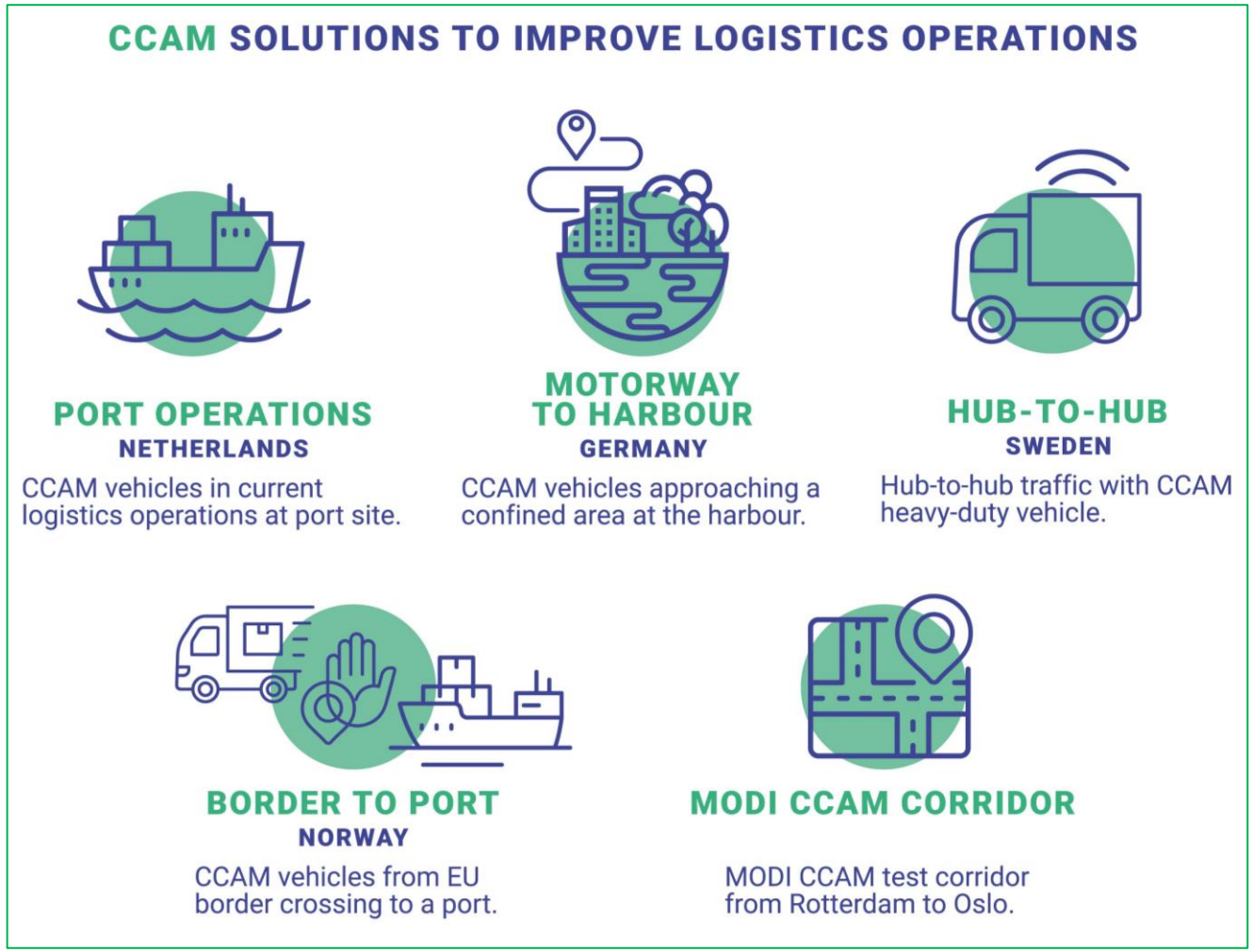
# Use cases




MODI

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# Expected outcome

## MODI KEY RESULTS

**CCAM vehicles at TRL 7** suitable for L4 demos on public roads & confined areas on the logistic corridor between The Netherlands and Norway.

**Interface for efficient coordination of** vehicles in public & confined areas, adding more benefits to **CCAM vehicles** use.

**Design of Physical and Digital Infrastructure** for supporting L4 CCAM vehicles, co-created and verified by relevant stakeholders.

**New viable business models** and tools creating value along the logistic chain by utilizing CCAM technology and vehicles.

**Assessment** of environmental, safety, operational, and socio-economic **impacts** to support the recommendation of CCAM deployment in logistics.

Lessons learned and **book of recommendations** on CCAM vehicles, PDI, regulation, harmonization, and standardization to accelerate CCAM adoption in logistics.

MODI

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Co-funded by the European Union

# Three Living Labs (LLs) and 5 Use Cases (UCs)

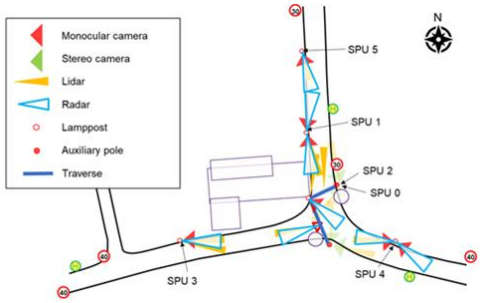
## Common aspects in all LLs

- Multi-access Edge Computing
- LTE and 5G coverage
- ITS-G5 (automotive WiFi) infrastructure
- Connected automated vehicle, incl. connectivity OBUs
- Mobile devices representing info regarding VRUs

## Ulm-Lehr LL in Germany

**Urban T-junction** equipped with sensing and data processing infrastructure + communication (UC1)

- 5G mmWave coverage
- 60GHz-WiFi
- Multipath connectivity
- RSU and Sensor Processing Units (SPUs) supporting multiple communication technologies



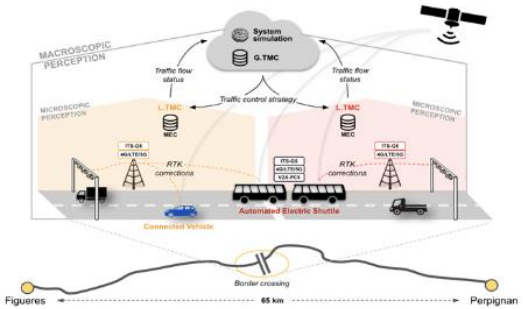

## LL in Spain

Real **urban** traffic environment (UC2):
a **corridor** in the **city of Barcelona** that connects two points through a set of intersections and main roads (multiple alternative paths).

- **Emergency vehicles**
- Emergencies Management Centre
- Traffic light controllers

Spain-France **cross-border** corridor (UC3):

- **Connected automated shuttle**
- MEC servers on each side of the border
- Includes **urban and suburban areas**




## LL in Italy

Focusing on software integrity, trust and truthfulness enhancements

A **complex urban intersection** in the City of Turin (UC4)

- Real edge infrastructure by TIM

**Highway tunnel** located on the Autostrada del Brennero (UC5)

- A22/BRE Traffic Control Centre
- RSUs along the motorway axis
- **Data from sensors and vehicles**

# Expected Impact

- Provide an **enhanced blueprint for CCAM services based on tightly integrated physical and digital infrastructures** via the digital twin concept.
- **Enhance quality of and trust in external data via a truthfulness assurance mechanism**, meeting the requirements of cross-border interoperability and continuity.
- Demonstrate the **potential, feasibility and sustainability of multi-connectivity, multipath communications and 5G mmWave for automotive**-related services.
- **Support the vision of low carbon and more energy efficient transport with increased safety**, especially for VRUs
- **Increase the uptake of CCAM related systems and services** by identifying and assessing the cooperation enablers and needs and providing real-life validation.


## ASSETS in THE MULTIMODAL LOGISTICS STRATEGY, IN PRACTICE GREEN DEAL DIRECT POSITIVE IMPACT

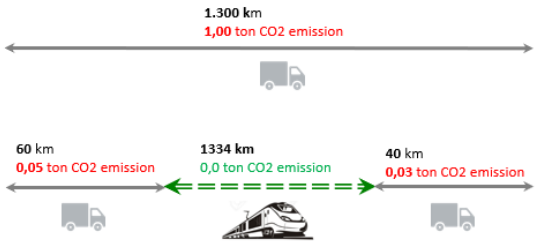
FFWD freshRAIL

Impact test Freixenet Nov. 2021

TENALACH CONSULTING

EcoTransIT World

**Route from Sant Sadurni d'Anoia (ES) to Alsheim (DE)**




## TRAILS – MULTIMODAL LOW EMISSION LOGISTICS

in-move by Railgrup

Barcelona city

**Sector / Subsector of Applicability**
Sustainable mobility / Logistics

**Technological area**
Digital society / Digitalisation / IoT / Sensors

**Green challenges**
Sustainability of food production systems;
Sustainable mobility;
Climate change mitigation and adaptation

**SDGs impact**

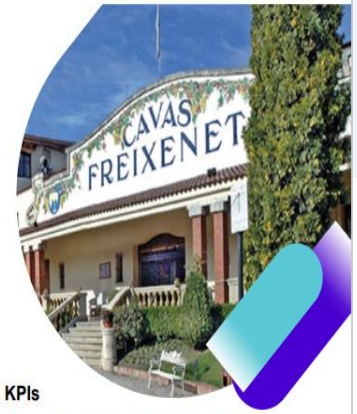
**Objective / Challenge**
To reduce $CO_2$ emissions from the viticulture sector exports.

**Environmental impacts and benefits addressed**
- ✓ To reduce greenhouse gas emissions from viticulture exports.
- ✓ To promote the use of railway transports for viticulture exports.
- ✓ To reduce viticulture exports time and costs.

**Solution's description**
- ✓ The solution has developed a logistic model capable of delivering European viticulture exports through railway transport.
- ✓ The solution is based on the TrackOne Cloud Application, a software that enables the supply chain complete visibility through tracking, tracing and monitoring of the goods and assets exported.
- ✓ The technology employs sensors to analyse the conditions (speed, temperature, vibrations...) in which goods are transported.
- ✓ The sensors send the data to the IoT Cloud platform, thus enabling a real time tracking and monitoring of the cargo.

**Main constraint / Difficulty**
Current Logistics Supply Chain are mainly (97% in Spain) by Road.
Lack of Market Places for Matching Available Volumes

+LINK




**KPIs**
- $CO_2$ (%): 92% less emissions.
- $CO_2$ – Tons saved – 0,92 Tn/1 transits.
- PayLoad : more than 3%
- Longest distance by sustainable mode of transport (train): 1200Km.

**Partners**

Freixenet · CIMALSA Logística i mobilitat · TENALACH CONSULTING · INNOVI Clúster Vitivinícola Català · DITECFER · NGS srl New Generation Sensors · Consell d'Usuaris del Transport Catalunya 1971-2021

ACCIÓ · Generalitat de Catalunya Government of Catalonia

## INTERNATIONAL COOPERATION THROUGH CLUSTER FROM ERCI

TRAILS · Interreg POCTEFA · CIMALSA Logística i mobilitat · FGC Ferrocarrils de la Generalitat de Catalunya · in-move · INNOVI Clúster Vitivinícola Català · ERCI10 EURAILCLUSTERS · DITECFER

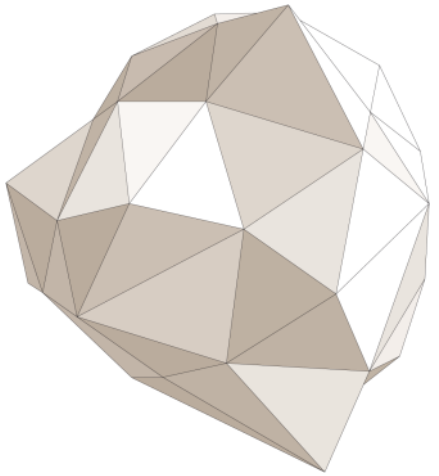
It's about Communication between people, the rest is Technology. Peter Ferdinand Drucker.

# Cluster it!

in-move by Railgrup

**Muchas gracias por su atención**

**Vielen Dank für eure Aufmerksamkeit**

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INNOVATION BROKERS