TER4RAIL

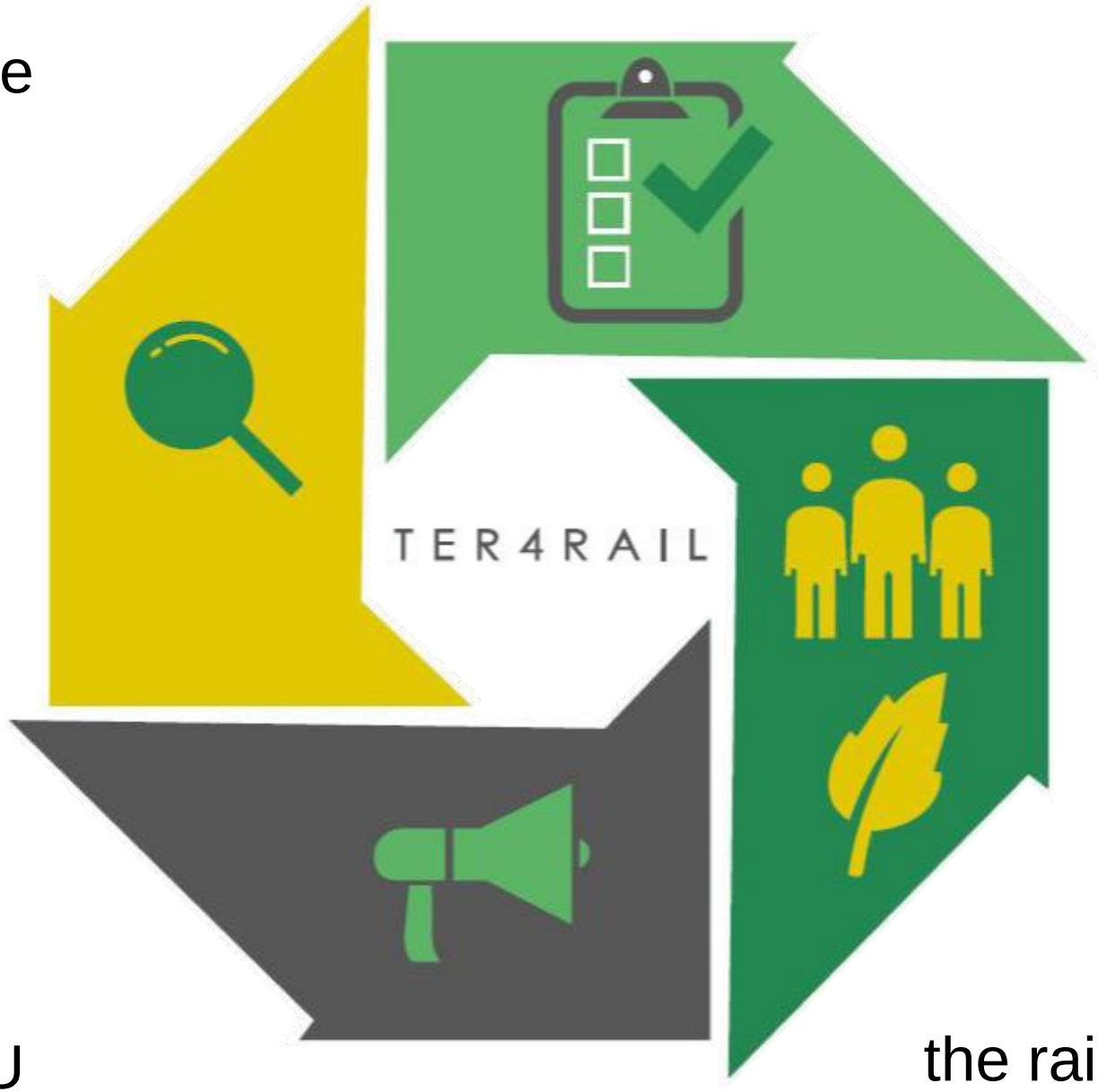
TRANSVERSAL EXPLORATORY RESEARCH ACTIVITIES FOR RAILWAY

TER4RAIL
Transversal Exploratory
Research Activities for Railway

This project has received funding from the Shift2Rail Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement no. 826055 (TER4RAIL)

Rail Innovative
Research
Observatory

Assess
roadmaps
for railways



Communicate
results in
liaison with
the Shift2Rail JU

Raise
arguments
Supporting
the railway sector

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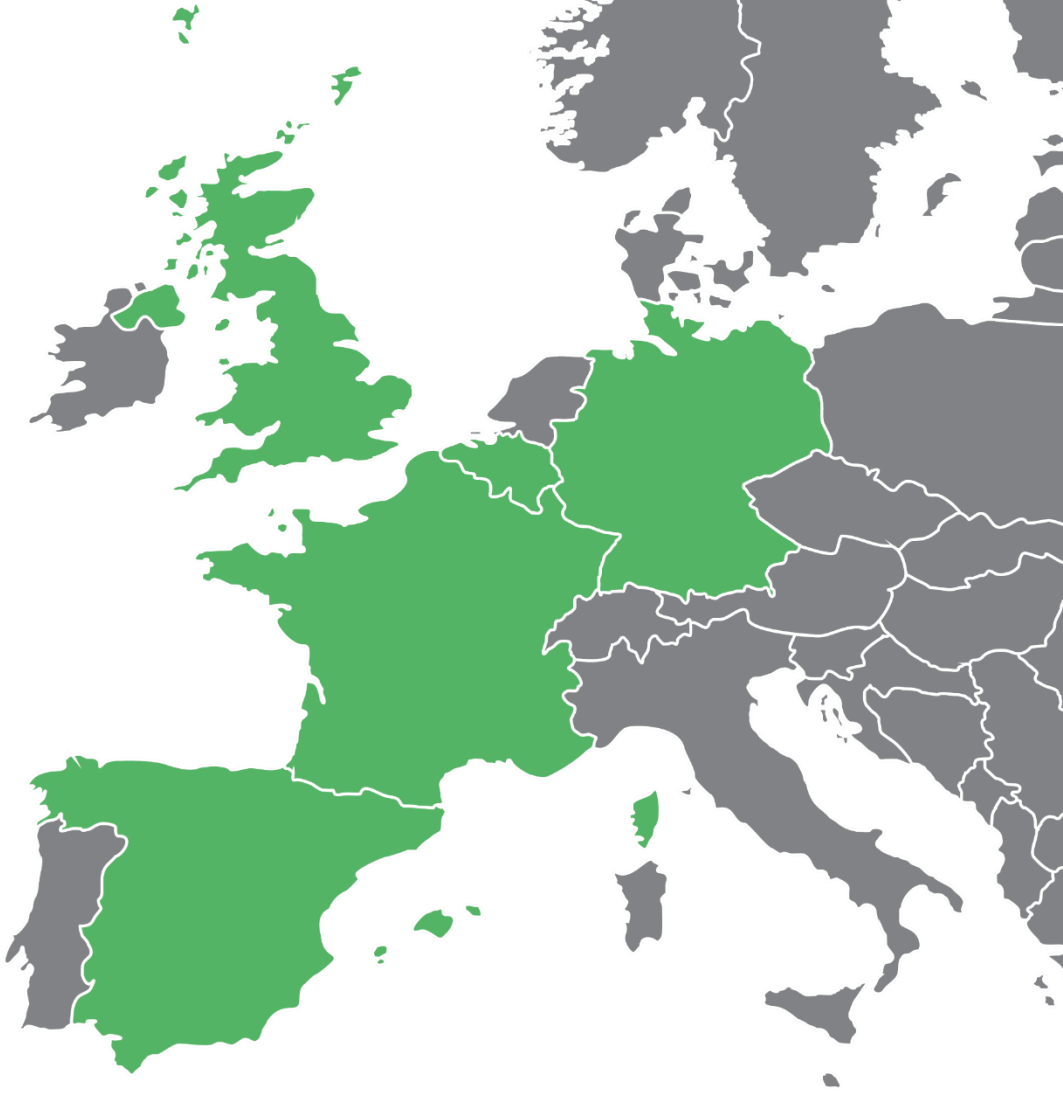


Project coordinator: EURNEX e. V

Start date: 01/12/2018

End date: 30/11/2020

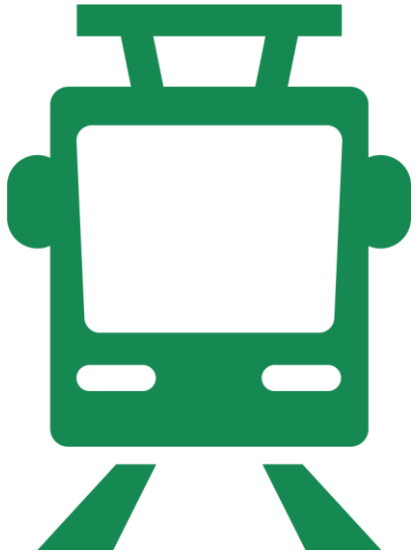
7 partners from 5 countries:
Germany, Belgium, France, UK, Spain

MAPPING RAIL INNOVATIVE RESEARCH

http://bit.ly/3aLMzN7

Analysis of rail policy and strategic **documents**

Trends, challenges, opportunities, risks, barriers



Railway **stakeholders** survey

Most promising technologies or innovations that have the potential to transform the rail sector in the next 5 years

Railway **Project** Scan

Horizon2020: 224 rail-related projects identified

National rail-related projects: 381 projects, 6 countries

RAIL MISSIONS 2050: WORKSHOP ON THE ROLE OF RAIL IN 2050 URBAN SCENARIOS

Outcomes of **Workshop on Urban Scenarios 2050** (architects, urbanists, land planners, authorities, academia) compared to **rail experts assessment**.

Common answers	
safety/security	automation/autonomous mobility
cybersecurity	artificial intelligence/big data
environment	urbanisation/demography
social inclusion	accessibility

https://ter4rail.eu/wp-content/uploads/2020/01/ter4rail_d12_overview_of_the_rail_missions_2050.pdf

IDENTIFICATION OF NON-RAIL ACTORS AND POOL OF EXPERTISE

- Which are the most interesting non-rail actors and expertise for the Rail R&D sector?
- Analysis of 52 European Technology Platforms & Public-Private Partnerships, approach to 17 of them.
- Collection of 10 factsheets: **5G PPP, ACARE, ALICE, ECSO, ECSEL, ECTP, EFFRA, ERTRAC, WATERBORNE, BDVA**.

https://ter4rail.eu/wp-content/uploads/2020/01/ter4rail_d12_overview_of_the_rail_missions_2050.pdf

IDENTIFICATION OF NON-RAIL ACTORS AND POOL OF EXPERTISE

4 aspects analysed:

- Contact with the railway sector;
- Identification of opportunities for further interaction;
- Research and innovation projects;
- Membership.

https://ter4rail.eu/wp-content/uploads/2020/01/ter4rail_d12_overview_of_the_rail_missions_2050.pdf

RAIL INNOVATIVE RESEARCH OBSERVATORY: OVERVIEW

10 Factsheets of non-rail actors available

8 Technology mappings

Rail research projects

Interactions, panels, discussions…

Dissemination, networking

Identification of common members with Shift2Rail

RAIL INNOVATIVE RESEARCH OBSERVATORY: INTERACTIONS

- ERRAC Plenary, 21st of March 2019, Brussels
  Panel: *Research and Innovation in Railways*

- Workshop on *Urban scenarios 2050.*
  UITP Summit, 11th June 2019, Stockholm

- ERRAC Plenary, 29th November 2019, Brussels
  Panel Discussion: Protecting Railways: R&D Priorities to tackle Cybersecurity Challenges of Emerging Technologies

RAIL INNOVATIVE RESEARCH OBSERVATORY: INTERACTIONS

10-13 Nov 2019 UITP Light Rail Committee	9th Dec 2019 UNIFE Technical Platform
13 Nov 2019 ECTP Infrastructure & Mobility Committee and Plenary Meeting	Compilation on Advanced Materials for the Railway Sector
14-15 Nov 2019 F&L Forum Annual Conference	ERRAC Plenary Nov. 2020

RAIL INNOVATIVE RESEARCH OBSERVATORY: MAPPING

Technology Mapping of European Technology Platforms / Public-Private Partnerships vs Shift2Rail

Analysis of:

- mention of railways/Shift2Rail at key documents;
- members in common;
- projects (cross-links with Technological Demonstrator);
- other information: railway innovation capabilities; events; references.

TRANSPORT COMMON KEYWORDS

ARGUMENTS SUPPORTING RAIL

PUBLIC TRANSPORT – METROS IN EUROPE

25% of worldwide metro systems	30% of world's automated metros
2.921 Km of line length (10 new lines from 2015; 491 new Km planned)	7 new conversion projects to GoA4 (full automation)
10.747mil pax/year (+13% ridership from 2015)	> 300 new Km of lines fully automated by 2028
46 cities served	220 hours per person per year saved
+ 45% increase in pax-km from 1995 (combined with trams)	50% safer than car – 40% less pollutant than car

ARGUMENTS SUPPORTING RAIL

PUBLIC TRANSPORT - LIGHT RAIL TRANSIT IN EUROPE

9.296 Km of line length (58% of world's length)	20.754 LRT vehicles (55% of world's total)
10.428 mil pax/year (71% of world's ridership)	0,47 accidents per pax-km (car: 2,86)
56 trips per year per inhabitant	7 times more energy efficient than cars
204 cities served (1.276 lines, 54% of world's total)	Possible innovations: catenary-less power supplies (niche), trams on tyres (small potential), Advanced Driver Assistance Systems (good potential)

ARGUMENTS SUPPORTING RAIL

FREIGHT

- steady growth in combined transport (+10% semitrailer traffic);
- consolidation of landbridge rail intermodal services with China (Silk Road) via Transiberian & Eurasia lines:
  - 40 trains weekly to Duisburg, and
  - regular services to many other EU Ports and Terminals (Hamburg, Milan, Belgrade, UK, France, Spain, etc.);

ARGUMENTS SUPPORTING RAIL

FREIGHT

- cost competitive than other modes also on shorter distances;
- substantial Increase of maritime traffic distribution via dry ports and large hubs in ”traffic industrialisation” mode increasing the ports’ competitive reach (Hamburg, Rotterdam, Antwerp, Genoa);
- progressive introduction of longer, heavier, faster trains on existing rail network. +750m;

ARGUMENTS SUPPORTING RAIL

FREIGHT

- Trieste Port doubled its rail traffic with regular services to Germany, Austria, Benelux, and towards the Eastern countries becoming very attractive for the shipping lines serving the Adriatic and becoming port of choice for Maritime Silk Road;

- short haul rail can be more cost effective and as time competitive as road;

ARGUMENTS SUPPORTING RAIL

FREIGHT

- rail (and inland waterways) carry building materials in and waste out of London/Paris and the Antwerp/Rotterdam cities/ports;

- wisdom that rail is only good over 300km is a social construct, and challenged by projects such as SPECTRUM and TIGER(s);

ARGUMENTS SUPPORTING RAIL FREIGHT

- the key economic driver of rail freight is volume and the efficient use of assets, rather than distance. This brings down the unit costs of production;

- logistical benefits about the use of space (often a big factor) and the availability of kit to cope with peaks.

RAIL SUCCESS STORIES & CHANCES

PUBLIC TRANSPORT - VIENNA

1.9M inhabitants – most populated and dense city in Austria	Ridership (1995-2018): +40% (965,9M pax/year)
Wiener Linien (PTO): 5 metro lines, 129 bus lines and 28 tram lines	Annual passes sold (2010-18): +131% (822.000 pax/day)
1.253 railcars and tramcars serve 2.65 million citizens every day	New car registrations (2008-18): +7,6%
Metro+LRT main “engines” of the Vienna PT system, accounting for the 79.5% of the total ridership, the 73.7% of the vehicles and the 84.6% of the available seats	Public transport mkt share (‘93-2018): from 29% to 38% - Car use: -11%

RAIL SUCCESS STORIES & CHANCES

PUBLIC TRANSPORT - VIENNA

Huge investments in PT particularly since 2010 (important projects ongoing (extension/construction of metro lines, automation projects, new smooth junctions between lines and modes, new vehicles)	Plans to increase e-mobility >50% of fleet by 2030
Customers' satisfaction surveys: >95% positive rates (2018)	WienMobil: single app combining many transport modes (planning and booking tool)
Citizens involved in the construction phase: contact person listening to their needs	WienMobil station: e-bikes, cargo bikes, bike garages, e-charging for cars, hybrid rental cars all in a single location, usable through the app

RAIL SUCCESS STORIES & CHANCES

PUBLIC TRANSPORT - NANTES

Nantes Metropole (NM): structure of 24 cities – 590.000 inhabitants (in demographic expansion). NM has competence on transport and mobility	Park&Ride facilities: incentives to leave the car and use the PT
Re-opening of tram lines in 1985. Urban rail chosen as preferred mode (more capacity, improves city landscape, fosters citizen's sense of community)	Key factors: efficient timelines, accessibility (event PRM), smooth and clear communication, engagement with users, easy intermodal connections, deep attention to safety and maintenance
2018: 43Km of tramways (3 lines, 91 stations, expansion programmes)	Results: 300.000 people use the PT every day (+54% ridership in 10 years, first French city to reduce cars market share, 210 PT trips per inhabitant/year), reshaping of the city (touristic impact), re-discovering of soft modes, improved organization of spaces (more green spaces), reduced pollution and emissions, re-discovering of soft modes

RAIL SUCCESS STORIES & CHANCES

HIGH SPEED

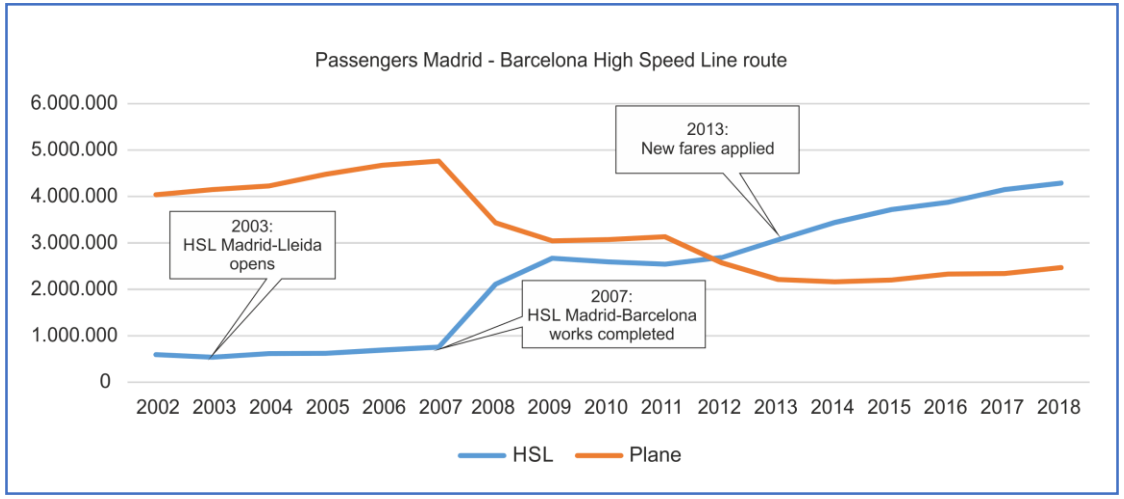
Madrid-Barcelona HSR

- Success story and revolution in Rail services;
- advanced technological innovation;
- proved its success and long term sustainability;
- eroded air market share in medium and long distances;
- proved the viability of co-modal integration extracting the best value performance from each mode.

Pioneering line in Spain: Cross-border solutions in development; low-cost services operating soon; considered for liberalisation.

RAIL SUCCESS STORIES & CHANCES

HIGH SPEED



- ✓ Inauguration date: 20/02/2008
- ✓ Maximum commercial speed: 300 km/h
- ✓ Total length: 663 kilometres
- ✓ Max./min. Altitude above sea level: 1,218m / 9m
- ✓ 47 tunnels; 139 bridges and viaducts

During its first 10 years (2008-2018):

- ✓ 35 million passengers direct connection
- ✓ 65 million passengers all high speed services
- ✓ 85.5 million passengers including connections with other services

RAIL SUCCESS STORIES & CHANCES

FREIGHT

MARATHON

the Marathon train is the Longest train in Europe (1524m)	100km commercial speed
combination of 2x750m standard trains- 72 wagons	2 tests performed (1 with 2 diesel - 1 with 2 electric locos)
4026 tons carried from Lyon to Nimes in real operating conditions	operating costs reduction: -30%
2 locos: 1 in the front - 1 in the middle radio commanded	50% capacity increase 10% energy saving

The M2O project now in execution is conducive towards establishing operating and safety protocols for large scale commercial utilisation.

RAIL SUCCESS STORIES & CHANCES

FREIGHT

TIGER

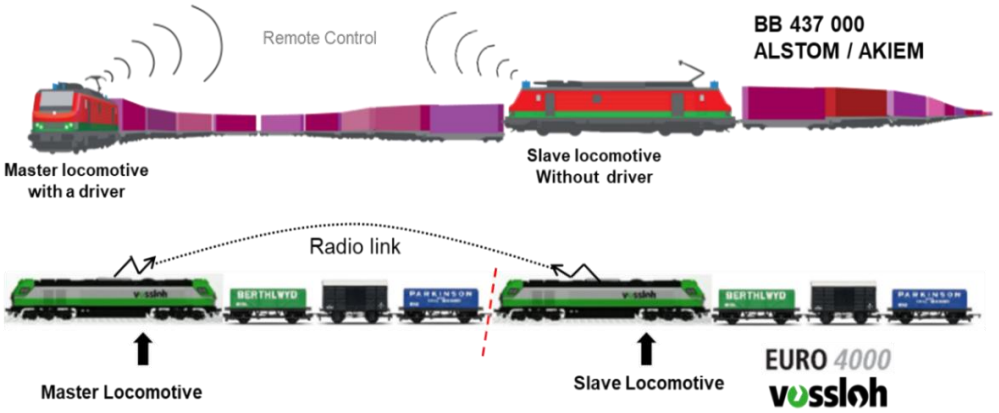
Distribution system via Dry Ports (4 tests)	Increased slot utilisation in Hamburg Sea Terminal by 100%
Operating costs reduction increasing train capacity by 15-20%	Service performances improvement through increased punctuality by 85-90%
Reduced costs in terminals increasing handled volumes	Reduced port congestion through increased Dry Port-Mega Hub rail connections
Reduced sea port costs avoiding shunting movement inside the port	Improved sea ports accessibility
Reduced dwelling & transit time: In Genoa 37% immediate plus 20% planned. Dwell time in Hamburg reduced by 92%	Reduced emissions and accidents caused by road vehicles

The TIGER industrial distribution approach is now used in major EU Seaports both North and South range.

RAIL SUCCESS STORIES & CHANCES

FREIGHT

THE MARATHON TRAIN

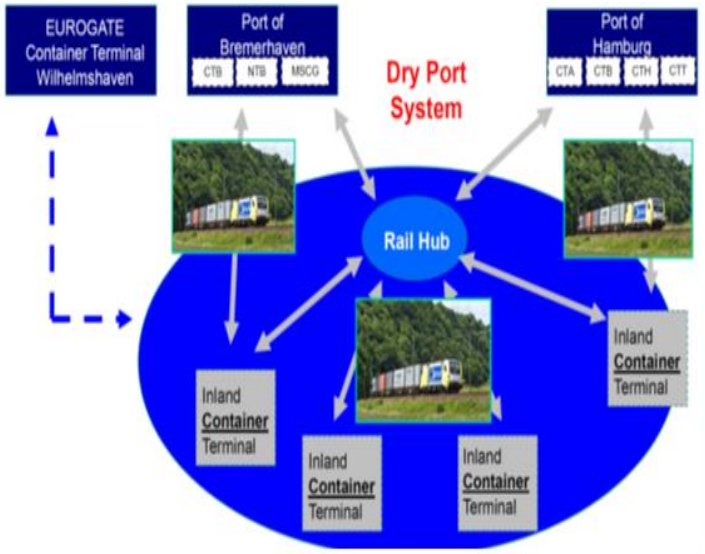


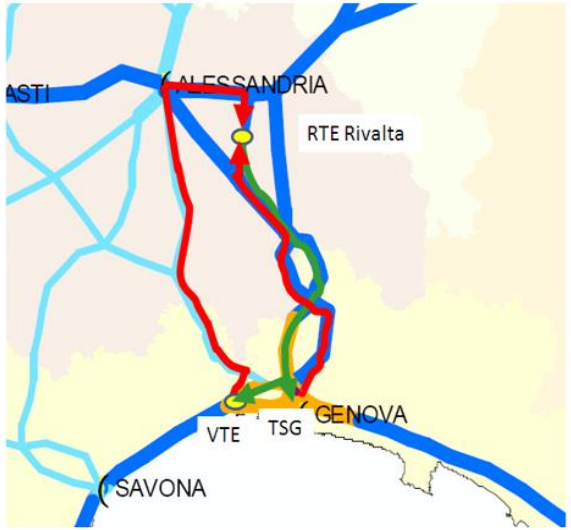
Carries twice the payload using only 20% more capacity than One standard train, and is manned by one driver only.

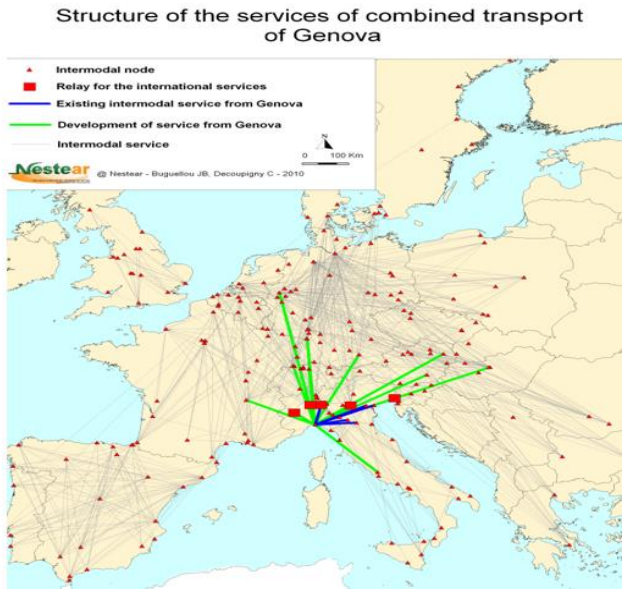
RAIL SUCCESS STORIES & CHANCES

FREIGHT

TIGER INDUSTRIAL RAILDRY PORT DISTRIBUTION CONCEPT







TO KNOW MORE ABOUT TER4RAIL RESEARCH

TER4RAIL
Transversal Exploratory
Research Activities for Railway

- Project website: www.ter4rail.eu Twitter: @Ter4R
- All available deliverables of project: https://ter4rail.eu/#deliverables
- Analysis of Rail projects financed under H2020: https://bit.ly/2OYU6Pp
- Compilation of Rail Research and Innovation projects financed at National Level: https://bit.ly/2qDiNJ1
- A comprehensive map of rail innovative research and key rail stakeholders: http://bit.ly/3aLMzN7
- Shift2Rail mission and objectives: http://bit.ly/36IdAPa
- Rail 2030 - Research and innovation priorities: http://bit.ly/3aTkqDL
- Rail 2050 - Research and innovation priorities: http://bit.ly/2wOYcUF

CONSORTIUM

TER4RAIL partners Stakeholders

unife
THE EUROPEAN RAIL INDUSTRY

uic

UITP
ADVANCING PUBLIC TRANSPORT

ETP

ERRAC
The European Rail Research Advisory Council

Shift2Rail

TER4RAIL partners Research providers

EURNEX

Newcastle University

New OPERA

Fundación de los Ferrocarriles Españoles