

TER4RAIL

Transversal Exploratory Research Activities for Railway

WORK PACKAGE 1 RAIL INNOVATIVE RESEARCH OBSERVATORY

Led by FFE

Partners: UITP, UNIFE, UIC, EURNEX, NEW OPERA

WP1 – RAIL INNOVATIVE RESEARCH OBSERVATORY

Objective:

- Identify, monitor, and facilitate the analysis of new **opportunities emerging from the rail sector and other sectors** for a **more successful rail research**.
- **Stimulate the transfer of knowledge** within and outside the sector.
- Structure interactions and **stimulate networking, cross-fertilisation, common collaboration and the kick-starting of new ideas**.

INSIDE THE RAILWAY SECTOR

STRATEGIC DOCUMENTS

Analysis of 28 key documents

RAIL STAKEHOLDERS

Survey: 115 responses; 46 completed

PROJECTS

*Identification Rail-related projects:
224 H2020; 381 National – 6 countries*



OUTSIDE THE RAILWAY SECTOR

URBAN SCENARIOS 2050

Workshop + expert view + analysis

IDENTIFICATION OF NON-RAIL ACTORS

10 factsheets; 8 technology mappings

INTERACTING, SHARING EXPERIENCES & CROSS-FERTILISATION

INSIDE RAIL: DOCUMENTS & STAKEHOLDERS

Analysis of 28 key strategic and policy documents

- Rail sector description
- Trends and challenges
- Rail vision (future)
- Rail innovative technology scanning
- How to deliver the vision

Survey to rail stakeholders (115 responses, 46 complete)

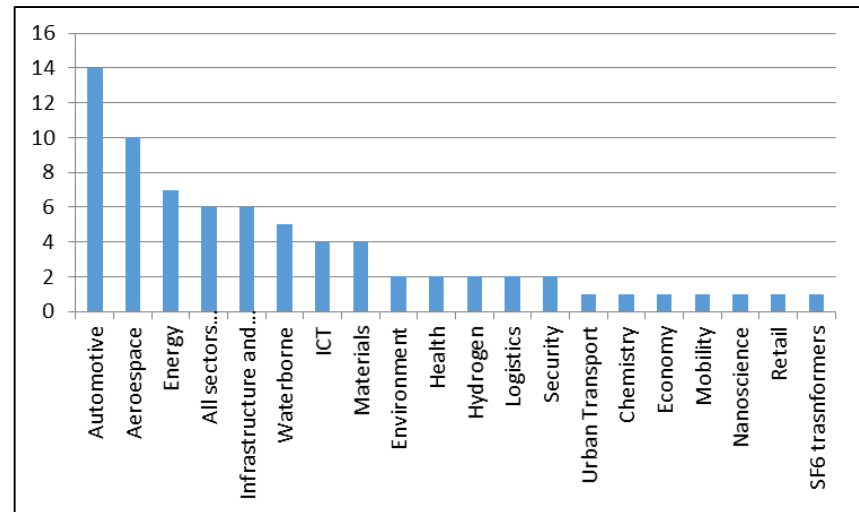
- Existing cooperation with other sectors
- Source of R&D public funding
- Collaboration between different actors
- Shift2Rail as a good instrument

The most promising technologies or innovations that have the potential to transform the rail sector...



... in the next 5 years	...in the coming decades
Digitalisation	Digital transformation
Materials	Materials
5G	Artificial Intelligence
Automation	Automation
Batteries	Autonomous mobility
Big Data	Power sources
Energy	Hyperloop

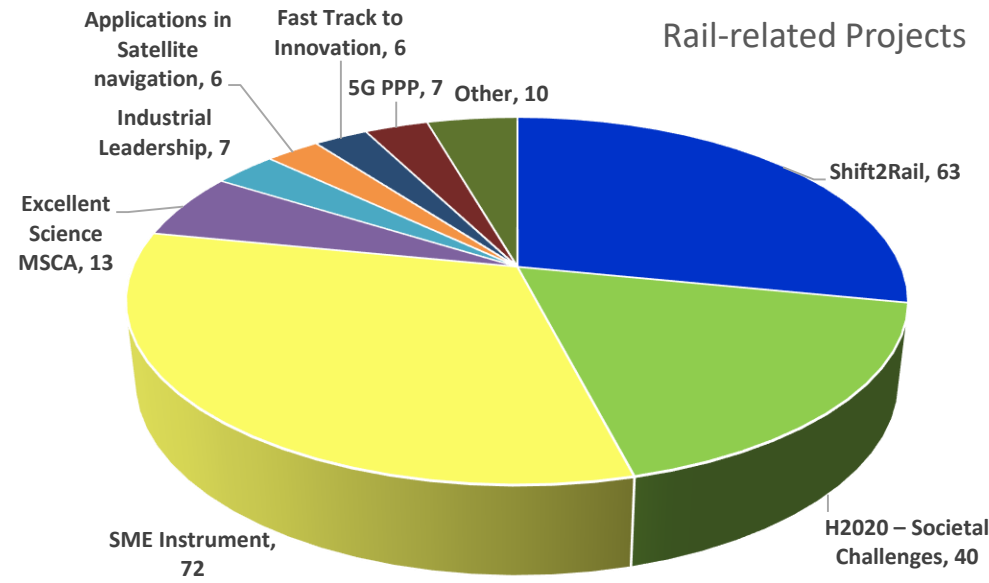
Collaboration with other sectors



INSIDE RAIL: RAIL RESEARCH & INNOVATION PROJECTS

H2020 RAIL-RELATED PROJECTS SCAN

224 Projects



NATIONAL RAIL-RELATED PROJECTS

381 Projects, 6 European Countries



*In order to have a good tool,
this exercise needs
continuous update*

TER4RAIL PROJECT: RAIL PROJECTS SCAN									
YE	ACRONYM	TITLE	OBJECTIVE	FUNDING PROGRAMME	TOPIC	ID CO	START	END D	FUNDING TOTAL BUD
2014	4FOLD	4FOLD Reduction of the International Transport of Empty Containers by 5G-Crosshaul: The 5G Integrated Fronthaulbackhaul	Due to the global imbalance c	H2020 - SME Instrument	IT-1-2014-1	650672	2014-10-01	2015-03-31	71,428.00
2014	5G-Crosshaul	5G-Crosshaul: The 5G Integrated Fronthaulbackhaul	Mobile data traffic is forecast	H2020 - ICT - 5G PPP	H2020-ICT-2014-2	675630	2015-07-01	2017-12-31	8,492,038.00
2014	AUGGMED	Automated Serious Game Scenario Generator for Mixed Reality Training	The aim of AUGGMED is to c	H2020 - SOCIETAL CHALLENGES - Secure societies - Protecting freedom and security	FCT-07-2014	653590	2015-06-01	2019-05-31	5,595,673.75
2014	BODEGA	BOrdErGuArD - Proactive Enhancement of Human Performance in Border Control	BODEGA for Proactive Enha	H2020 - SOCIETAL CHALLENGES - Secure societies - Protecting freedom and security of Europe and its citizens	H2020-BES-14-2014: Ethical Societal Dimension topic 1: Human factors in border control	653676	2015-06-01	2018-10-31	4,999,238.00
2014	BONVOYAGE	From Bilbao to Oslo, intermodal mobility solutions and interfaces for people and goods, supported by an innovative communication network.	BONVOYAGE will design, dev	H2020 - SOCIETAL CHALLENGES - Smart, green and integrated transport	MG-7.2a-2014: Towards seamless mobility addressing fragmentation in ITS deployment in	635867	2015-05-01	2018-04-30	4,000,000.00
2014	COMPOSKE	Development of a new technology for production of Skeletons in composite materials for realization of pre-cast	The objective of this project is	H2020 - SME Instrument	NMP-25-2014	672267	2015-07-01	2017-06-30	1,133,562.50

OUTSIDE RAIL: IDENTIFICATION AND KNOWLEDGE EXCHANGE WITH NON-RAIL ACTORS

- Initial list of 52 **European Technology Platforms & Public-Private Partnerships.**
- Individual approach to 17 ETPs / PPPs

Urban Scenarios 2050

- Workshop with architects, urbanists, land planners, authorities, academia (UITP Summit, 11th June 2019)
- Rail experts assessment

**10 Factsheets
available**

**Interactions, panels,
discussions....**

**Dissemination,
networking**



**Rail research
projects**

**8 technology
mappings**

**Identification of
common members
with Shift2Rail**

Identification of common points:
digital revolution, big data,
cybersecurity, artificial intelligence,
automation/autonomous mobility,
environment (materials, Evs),
safety/security,
urbanization/demography, social
inclusion, accessibility.

Analysis of Main Gaps

Functions: technology; environment;
space planning; social dimension;
safety; disruptive technology



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OUTSIDE RAIL: TER4RAIL 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 (ECSSO)



10-13 Nov.2019
UITP Light Rail
Committee



13 Nov.2019
ECTP Infrastructure
& Mobility
Committee and
Plenary Meeting



14-15 Nov.2019
F&L Forum
Annual
Conference



9th Dec.2019
UNIFE Technical
Platform



9th Sept.2020
Research &
Innovation
Coordination
Group



6th Oct.2020
General
Assembly



28th Nov.2020
Compilation
Advanced
Materials



19th Nov. 2020
ERRAC Plenary
FINAL T4R event

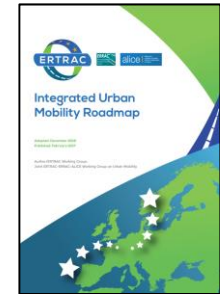
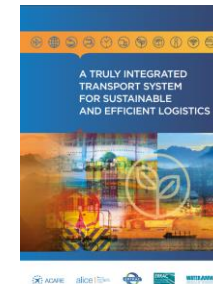
OUTSIDE RAIL: IDENTIFICATION AND KNOWLEDGE EXCHANGE WITH NON-RAIL ACTORS

General results:

ETPs / PPPs already collaborating with the railway sector



Railway stakeholders



Bi-directional participation at Plenaries
Working Groups / Expert Groups
Consultations
Collaboration H2020 Work Programme

OUTSIDE RAIL: IDENTIFICATION AND KNOWLEDGE EXCHANGE WITH NON-RAIL ACTORS

General results:

ETPs / PPPs with occasional contact with the railway sector, but including it – directly or indirectly- among their scope.



Vertical engagement activity / key applications / sector reports → include transport or mobility

Projects with direct application to railways

Workgroups open to end users / stakeholders

OUTSIDE RAIL: EXAMPLE OF TECHNOLOGY MAPPING

Mention of railways at key documents

Trains as vertical use case: Connectivity Services to Passengers; Video Security for Smart Cities: Real-time low-latency object tracking; 5G moving platform backhaul; mobility management optimization; railway stations 5G spectrum...

Structure

Trials Work Group: trials with vertical sector use cases. Open for participation, membership not required

5G-PPP Vertical Engagement Task Force: inside the industry association to (1) present 5G and its potential for verticals; (2) listen to industry professionals and gather specific requirements from different verticals

Analysis of members

Shift2Rail Member	5G-PPP	5G IA
Bombardier Transportation GmbH	✓	
DLR		✓
Fraunhofer	✓	✓
INDRA SISTEMAS, S.A		✓
Infraestruturas de Portugal, S.A.	✓	
IZT	✓	
Virtual Vehicle	✓	
Siemens Aktiengesellschaft	✓*	
THALES		✓*
UNIVERSIDAD DEL PAIS VASCO	✓	



Rail-related Projects



Key Words: Communications, optical network

Relation with S2R TD: TD2.1- Adaptable communications for all railways, TD2.2- Railway network capacity increase, TD2.9- Traffic management system



5GPPP Projects directly related to rail										
Name	5G Picture 						5G Growth 			
Domain	Communications, optical network						Communications, level crossings			
Related TDs	TD2.1, TD2.2, TD2.9						TD2.1			
Relation with TDs	5G-PICTURE will demonstrate converged <u>fronthaul</u> and backhaul services in: <ul style="list-style-type: none"> -a smart city environment, -a 5G railway experimental testbed showcasing seamless service provisioning and mobility management in high-speed moving environments, and -a stadium with ultra-high user density, supporting media services. https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5b838fb48&appId=PPGMS						There is a specific pilot on the communications and security systems of a level crossing			
Shift2Rail Projects related	<u>XRail 1</u>	MISTRAL	EMULRADIO4RAIL	X2RAIL 3	ASTRAIL	XRail2	<u>XRail 1</u>	MISTRAL	EMULRADIO4RAIL	X2RAIL3
Common partners	None	TU Dresden	None	None	TU Dresden	None	None	None	None	None
Links	www.5g-picture-project.eu https://cordis.europa.eu/project/id/762057						www.5growth.eu https://cordis.europa.eu/project/id/856709			



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OUTSIDE RAIL: IDENTIFICATION AND KNOWLEDGE EXCHANGE WITH NON-RAIL ACTORS



	5GPPP	ALICE	ECSEL	ECS	ECTP	ERTRAC	FoF	SPARC
Railways explicitly mentioned at key documents								
Rail related projects already in place	7		6				3	2
Possibility of participation of railways stakeholders through already established structures inside the PPP/JU	Vertical Engagement Task Force (Transport)			WG3 Sectoral Demand (Transportation)	Infrastructure and Mobility Committee			Topic Group on Logistics and Transport
Common members with S2R	7	3	10	7	8	2	4	7
1. Automated train operation	✓		✓	✓				
2. Mobility as a Service	✓			✓		✓		
3. Logistics on demand		✓		✓		✓		✓
4. More value from data	✓	✓		✓				
5. Optimum energy use			✓	✓			✓	
6. Service timed to the second	✓		✓	✓				
7. Low cost railway				✓	✓		✓	✓
8. Guaranteed asset health and availability			✓	✓	✓			✓
9. Intelligent trains	✓		✓	✓			✓	
10. Stations and “smart” city mobility	✓			✓	✓	✓		
11. Environmental and social sustainability					✓		✓	
12. Rapid and reliable R&D delivery								

- Rail Innovative Research Observatory provides **complementary knowledge of Rail R&D status, evolution and vision**
- Excellent exercise to **map** the **rail related work developed by other sectors** and their relation/influence with the railway sector (are we missing knowledge that is being developed outside our usual radars?)
- **Stimulates networking, contributes to the transfer of knowledge and cross-fertilisation.** TEr4RAIL only provided a baseline. There is a need of more resources to broad the exercise to more sectors and programmes, as well as a **deeper analysis where variables could be compared** and more precise knowledge could be gained to plan and guide future rail research and policies
- The mapping / radar exercise needs **continuous update**. It is specially relevant for **Horizon Europe** – Cluster 5: Climate, energy and mobility

KEY CHALLENGE: SYNERGIES BY SRIA

- **European Partnerships:** EP Clean Hydrogen, European industrial battery value chain, EP for Key Digital Technologies, EP on Artificial Intelligence, Data & Robotics, EP for High Performance Computing, EP for Integrated Air Traffic Management, EP for Clean Aviation, EP for Smart Networks and Services, EP on Connected and Automated Driving
- **European Technology Platforms** in the transport and mobility domain: ACARE, ALICE, ECTP, ERTRAC, Waterborne
- European Innovation Council (EIC); EIT Knowledge and Innovation Communities; European research and innovation missions
- **National and Regional level** (especially with National Rail Technology Platforms)

- Need of a clear plan on how to **structure and support synergies** identified by the Strategic Research and Innovation Agenda of ERRAC
- **Strategic evaluation** of T4R mapping activities: What information is useful? For whom? In which format? Are there activities that should be adopted by ERRAC?

Thank you very much for your attention

Questions / Feedback?

Project Info: www.ter4rail.eu / @ter4R

INSIDE THE RAILWAY SECTOR

- **STRATEGIC DOCUMENTS:** *Analysis of 28 key documents*
- **RAIL STAKEHOLDERS:** *Survey: 115 responses; 46 completed*
- **PROJECTS:**
 - *Analysis of 2014-2017 data*
 - *Excel of 224 H2020 Rail-related projects: [link](#)*
 - *Excel of 381 National R&D Rail-related projects – 6 countries: [link](#)*

Deliverable 1.1 A comprehensive map of rail innovative research and key rail stakeholders

OUTSIDE THE RAILWAY SECTOR

- **URBAN SCENARIOS 2050:** *Workshop + expert view + analysis*
- **IDENTIFICATION OF NON-RAIL ACTORS:** *factsheets*
- **INTERACTING, SHARING EXPERIENCES & CROSS-FERTILISATION:**
 - *Technology mapping*
 - *Report on interactions*
 - *Pots at twitter account & Projects website*

Deliverable 1.2 Overview of the rail missions 2050

Deliverable 1.3: Rail Innovative Research Observatory