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Research and innovation capacity in transport infrastructure

An assessment based on the Transport Research and Innovation Monitoring and Information System (TRIMIS)

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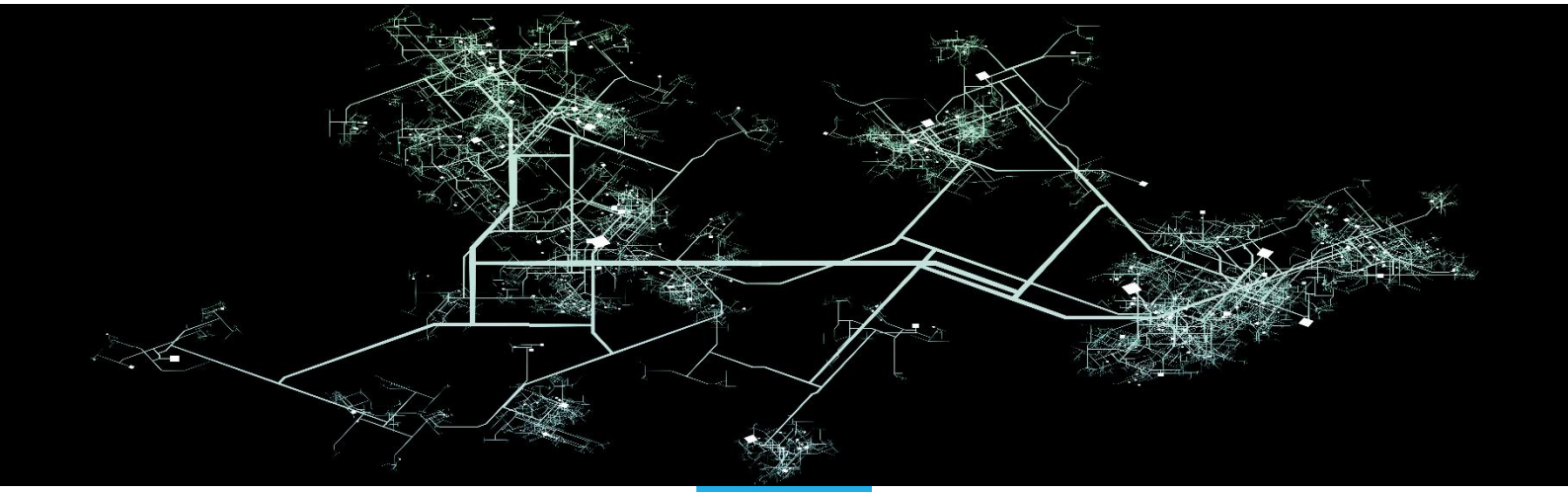

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Contents

Abstract

The European Commission's Strategic Transport Research and Innovation Agenda (STRIA) defines transport infrastructure (INF) as a key research area. TRIMIS supports STRIA by monitoring the status of transport research across Europe, including INF. This report maps INF research and innovation capacity and focuses on the geographical and organisational distribution of funds, as well as investments per Member State and per mode of transport. The results inform policy makers where potential interventions are beneficial.

Acknowledgements

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Executive summary

The Transport Research and Innovation Monitoring and Information System (TRIMIS) is the analytical support tool for the establishment and implementation of the Strategic Transport Research and Innovation Agenda (STRIA), and is the European Commission's (EC) instrument for mapping transport technology trends and research and innovation capacities. TRIMIS hosts a continuously updated database of EU and MS programmes and projects (currently over 7 000), which is used to analyse seven STRIA roadmaps that cover various thematic areas, namely:

— Cooperative, connected and automated transport;

— Transport electrification;

— Vehicle design and manufacturing;

— Low-emission alternative energy for transport;

— Network and traffic management systems;

— Smart mobility and services; and

— Infrastructure.

Policy context

In May 2017, the EC adopted the Strategic Transport Research and Innovation Agenda (STRIA) as part of the 'Europe on the Move' package, which highlights main transport Research and Innovation (R&I) areas and priorities for clean, connected and competitive mobility.

In December 2018, the European Commission has started to update the STRIA roadmap on transport infrastructure (INF), in close cooperation with Member States (MS) and industry stakeholders. The roadmap will include an action plan for short, medium and long-term R&I initiatives. The present report supports this process with a specific assessment of R&I capacity in INF, based on the TRIMIS database.

Key conclusions

The report provides insights into the status of INF R&I across Europe from several perspectives. One key observation is that INF research funds are spread across Europe, but areas with a large number of beneficiaries located on the long stretch between Manchester and Munich. The question arises if geographical areas that are less active in the field of INF could be better involved through future projects.

Main findings

Spending on INF research under the H2020 framework programme peaked in the beginning of 2018. Road, rail and multimodal transport receive greatest interest in this field. Waterborne transport receives the smallest amount of funds for INF research amongst all modes. This is also visible when analysing the project focus of the top 20 beneficiaries, which mainly conduct research on rail and road transport.

France and Germany are the largest beneficiaries of INF research funds. Organisations from Denmark and Sweden are relatively most successful in winning Horizon 2020 (H2020) INF projects.

An analysis on collaborations between MS identified strong ties and distinct gaps. Networking events and targeted linking could help organisations connect across Europe to deliver stronger H2020 proposals in the field of INF.

Related and future JRC work

The data repository is being expanded to better assess R&I efforts of projects that are not funded by the EU or national governments. As part of this effort, information will be

added on technologies, patents and publications. The TRIMIS team will also support the STRIA working groups with additional analyses where needed.

Quick guide

The report is structured as follows: Chapter 1 gives a brief introduction. Chapter 2 outlines the methodological background. Chapter 3 presents results on the following INF R&I dimensions: framework programmes, geographical and organisational distribution of funds, investments per MS and mode of transport. Chapter 4, finally, presents the conclusions of the report.

1 Introduction

In May 2017, the European Commission (EC) adopted the Strategic Transport Research and Innovation Agenda (STRIA) as part of the 'Europe on the Move' package (European Commission, 2017a; 2017b), which highlights main transport research and innovation (R&I) areas and priorities for clean, connected and competitive mobility.

The STRIA roadmaps set out common priorities to support and speed up the research, innovation and deployment process leading to radical technology changes in transport. A total of seven STRIA roadmaps have been developed covering various thematic areas, namely:

- Cooperative, connected and automated transport;
- Transport electrification;
- Vehicle design and manufacturing;
- Low-emission alternative energy for transport;
- Network and traffic management systems;
- Smart mobility and services; and
- Infrastructure.

The STRIA Roadmap for transport infrastructure (INF) is the focus of this report. Transport infrastructure covers physical transport networks, terminals and intermodal nodes, information systems and refuelling and electrical supply networks, which are necessary for the safe, secure operation of road, rail, civil aviation, inland waterways and shipping.

Unlike other transport operations, transport infrastructure is either promoted by or actually owned by public sector organisations at state or regional level. Where the infrastructure is privately owned, it is subjected to various degrees of economic regulation to comply with policies set by Member States (MS).

The roadmap identifies several research needs for the years to come. While observing that there are no major technological barriers to change in the infrastructure arena, it identifies a number of areas where consumer or user acceptance will be needed, especially in the area of charging.

Another issue concerns the growing pressure on existing transport systems, combined with regularly underfunded maintenance activity, the growing digital connectivity, infrastructure vulnerabilities to man-made or natural disasters and the carbon efficiency of infrastructure reuse. In this context, life-cycle optimisation and integrated efficient operation can lead to improvements in the existing and future infrastructure stock.

Finally, innovations or disruptions that change how people use transport (e.g. MaaS – Mobility as a Service, and CCAM – Cooperative connected and automated mobility) have an influence on the optimal use of existing infrastructure and require a discussion on future standards and requirements.

In December 2018, the European Commission has started to update the INF roadmap, in close cooperation with MS and industry stakeholders. The roadmap will include an action plan for short, medium and long-term R&I initiatives.

The present report supports this process with a specific assessment of R&I capacity in INF, based on TRIMIS. It provides a comprehensive analysis of INF research projects that are financed by the Horizon 2020 (H2020) Framework Programme (FP). The report evaluates past funding and proposes directions for future activities.

2 Methodology

The EC Joint Research Centre (JRC) developed the Transport Research and Innovation Monitoring and Information System (TRIMIS) to support the implementation of STRIA (European Commission, 2017c). TRIMIS provides an effective monitoring and information mechanism that assists the development and updating of STRIA and supports analyses on transport R&I (European Commission, 2017a; 2017b). It hosts a continuously updated extensive database of EU and MS programmes and projects (currently over 7 000) on transport R&I (Tsakalidis et al., 2018).

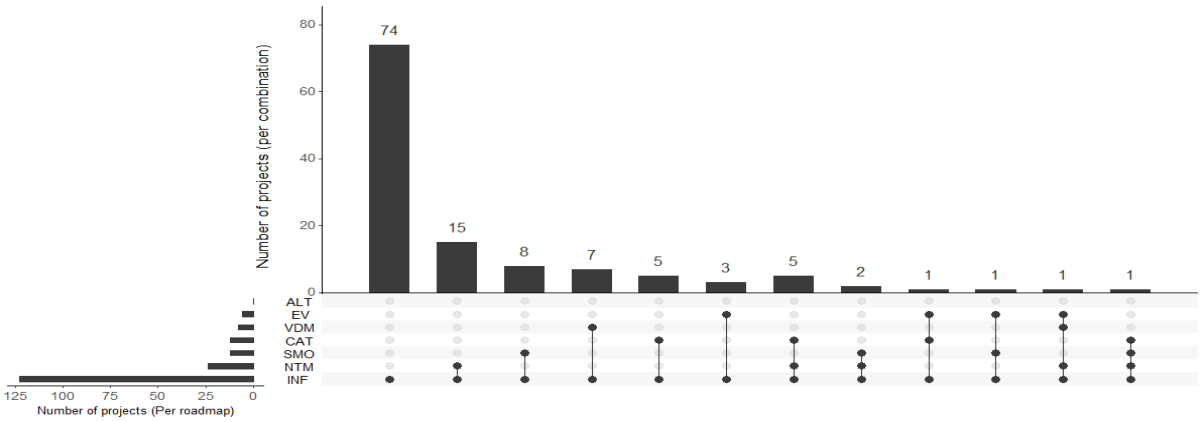
A first step was to identify those projects that fall under the INF roadmap. For this, the scope of the INF roadmap was defined by the initial roadmap report. The projects in the TRIMIS database were then manually assigned to the INF roadmap by transport specialists who have a deep understanding of all STRIA roadmaps. Considering that many projects cover infrastructure elements to some extent, only those projects that mentioned a considerable infrastructure research component in the project description were assigned to the INF roadmap. The specialists also assessed the projects on several other variables, including the mode of transport and geographical orientation. Through discussions and interrater reliability assessments the quality of the labelling was improved.

The project information in the TRIMIS database is enriched with data from several other sources, including the Community Research and Development Information Service (CORDIS) and other EC and external databases. Based on the information within the database a list of indicators was established that can improve our understanding of the capacity of INF R&I in Europe (See Annex). The indicators cover several dimensions, including: financial, technological, organisational, legal, and socioeconomic elements. For each indicator a description is provided together with the measurement unit, source and data availability.

The current report provides information on these indicators. Projects that fall under the Horizon 2020 FP (H2020) are the focus of the report, because the data quality of H2020 projects is highest and these projects give a good contemporary insight into the field's research capacity. The data were extracted from the TRIMIS database in November 2018.

A final point for consideration is that projects do not necessarily focus solely on infrastructure research (Figure 1). An overview on the extent to which INF projects overlap with other roadmaps is depicted below. The dots indicate the STRIA roadmaps to which projects belong and the bars show the frequency of that specific combination.

Figure 1. Overlap between Infrastructure projects with other STRIA roadmaps



(*) Alternative Energy (ALT); Electrification (EV); Vehicle Design & Manufacturing (VDM); Connected & Automated Transport (CAT); Smart Mobility (SMO), Network & Traffic Management (NTM), Infrastructure (INF).

Source: TRIMIS

As the figure suggests, some projects are cross-cutting and include elements of other STRIA roadmaps as well. This should be taken into consideration when interpreting the results that are provided in this report.

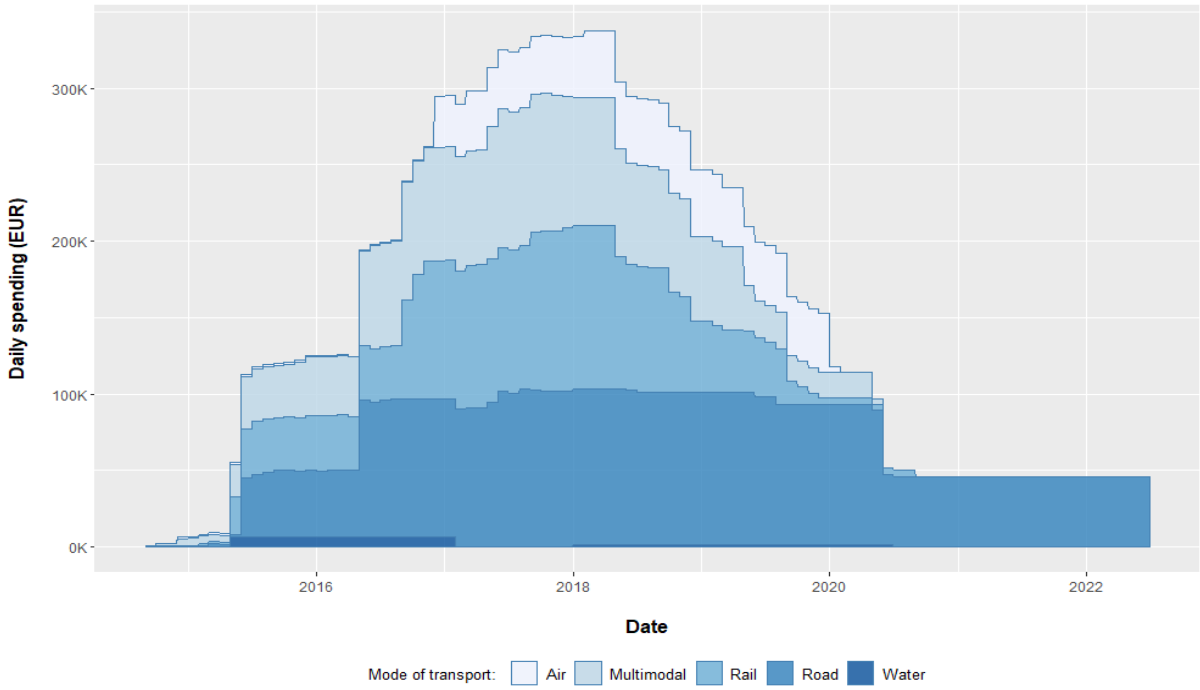
3 Assessment of infrastructure research

3.1 Framework programmes analysis

Under H2020 over EUR 450 million have been invested in INF research projects. This includes EUR 302 million of EU funds and EUR 148 million of own contributions by beneficiary organisations. Figure 2 shows the average daily H2020 related spending for each transport mode since 2014. The daily research spending peaked in the first quarter of 2018 at approximately EUR 330 000. This peak can be partially explained by the timeframe of the FP, in which projects are selected between 2014 and 2020. The forecast includes projects that were awarded by November 2018.

It is noticeable that the road and rail categories are relatively large. Research on air infrastructure is comparatively small while research on waterborne transport is very limited. Here it should be noted that aviation and waterborne related projects are also financed through other instruments, which are not covered by this report.

Figure 2. Daily H2020 INF R&I spending per transport mode



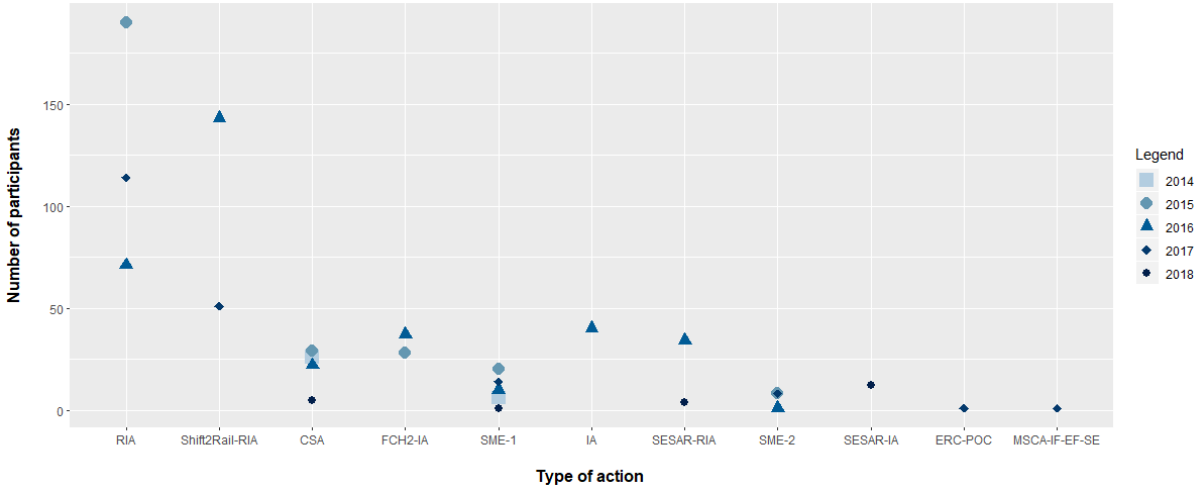
Source: TRIMIS

Figure 3 shows an analysis on the various type of actions under H2020 that are used to fund a project. The type of action is indicative of the sort of research that will be conducted. For instance, where Research and Innovation Actions (RIA) focus on establishing new knowledge, SME-2 projects focus on the market introduction of innovations.[1]

The figure shows that RIA projects are most prominently present, with the number of new participants peaking in 2015 when a large number of projects commenced. Second are the research projects funded under the Shift2Rail-RIA action. This explains the relatively large amount of funds that are allocated to rail infrastructure research, as shown in Figure 1.

[1] More information on the types of actions can be found here: http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf

Figure 3. H2020 INF funding beneficiaries per type of action (*)



(*) Research and Innovation Action (RIA); Innovation Action (IA); Coordination and Support Action (CSA); SME instrument (SME)

Source: TRIMIS.

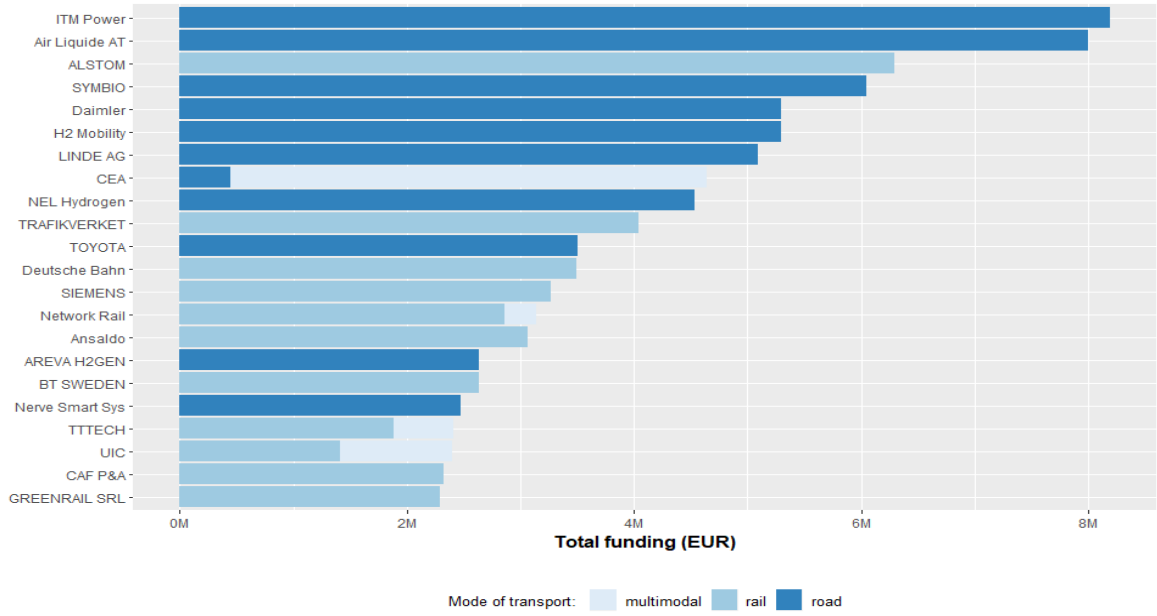
The figure equally shows that various other types of actions are leveraged in the field of INF, albeit to a lesser extent. This indicates that H2020 projects in this field mainly focus on the development phase of technologies.

3.2 Geographical and organisation analysis

A total of 639 unique organisations received funding for INF research, with an average of about EUR 474 000. Figure 4 shows the top 20 beneficiaries with the total amount of funds received and their research focus in terms of transport mode.

Some organisations focus exclusively on INF research in one mode of transport, whereas others are active across several modes. Of the top 20 beneficiaries, 11 are active in road transport, 11 in rail, and 4 in multimodal transport.

Figure 4. Top 20 H2020 INF funding beneficiaries, including division between transport modes



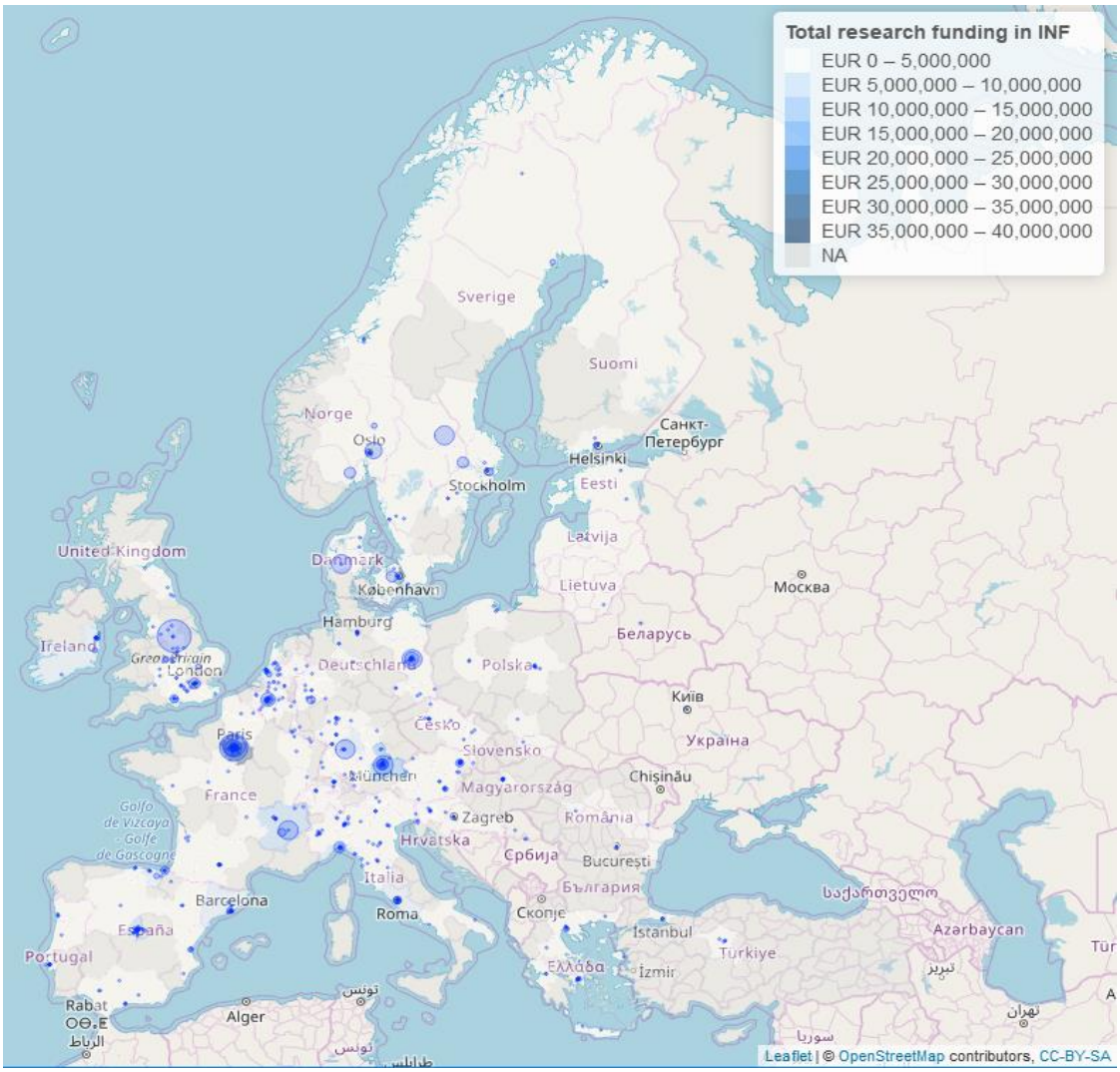
Source: TRIMIS

The top 20 beneficiaries received approximately EUR 87 million of funding, which is 28% of the total INF funding budget. The funding concentration is therefore intermediate and funds are spread amongst a relatively large number of organisations.

Figure 5 provides a deeper look onto the geographical spread of the funds. Several beneficiaries in the UK, France, Germany and Denmark receive a large part of the funding, as indicated by the size of the circles. Most organisations are located on the long stretch between Manchester and Munich. Organisations from the EU-13 receive a smaller share of the funds.

One remark is that the spending of research funds may happen in a different location than where a beneficiary is registered. Such could happen when pilot studies occur at different sites, which is not indicated below. Despite this limitation it is believed that the map does provide a reasonable approximation of where resources are allocated.

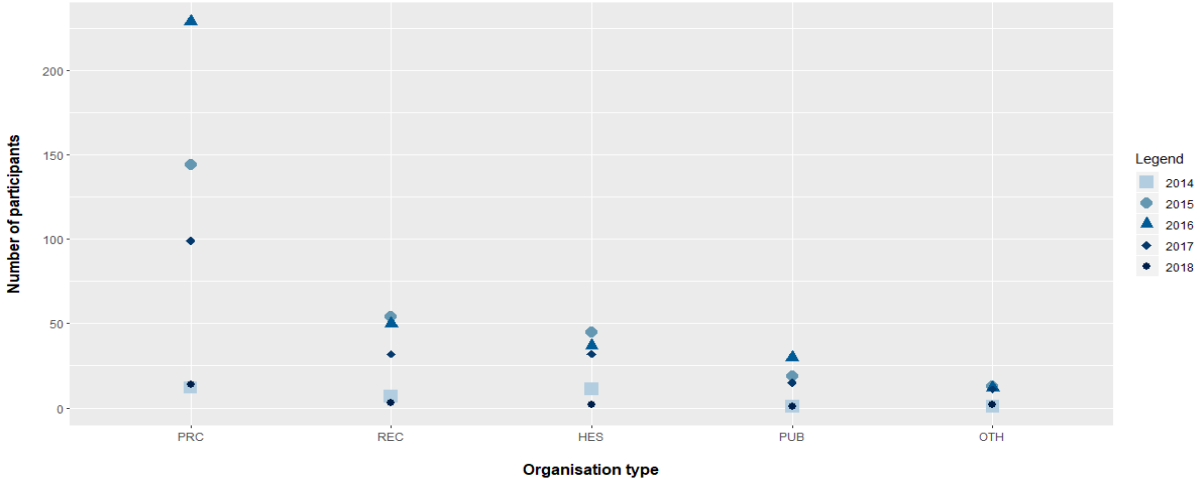
Figure 5. Location of H2020 INF funding beneficiaries



Source: TRIMIS

When considering the type of organisations that receive INF research funding it is observed that private companies benefit most (see Figure 6). This can be indicative of the applied nature of the infrastructure research that is undertaken in H2020 projects. The public sector is noticeably less involved when compared to the H2020 research on 'connected and automated transport' and 'smart mobility and services', as shown in the previous TRIMIS capacity reports (van Balen et al., 2018a; 2018b).

Figure 6. H2020 INF funding beneficiaries per type of organisation (*)



(*) Private companies (PRC); research organisations (REC); higher education establishments (HES); public sector (PUB); other (OTH).

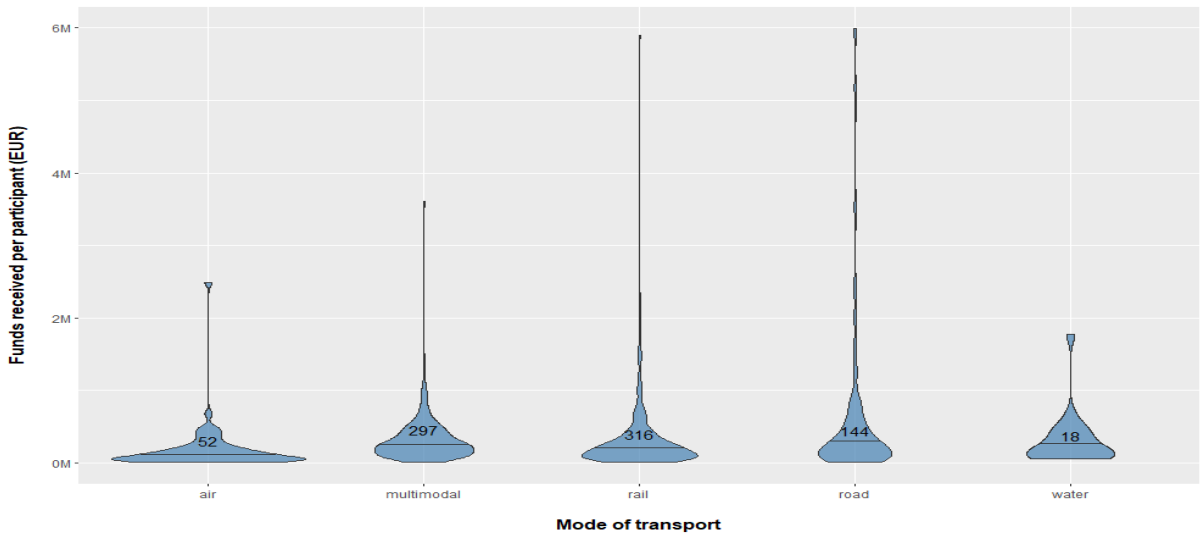
Source: TRIMIS

Figure 7 provides an additional perspective on research funding patterns per mode of transport. The plots show the distribution of INF research funding. The thickness of the plots indicates how common it is that an organisation receives a certain amount of funding.

For each mode of transport, the number of beneficiaries is shown whereas the horizontal lines show the median amount of funding per mode.

A total of 316 grants were provided to organisations that research rail infrastructure, which together with grants in road transport shows the highest values. While the peak values are lower for multimodal transport, there is a high number of beneficiaries. The number of grants in air and water transport are relatively small, when compared with the other modes. Here it is reiterated that investments in air, rail, and water transport also are made through other European financing instruments which are not covered by this analysis.

Figure 7. Variation in H2020 INF R&I funding per transport mode

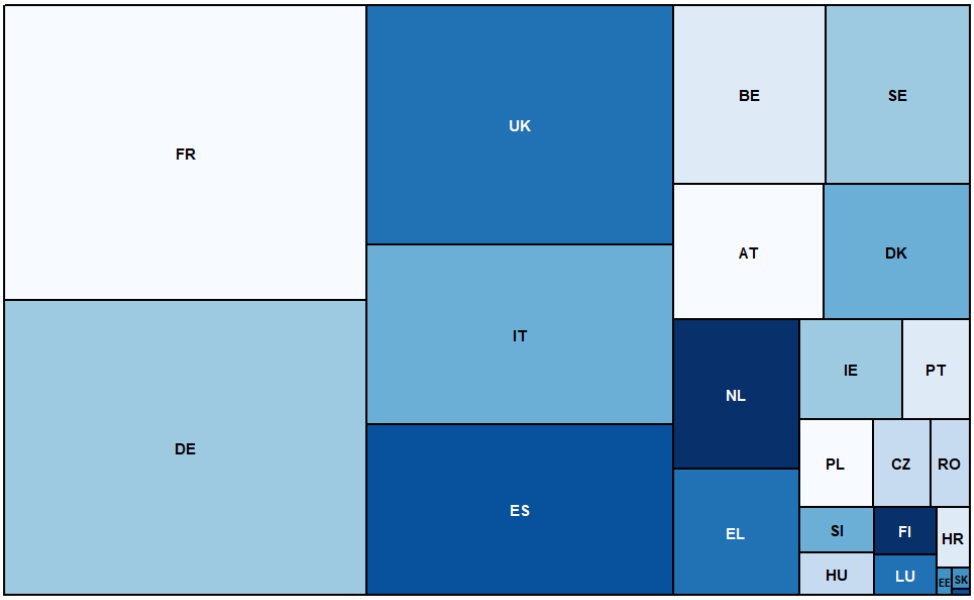


Source: TRIMIS

3.3 Member State analysis

An assessment of H2020 INF research in terms of funds received by MS, based on the beneficiaries' addresses, shows that France is the largest beneficiary in absolute terms, followed by Germany (see Figure 8). A strong imbalance is moreover noticeable as beneficiaries from EU-13 countries receive approximately 4.3 % of all INF research funding.

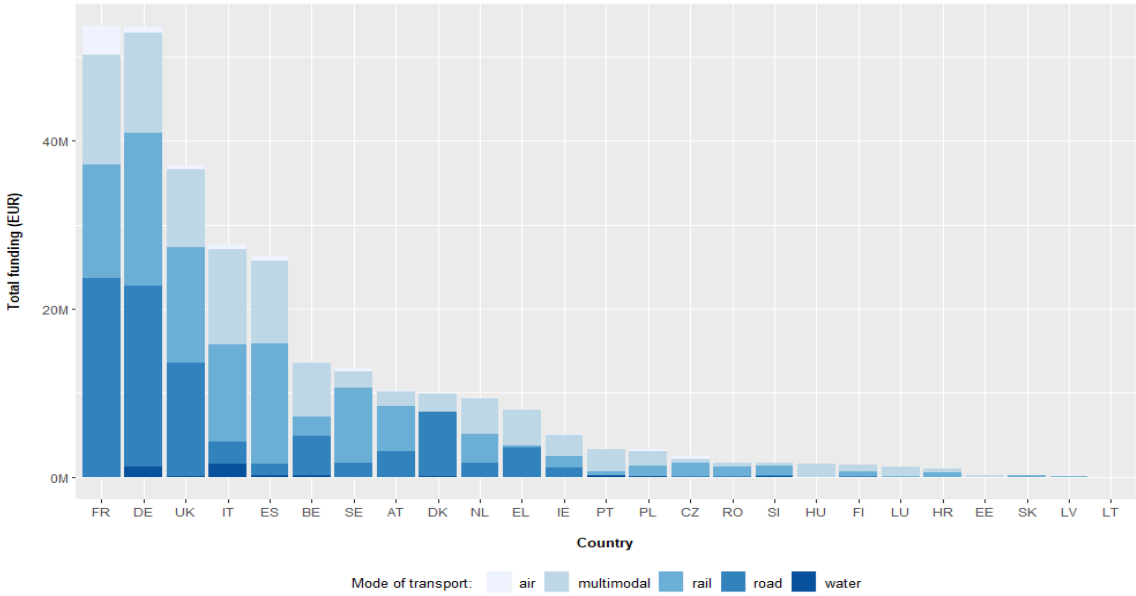
Figure 8. MS shares of H2020 INF funding



Source: TRIMIS

Figure 9 provides a more detailed overview on INF research funding, showing the total amount of funding received per MS split per transport mode. Organisations from Bulgaria, Cyprus, and Malta did not participate in H2020 projects on INF.

Figure 9. H2020 INF funding per MS, including division between transport modes

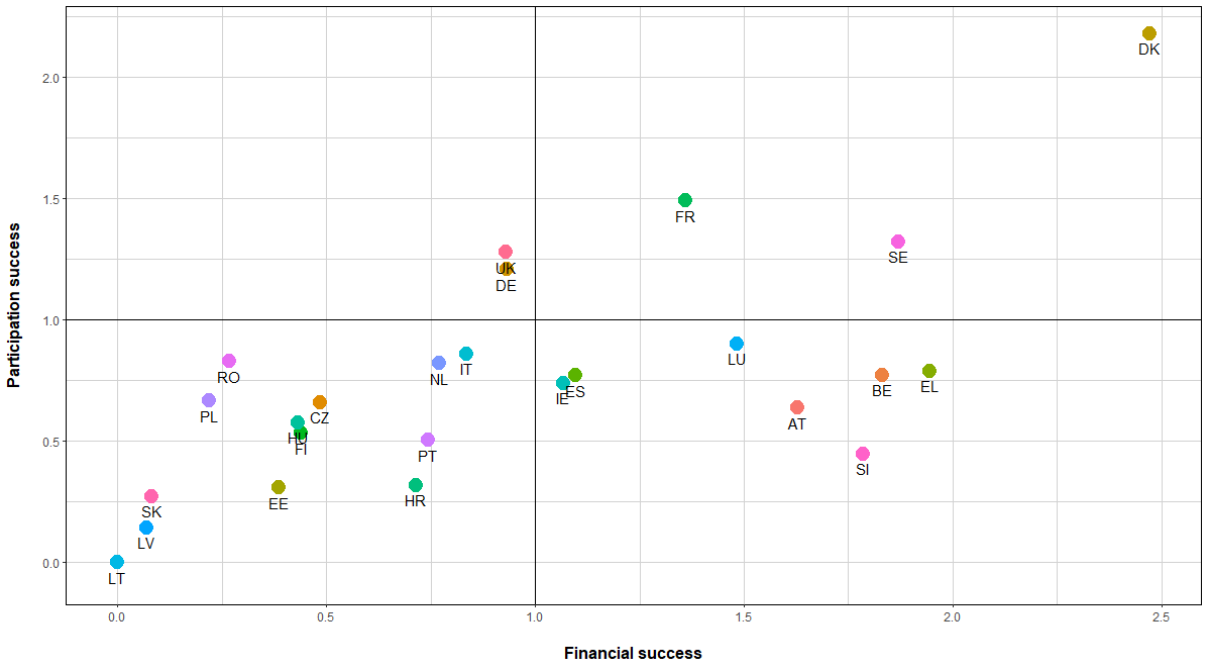


Source: TRIMIS

To understand the relative performance of MS, the participation and financial success rates are normalised based on Gross Domestic Product (GDP) in 2016. The participation success rate assesses the involvement of organisations from one MS compared to the total participation. Similarly, the financial success rate assesses the total amount of granted funds per MS as compared to the total INF R&I funding. A score of one indicates an average performance, with scores above or below one being better or worse respectively.

Figure 10 shows three strong performers in terms of participation and financial success, namely Denmark, France, and Sweden. A number of countries in the lower right quadrant succeed in attracting larger funds with relatively fewer organisations. This may be indicative of some expert organisations in these MS. The lower left corner shows a large number of countries that are involved less in H2020-funded INF research relative to what could be expected from a MS based on its size in terms of GDP.

Figure 10. Participation and financial success rate of Member States



Source: TRIMIS

In many projects a large number of organisations from various countries participate. These collaborations can be aggregated on a MS level to show which countries work most often together in the field of INF.

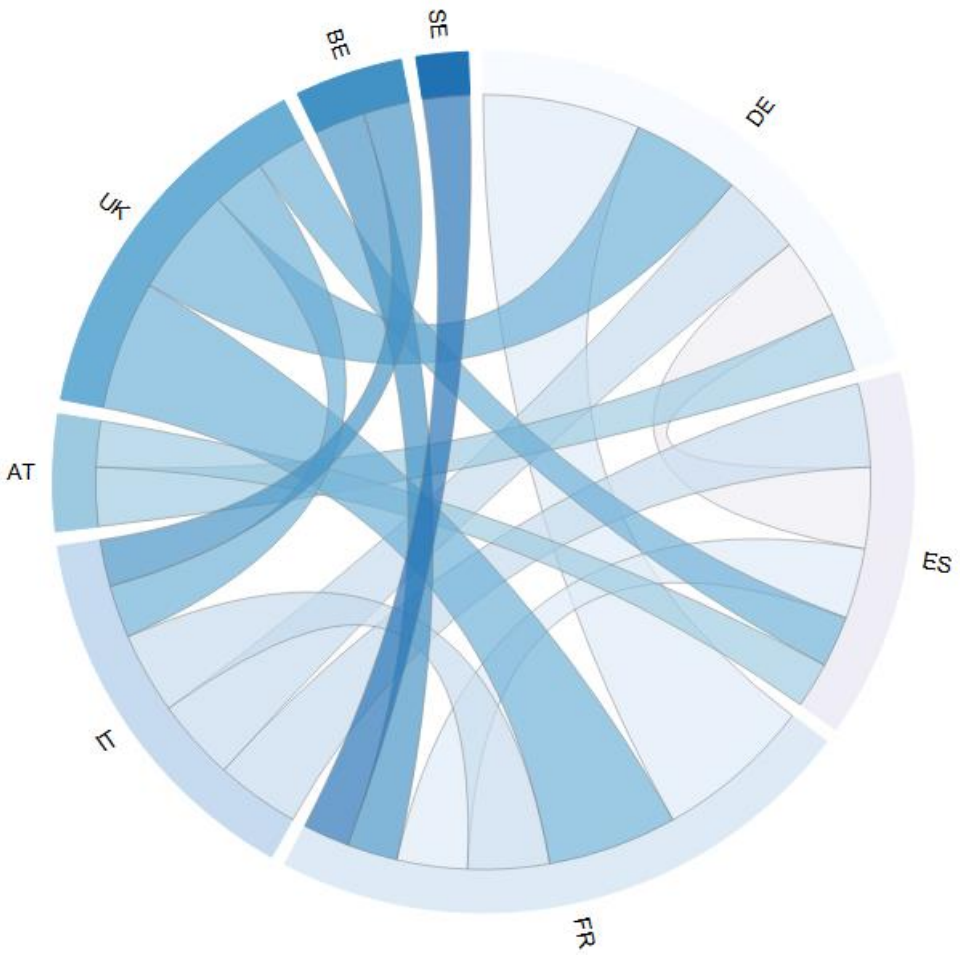
Figure 11 shows the most common links by highlighting those collaborations between organisations from MS that occurred at least 100 times. This means for instance that if in a project one Spanish and two Austrian organisations collaborate, the link between Austria and Spain gains a strength of two. These counts are accumulated for all projects. The colours are indicative of the country, whereas the width of the cords is indicative of the number of collaborations.

Eight MS surpass the barrier of 100 organisational collaborations. Organisations from other MS also actively collaborate, but these ties are not visualised as they do not surpass the barrier. The analysis therefore focuses on absolute, rather than the normalised performance as was used in Figure 10.

A few observations can be shared. Unsurprisingly, the larger EU countries are most visible in this chart. It equally shows that Austrian organisations have strong relations with Germany and Spain in the field of INF research.

Organisations from Belgium are also present in the collaboration network. Such can be explained by the presence of many Brussels based associations in the field of transport.

Figure 11. Chord diagram on Member State collaborations in H2020 INF projects



Source: TRIMIS

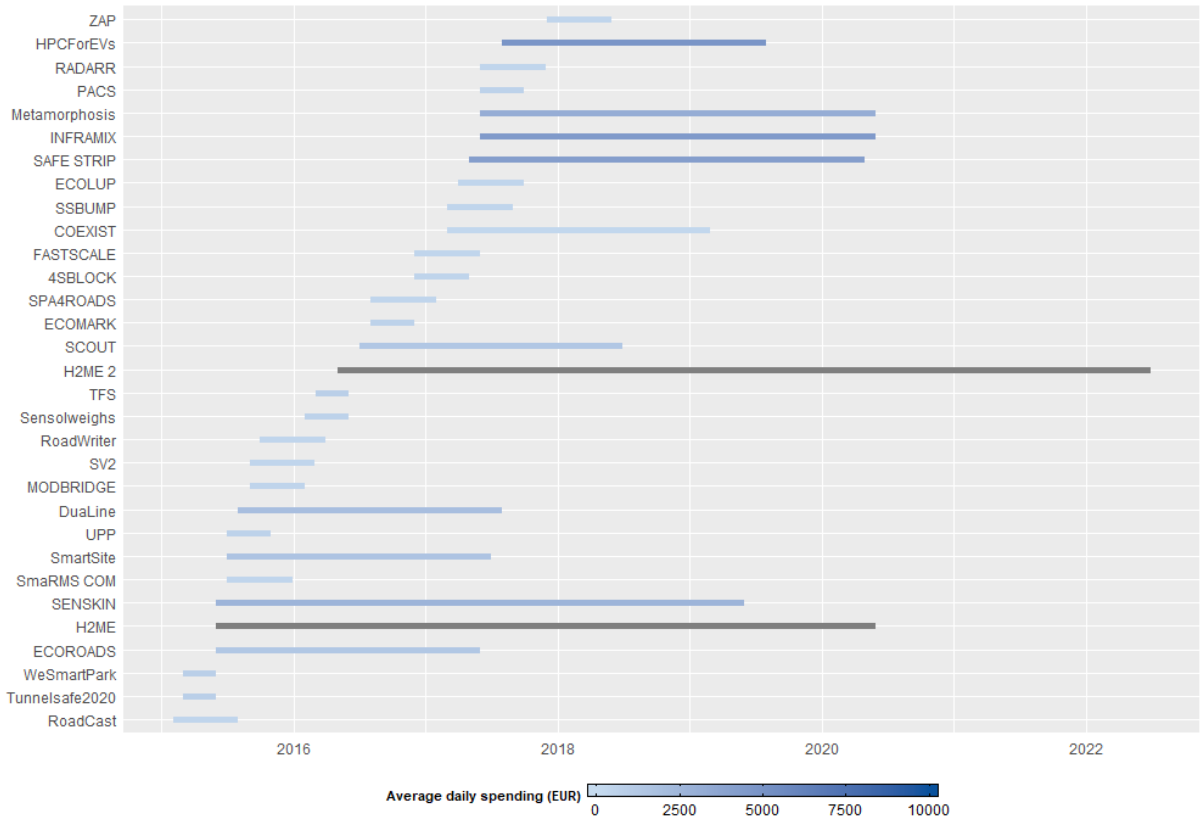
3.4 Transport mode analysis

This final section of the results chapter provides an overview of the INF projects that have been conducted, showing their timelines and associated funding. The charts are split per transport mode, so that the research efforts per field can be more clearly identified.

The colour of the timelines shows the average daily spending in the project. A higher daily spending combined with a long duration highlight those projects with potentially the greatest impact. The projects with a grey timeline are those with the highest spending.

Figure 12 shows that, in the field of road transport, most projects received a large amount of funding. This includes the H2ME project number 1 and 2, on hydrogen fuel infrastructure, which received EUR 32 and 35 million in funding respectively. A total number of 31 road transport research projects were funded, many of which have a short duration.

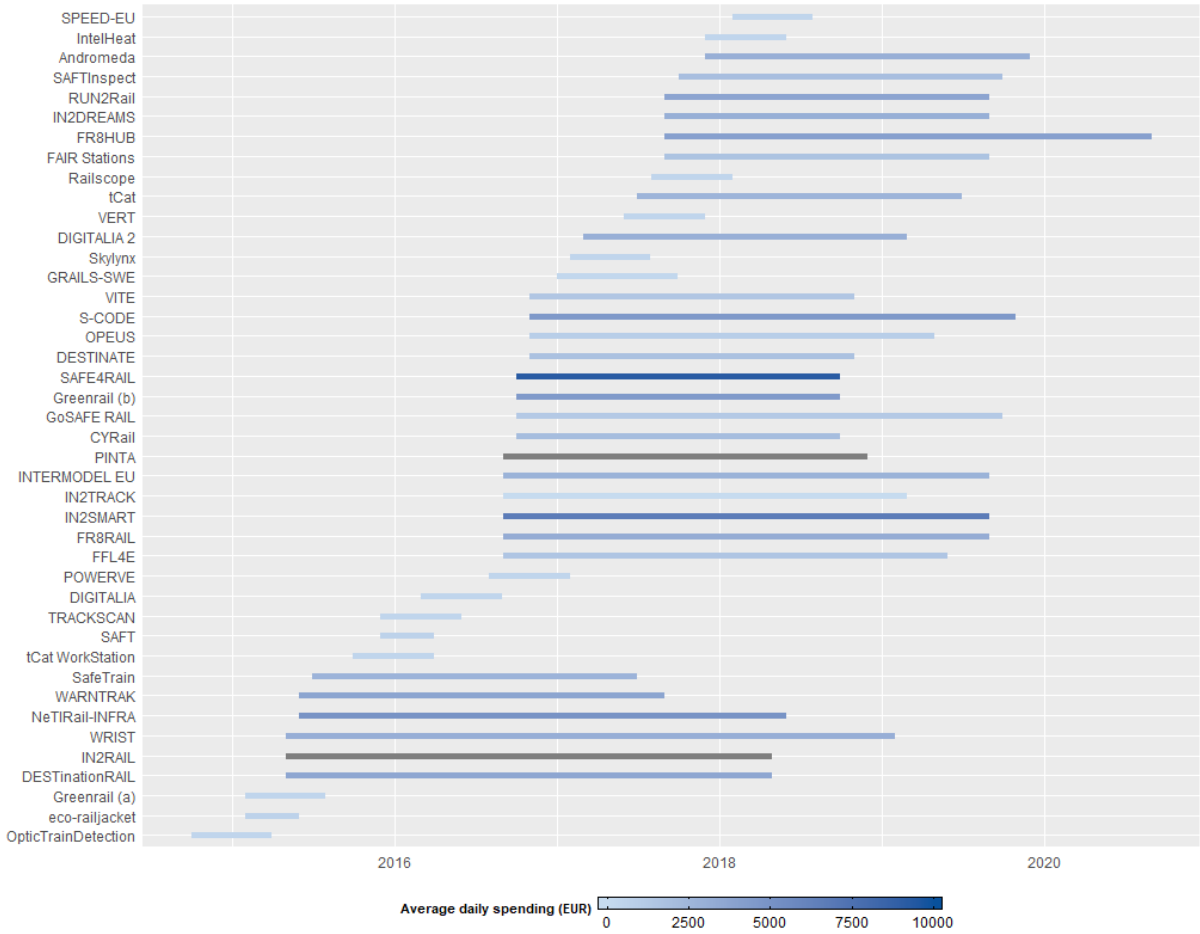
Figure 12. H2020 INF projects in road transport



Source: TRIMIS

Figure 13 shows the rail transport-related INF projects under H2020. There are also a large number of rail transport projects. It also should be mentioned that many projects with rail transport dimensions that are present in INF research, also fall under the multimodal category.

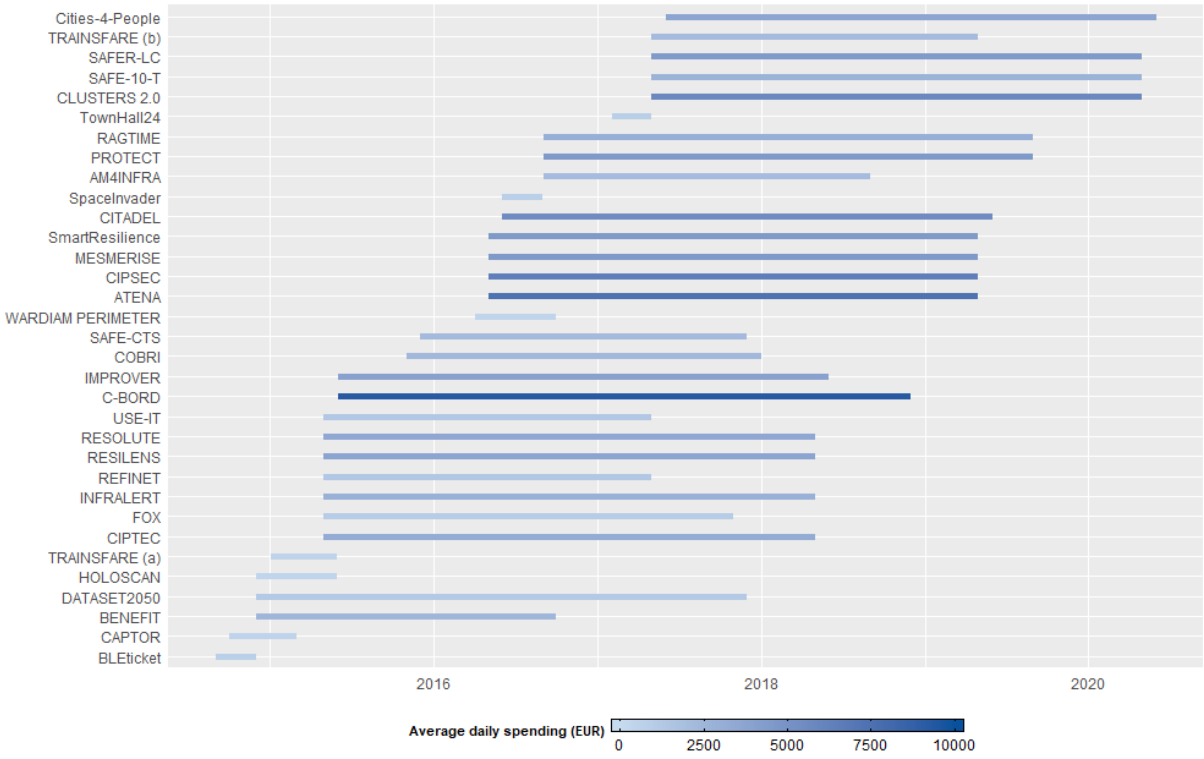
Figure 13. H2020 INF projects in rail transport



Source: TRIMIS

A total of 33 projects were identified on INF multimodal research. The field includes many large projects with a duration of over 3 years (see Figure 14). This includes a project like C-Bord, on container inspection infrastructure at border control points.

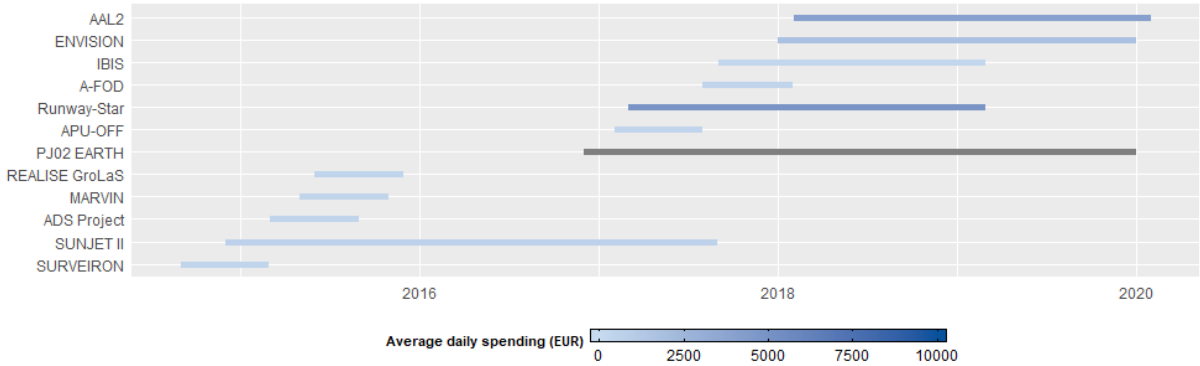
Figure 14. H2020 INF projects in multimodal transport



Source: TRIMIS

INF in air transport mostly entails research on airports. The projects that are spread throughout time, vary in size and duration (see Figure 15). The single largest project is PJ02 EARTH, which researches ways to enhance airport infrastructure to increase throughput while maintaining high levels of safety.

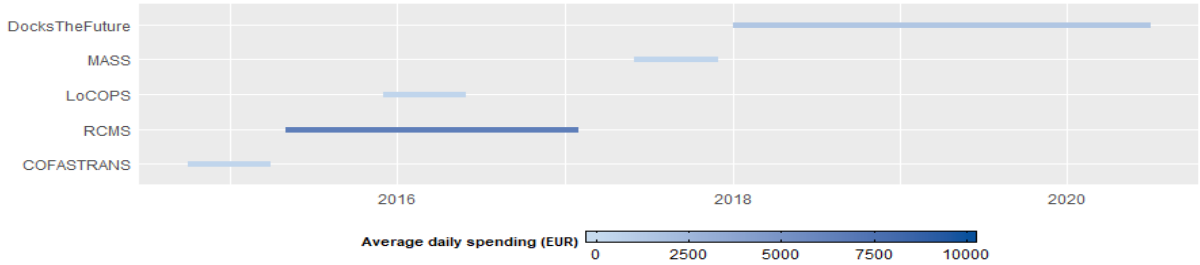
Figure 15. H2020 INF projects in air transport



Source: TRIMIS

In waterborne transport there are five projects observed, as shown in Figure 16. Three of these projects have a relatively short duration. The largest project is RCMS, which focuses on new port container management systems.

Figure 16. H2020 INF projects in waterborne transport



Source: TRIMIS

4 Conclusions

The report provides insights into the capacity of INF R&I across Europe from several perspectives, namely framework programmes, the geographical and organisational distribution of funds, as well as investments per MS and per mode of transport.

It was found that the spending on INF research under the H2020 FP has increased over time, with a peak in the beginning of 2018. A large amount of funds is invested in both road and rail projects. The spending on waterborne transport is limited.

The INF research funds are spread across Europe, but areas with many beneficiaries are clearly visible. Several large beneficiaries are observed in the UK, France, Germany and Denmark. Most organisations are indeed located on the long stretch between Manchester and Munich. Organisations from the EU-13 receive a smaller amount of funds.

The report is subject to several limitations as well, namely:

- The report focused on projects within the H2020 FP. Projects that fall outside the H2020 work programme are therefore not captured by this report. Future TRIMIS innovation capacity reports aim to broaden the scope and include a larger number of European and national projects.
- For some indicators that were mentioned in the Annex, no information could be provided due to data availability issues. It is expected that future TRIMIS reports will provide information on these indicators as well.

Whilst acknowledging these limitations, this report does offer an insightful and up-to-date overview on the capacity of INF research across Europe. The report therefore provides relevant insights to update the STRIA INF roadmap.

Annex

List of indicators

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
1	Financial	Input	Total amount of money spent in Europe in Transport R&D	Sum of money spent on Transport R&D projects	Euro	CORDIS/TRIMIS	YES
2	Financial	Input	Cash flow in Transport R&D Projects	Average daily investment in Transport R&D projects	Euro	CORDIS/TRIMIS	YES
3	Financial	Input	Total amount of money spent in Transport R&D according to funding scheme	Sum of money spent on Transport R&D projects according to the funding scheme	Euro	CORDIS/TRIMIS	YES
4	Financial	Input	Total amount of money spent in Transport R&D for each mode of transport	Sum of money spent on Transport R&D projects per mode of transport	Euro	CORDIS/TRIMIS	YES
5	Financial	Input	Total EU contribution in Transport R&D	Sum of EU money granted to Transport R&D projects	Euro	CORDIS/TRIMIS	YES
6	Financial	Input	Total amount of money spent in Transport R&D for freight/passengers/combined	Sum of money spent on Transport R&D projects according to the following transport sectors: freight, passenger and the two combined	Euro	CORDIS/TRIMIS	YES
7	Financial	Input	Total amount of money spent in Transport R&D based on NUTS classification	Sum of money spent on Transport R&D projects according to territorial statistics units, NUTS Nomenclature	Euro	CORDIS/TRIMIS/ Eurostat	YES

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
8	Financial	Input	Total amount of money spent in Transport R&D according to organisation type	Sum of money spent on Transport R&D projects according to the following types of organisations: Higher or Secondary Education Establishments, Research Organisations, Private for-profit entities (excluding Higher or Secondary Education Establishments), Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments), Other	Euro	CORDIS/TRIMIS	YES
9	Financial	Input	Total amount of money spent in Transport R&D per organisation	Sum of money spent on Transport R&D projects per beneficiary	Euro	CORDIS/TRIMIS	YES
10	Financial	Input	Total amount of money spent in each MS on Transport R&D	Sum of money spent on Transport R&D projects in each MS related to FPs	Euro	CORDIS/TRIMIS	YES
11	Financial	Input	Total EU contribution in Transport R&D in each MS	Sum of EU money granted to Transport R&D projects in each MS	Euro	CORDIS/TRIMIS	YES
12	Financial-Organisational-Socio-economic	Input	Participation Index	Normalised rate (based on GDP) of Transport R&D project participation per MS	Rate	CORDIS/TRIMIS	YES
13	Financial	Input	Financial success index	Normalised rate (based on GDP) of Transport R&D project funding per MS	Rate	CORDIS/TRIMIS	YES
14	Organisational	Input	Level of cooperation among MSs and projects participants	Network analysis of project partners for the selected projects	Network measures	CORDIS/TRIMIS/ COMPASS/CORDA/ EXPERTS	PARTIALLY
15	Transport	Input	Projects timeline according to transport modes	Start and end data of projects per mode of transport	Time	CORDIS/TRIMIS	YES

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
16	Legal	Input	List or relevant legal initiatives at European level	List and description of the relevant legal initiatives linked to the RM implementation	Number/ Description	EUR-Lex/EXPERTS	YES
17	Financial	Input	Total amount of money spent in Transport R&D according to beneficiary names and mode of transport	Sum of money spent on Transport R&D projects according to the beneficiary names and transport modes	Euro	CORDIS/TRIMIS	YES
18	Technological-Organisational	Input	Projects timeline according to technologies	Projects evolution during years according to technology types	Number of projects	CORDIS/TRIMIS	YES
19	Financial-Organisational	Input	Projects timeline according to Funding Scheme	Projects evolution during years according to Funding Scheme	Number of projects	CORDIS/TRIMIS	YES
20	Socio-economic	Input	Total number of staff working on Transport R&D projects	Total number of staff mentioned in Transport R&D projects	FTE	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
21	Socio-economic	Input	Total number of man-months involved on Transport R&D projects	Total number of man-months that worked on the Transport R&D projects	Man-months	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
22	Socio-economic	Input	Total number of full-time equivalent (FTE) units working on Transport R&D projects	Total number of FTE that worked on the Transport R&D projects	FTE	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
23	Socio-economic	Input	Total number of people involved in Transport R&D projects according to expertise fields	Total number people involved in Transport R&D projects classified according to the following backgrounds/field of expertise: Exact sciences, Economics, Legal, Administrative	FTE	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
24	Socio-economic	Input	Total number of people involved in Transport R&D projects according to gender	Total number of people involved in Transport R&D projects classified according to their gender	FTE	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
25	Socio-economic	Input	Average age of the people involved in Transport R&D projects	Average age of the people involved in the Transport R&D projects	Average age	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
26	Organisational	Input	Level of international cooperation in Transport R&D	Correlation matrix based on collaborations between organisations in the MS	Coefficient	CORDIS/TRIMIS/ COMPASS/CORDA/ Experts	PARTIALLY
27	Socio-economic	Input	Small Medium Enterprise (SME) participation	Number of SME companies participating in Transport R&D projects	Firm Count	CORDIS/TRIMIS/ CORDA	PARTIALLY
28	Socio-economic	Output	Patent's application	Number of patents applications for each company participating in Transport R&D projects	Patent count	CORDIS/TRIMIS/ CORDA	PARTIALLY
29	Socio-economic	Output	Bibliometrics - Number of scientific publications	Number of scientific publications for each company participating in Transport R&D projects	Publication count	CORDIS/TRIMIS/ CORDA	PARTIALLY

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List of abbreviations and definitions

AT	Austria
BE	Belgium
BG	Bulgaria
CCAM	Cooperative, connected and automated mobility
CORDA	Common Research Data Warehouse
CORDIS	Community Research and Development Information Service
CSA	Coordination and Support Action
CY	Cyprus
CZ	Czech Republic
DE	Germany
DG MOVE	Directorate-General for Mobility and Transport
DG RTD	Directorate-General for Research and Innovation
DK	Denmark
EC	European Commission
EE	Estonia
EL	Greece
ES	Spain
EU	European Union
EU-13	Group of 13 EU countries: Bulgaria (BG), Czech Republic (CZ), Croatia (HR), Cyprus (CY), Estonia (EE), Hungary (HU), Latvia (LV), Lithuania (LT), Malta (MT), Poland (PL), Romania (RO), Slovakia (SK) and Slovenia (SI)
EUR	Euro
FI	Finland
FP	Framework programme
FR	France
GDP	Gross domestic product
H2020	Horizon 2020 framework programme
HR	Croatia
HU	Hungary
IA	Innovation action
IE	Ireland
INF	Infrastructure
IT	Italy
JRC	Joint Research Centre
JU	Joint undertaking
LT	Lithuania
LU	Luxembourg

LV	Latvia
MaaS	Mobility as a Service
MS	Member States
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
R&D	Research and Development
R&I	Research and Innovation
RIA	Research and Innovation Action
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
SME	Small and medium-sized enterprises
STRIA	Strategic Transport Research and Innovation Agenda
TRIMIS	Transport Research and Innovation Monitoring and Information System
UK	United Kingdom

List of figures

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