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Research and innovation capacity in smart mobility and services

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

van Balen, M., Grosso, M., Tsakalidis, A., Gkoumas, K., Haq, G., Ortega Hortelano, A., and Pekar, F.

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Contact information
Name: Ferenc Pekar
Address: European Commission, Joint Research Centre, Vie E. Fermi 2749, I-21027, Ispra (VA) - Italy
Email: ferenc.pekar@ec.europa.eu
Tel. +39 0332 783925

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Research and innovation capacity in smart mobility and services -
An assessment based on the Transport Research and Innovation Monitoring and Information System (TRIMIS)

The European Commission's Strategic Transport Research and Innovation Agenda (STRIA) defines smart mobility and services (SMO) as a key research area. TRIMIS supports STRIA by monitoring the status of transport research across Europe, including SMO. This report maps SMO research and innovation capacity and focuses on framework programmes, 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.

Contents

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Authors

Mitchell van Balen, Joint Research Centre

Monica Grosso, Joint Research Centre

Anastasios Tsakalidis, Joint Research Centre

Konstantinos Gkoumas, Joint Research Centre

Gary Haq, Joint Research Centre

Alejandro Ortega Hortelano, Joint Research Centre

Ferenc Pekar, Joint Research Centre

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.

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.

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 to complement the 2015 Strategic Energy Technology Plan (European Commission, 2015).

In November 2018, the European Commission has started to update the STRIA roadmap on Smart Mobility and Services (SMO), 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 SMO, based on TRIMIS.

Key conclusions

The report provides insights into the status of SMO R&I across Europe from several perspectives. It was found that the spending on SMO research under the H2020 framework programme peaked in the beginning of 2018.

The spending is concentrated on multimodal projects, which is in line with the roadmap's focus on integrating transport systems. Projects that focus solely on waterborne transport are absent and pure rail projects are few. Rail transport is however often analysed within a multimodal context.

The SMO research funds are spread across Europe, but areas with many beneficiaries are clearly visible. Large cities in Western Europe and the North of Italy are particularly well represented. The question arises if geographical areas that are less active in the field of SMO could be better involved through future projects.

Main findings

Various observations were made on R&I capacities in SMO. Multimodal transport receives the greatest interest in terms of total funding and the number of organisations involved. Using spatial analysis, it was observed that most SMO research funding occurs in large Western European cities and Northern Italy.

A large number of the top 20 beneficiaries perform SMO research on several modes of transport. Insights gained from research on one mode can therefore be beneficial to another mode. SMO funding in waterborne transport is however absent.

Italy is the largest beneficiary of SMO research funds. Relative to their GDP, it appears that organisations from Malta, Cyprus, Greece, Portugal, Finland and the Netherlands are the most successful in delivering winning Horizon 2020 (H2020) SMO proposals. An analyses on the collaboration between MS organisations identified strong links as well as gaps. Networking events and targeted linking could help organisations connect across Europe to deliver stronger H2020 proposals in the field of SMO.

Related and future JRC work

The TRIMIS team is expanding the data repository 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, together with various other topics of interest.

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 SMO 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 to complement the 2015 Strategic Energy Technology Plan (European Commission, 2015).

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 smart mobility and services (SMO) covers emerging new transport technologies in multimodal, electric, autonomous, low altitude aerial, vertical and on-demand mobility, and their integrated operation, which have a potential contribution to the decarbonisation of the European transport sector. Specifically, the roadmap focuses on digitalisation and smart solutions that contribute to changes in transport behaviour and lifestyles, such as the use of ICT-enabled web, mobile and big data applications, along with a general trend towards using rather than owning a means of transport.

The roadmap observes that policy and innovation efforts strongly focus on improving vehicle technology rather than developing and implementing integrated transport and mobility strategies. Breaking this path-dependency remains a key innovation challenge that is explicitly addressed by the SMO roadmap. Additionally, future transport and mobility services will need to be part of smart and sustainable city strategies to improve urban resource efficiency, decarbonisation and ensure an integrated transport system. Finally, the identification and evaluation of cost effective, equitable and successful transport innovation regimes at the urban level and beyond is a main transport policy challenge that the roadmap highlights.

To better understand where the SMO research field is at, and what needs to be done, this report provides a comprehensive analysis of SMO research projects as financed by the Horizon 2020 (H2020) framework programme (FP). The report thus 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).

The scope of the SMO roadmap is defined by its contents, as described in the introduction. The projects in the TRIMIS database were manually assigned to the SMO roadmap by coders who have a deep understanding of all STRIA roadmaps. The coders also assessed the projects on several other variables, including the mode of transport and geographical orientation.

The project information in the TRIMIS database is enriched by 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 improve our understanding of the capacity of SMO 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 builds on these indicators and focuses primarily on projects that fall under the Horizon 2020 Framework Programme (H2020), given that the data quality of H2020 projects is the highest and these projects represent the state of the art. The data was extracted from the TRIMIS database in August 2018.

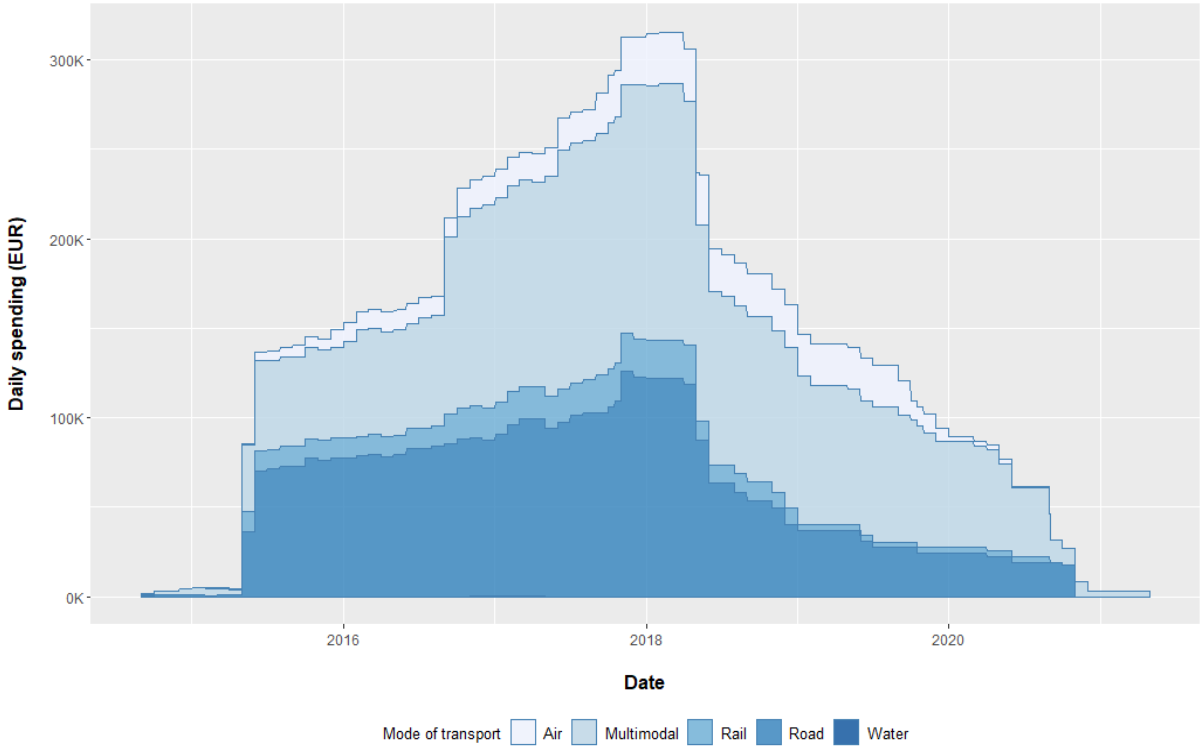
3 Assessment of SMO research

3.1 Framework programmes analysis

Under H2020 over EUR 350 million has been invested in SMO research projects. This includes EUR 319 million of EU funds and EUR 31 million of own contributions by beneficiary organisations. Figure 1 shows the average daily H2020 related spending for each transport mode since 2014. The investments peaked at approximately EUR 310 000 of daily research spending in the first quarter of 2018. This peak is largely related to the timing of the FP. The forecast includes projects that were covered by the database in August 2018.

It is noticeable that the multimodal category is relatively large compared to the other categories. The reason is in part methodological, as projects that relate to both road and rail transport were categorised as multimodal projects. There are no projects in the SMO field that focus on waterborne transport only.

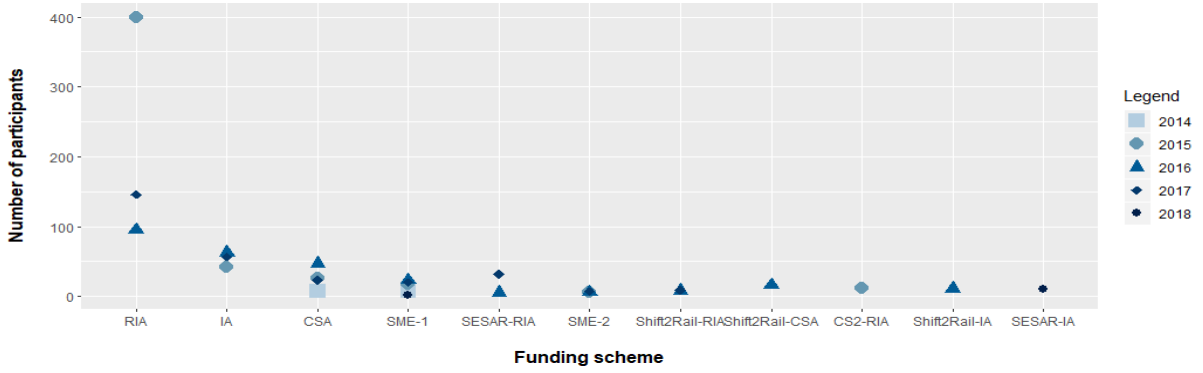
Figure 1. Daily H2020 SMO R&I spending per transport mode



Source: TRIMIS.

Figure 2 shows an analysis on the various funding schemes under H2020. The Research and Innovation Actions (RIA) scheme funds the largest number of participants, with a peak in 2015 when a large number of projects commenced. In the subsequent years, fewer projects started under RIA and other schemes. This is in line with the figure above, in which a strong growth in spending is observed in 2015, for it to drop a few years afterwards.

Figure 2. H2020 SMO funding beneficiaries per scheme (*)



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

Source: TRIMIS.

The figure also shows that many other schemes are leveraged in the field of SMO. The frequency is nevertheless considerably smaller than for the RIA scheme.

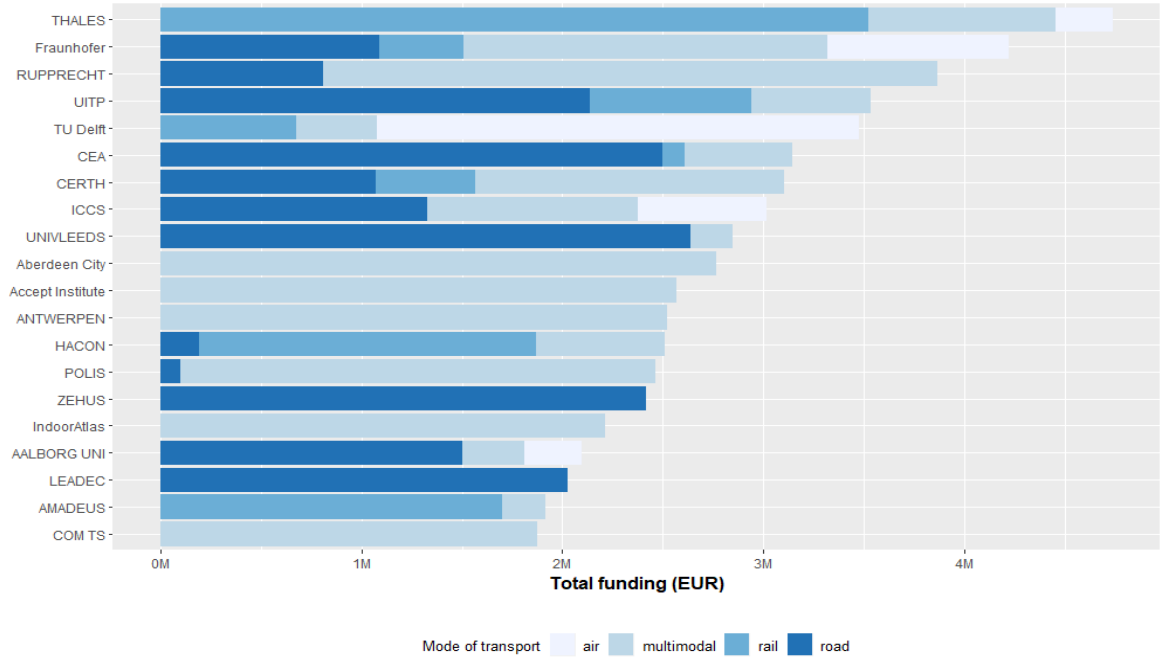
3.2 Geographical and organisation analysis

A total of 812 unique organisations received funding for SMO research, with an average of about EUR 410 000. Figure 3 shows the top 20 beneficiaries, the total amount of funds received and their research focus in terms of transport mode.

Some organisations focus exclusively on SMO research in one mode of transport, whereas others are active across several modes.

Of the top 20 beneficiaries, 12 are active in road transport, 8 in rail, and 5 in aviation, which often equals drone technology in this roadmap. A total of 18 organisations are involved in multimodal transport.

Figure 3. Top 20 H2020 SMO funding beneficiaries, including division between transport modes



Source: TRIMIS.

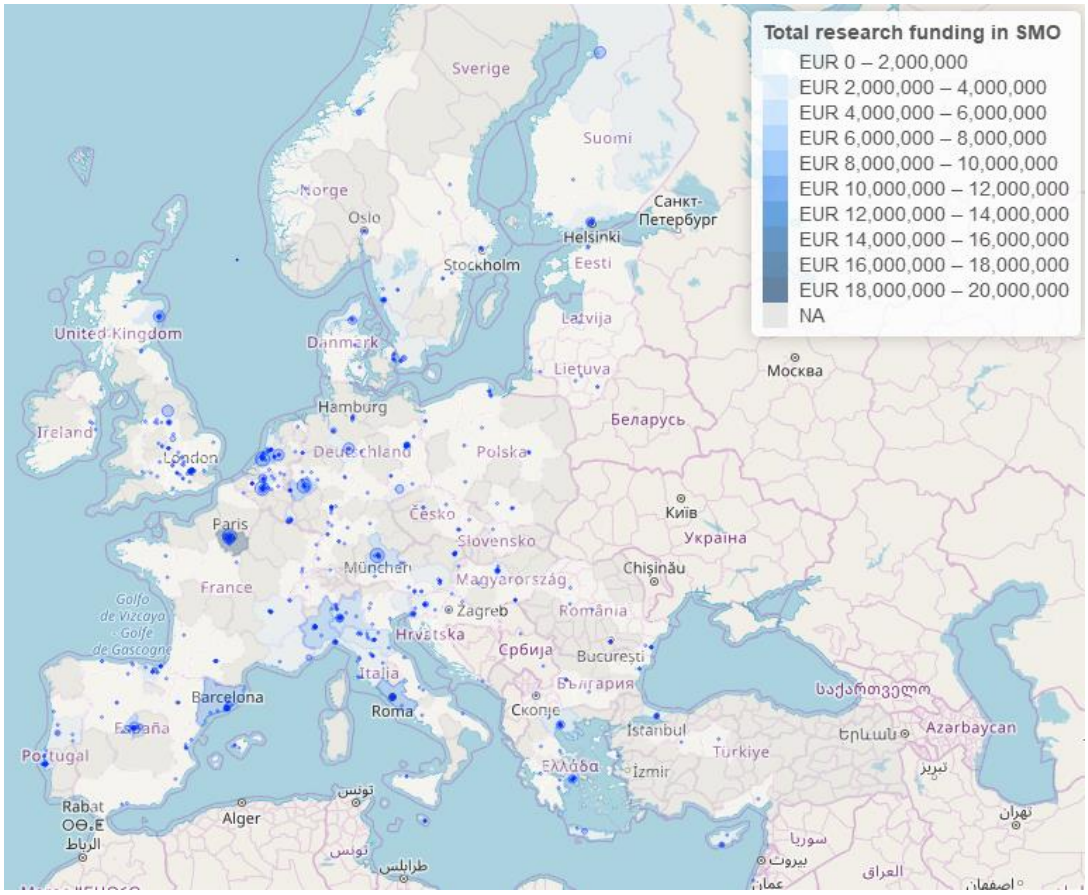
The top 20 beneficiaries received approximately EUR 57 million of funding, which is 18 % of the total SMO budget. The funding concentration is therefore rather low and funds are spread amongst a relatively large number of organisations. The number of projects in which the top 20 beneficiaries participate ranges from 1 to 10.

Organisations in all MS received funding and some patterns are clearly observable in Figure 4. Unsurprisingly, large urban areas where mobility issues are salient are well represented. It is equally visible that a great number of organisations from Italy are active in the field of SMO.

Although organisations from all MS are represented, it is visible that organisations in the EU-13 receive a smaller amount of funds. This suggests that organisations in those EU MS experience greater difficulties in winning multiple H2020 SMO projects.

Having said that, it may be that the spending of resources happens in a different location than where a beneficiary is registered. This could happen, for example, during pilot projects. Nevertheless, it is believed that this assessment gives a good approximation of where resources are allocated.

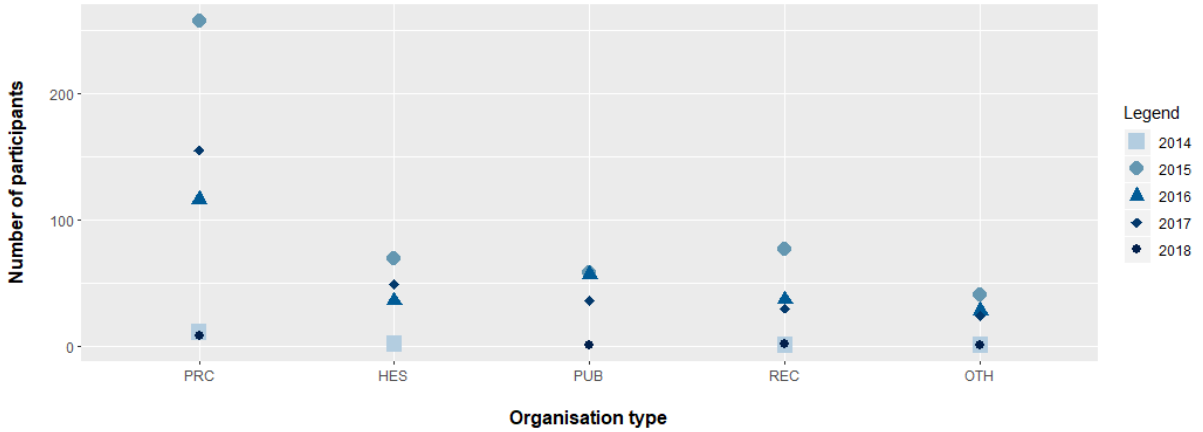
Figure 4. Location of H2020 SMO funding beneficiaries



Source: TRIMIS

When considering the type of organisations that receive SMO research funding it is observed that private companies benefit most (see Figure 5). Whilst the number of private companies that were awarded funding has decreased over time, the group remains the largest. This can be indicative of the market readiness of several technologies that are developed in the H2020 projects. The involvement of the public sector is also indicative of the applied nature of many SMO projects.

Figure 5. H2020 SMO funding beneficiaries per type of organisation (*)



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

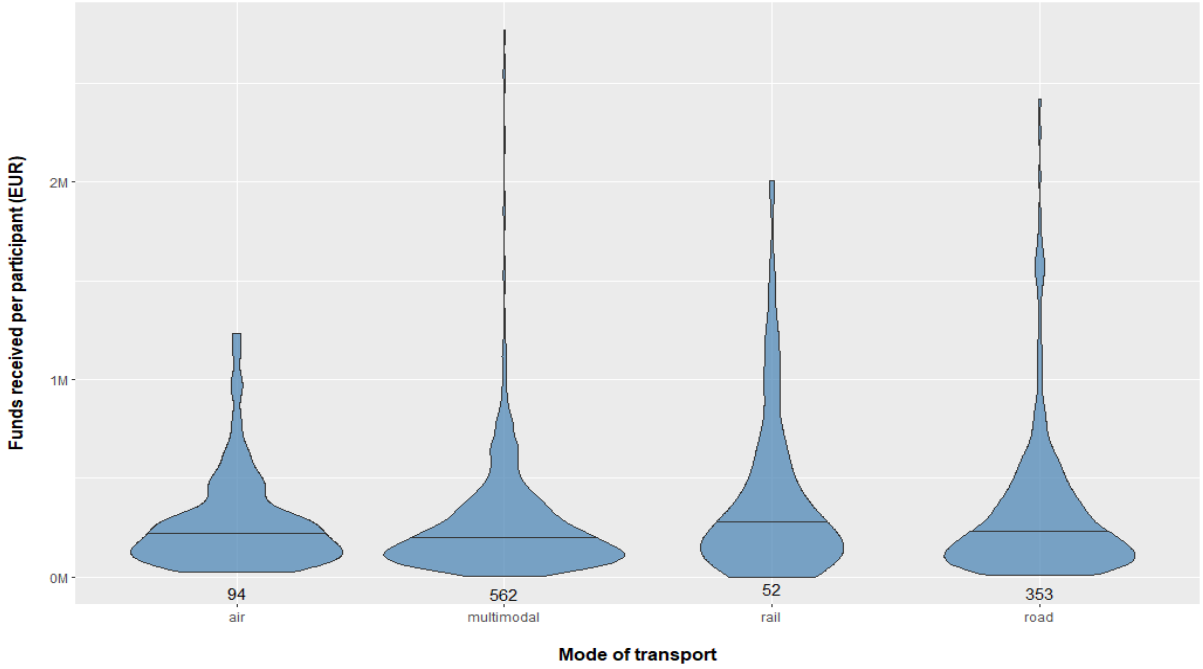
Source: TRIMIS.

Figure 6 provides an additional perspective on research funding patterns per mode of transport. The plots show the distribution of SMO 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 mentioned and the horizontal lines show the median amount of funding received per mode.

A total of 562 grants were provided to organisations that research multimodality in SMO. Compared to SMO research on other modes of transport, multimodal research grants are typically smaller. Nevertheless, the highest grants of over EUR 2.5 million were assigned to projects on multimodality.

Figure 6. Variation in H2020 SMO R&I funding per transport mode



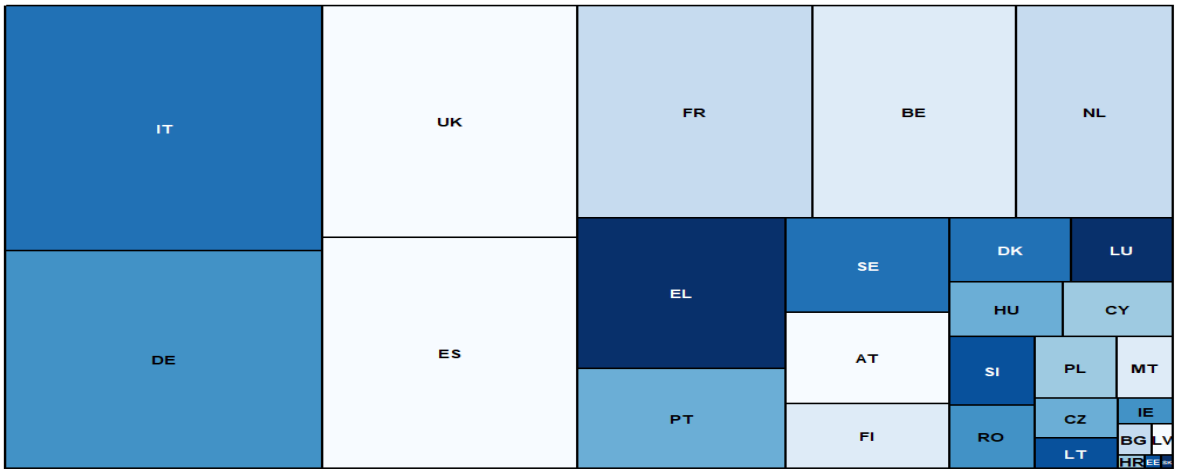
Source: TRIMIS.

3.3 Member State analysis

An assessment of H2020 SMO research in terms of funds received by MS, shows that Italy is the largest beneficiary in absolute terms (see Figure 7). This reflects the high number of Italian cities and research organisations that are active in the field of SMO, as previously shown.

A strong imbalance is moreover noticeable as beneficiaries from EU-13 countries receive ~ 7 % of all SMO research funding.

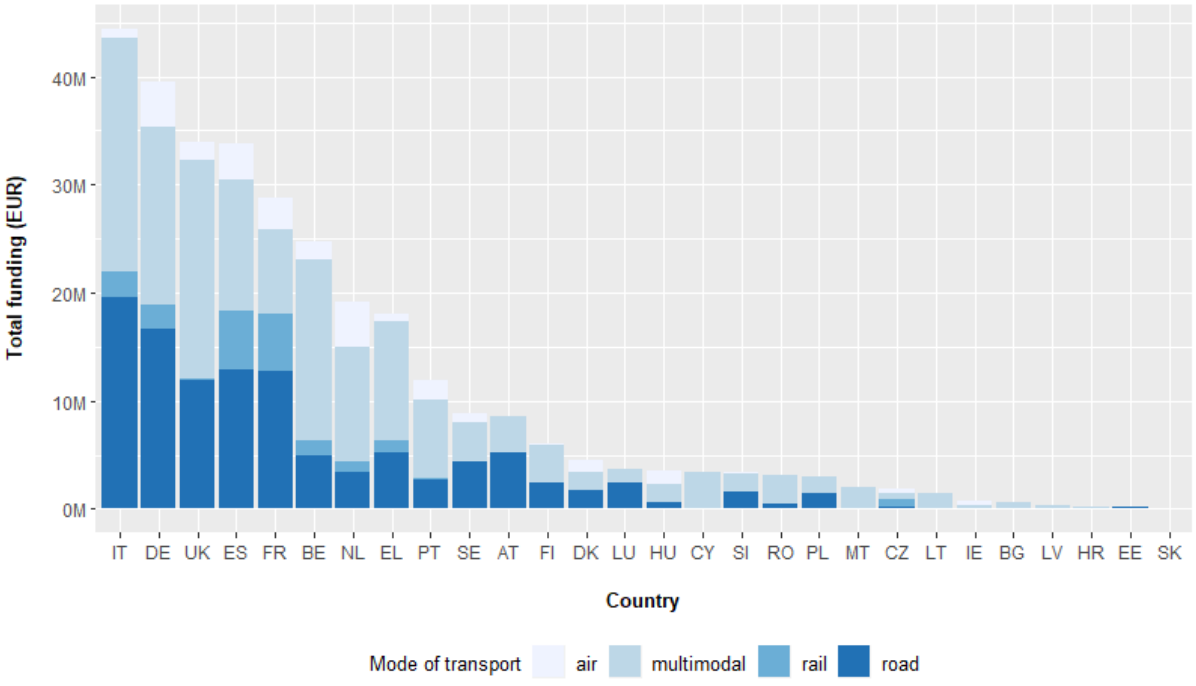
Figure 7. MS shares of H2020 SMO funding



Source: TRIMIS.

Figure 8 provides a more detailed overview on SMO research funding, showing the total amount of funding received per MS split per transport mode.

Figure 8. H2020 SMO funding per MS, including division between transport modes

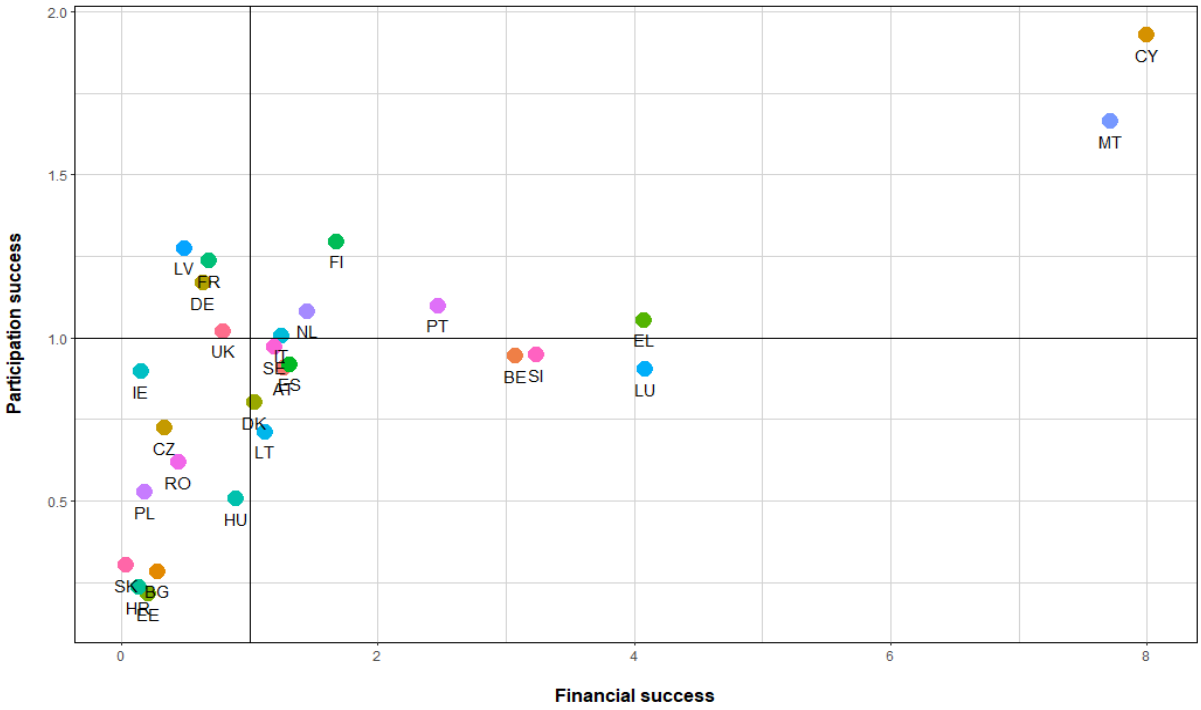


Source: TRIMIS.

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 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 of a MS as compared to the total SMO R&I funding. A score of one indicates an average performance, with scores above or below one being better or worse respectively.

Figure 9 shows six strong performers in terms of participation and financial success, namely Cyprus, Malta, Greece, Portugal, Finland and the Netherlands. 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 SMO research relative to what could be expected from a MS based on its size in terms of GDP.

Figure 9. 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 SMO.

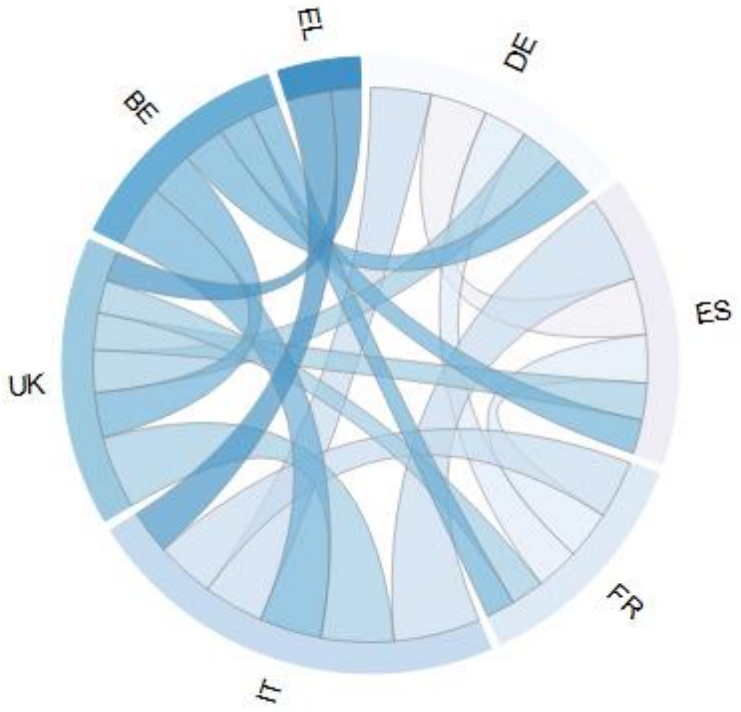
Figure 10 shows the most common links by highlighting those collaborations between organisations from MS that occurred at least 100 times. This means that if in a project one Spanish and two Belgian organisations collaborate, the link between Belgium and Spain gains a strength of two. This is cumulated for all projects.

Ten MS surpass the barrier of 100 organisational collaborations. Organisations from other MS also actively collaborate, but as they do not surpass this barrier their links are not visualised.

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

Organisations from Belgium are also very central to collaboration networks. Such can be explained by the presence of many Brussels based associations in the field of transport.

Figure 10. Chord diagram on Member State collaborations in H2020 SMO projects



Source: TRIMIS.

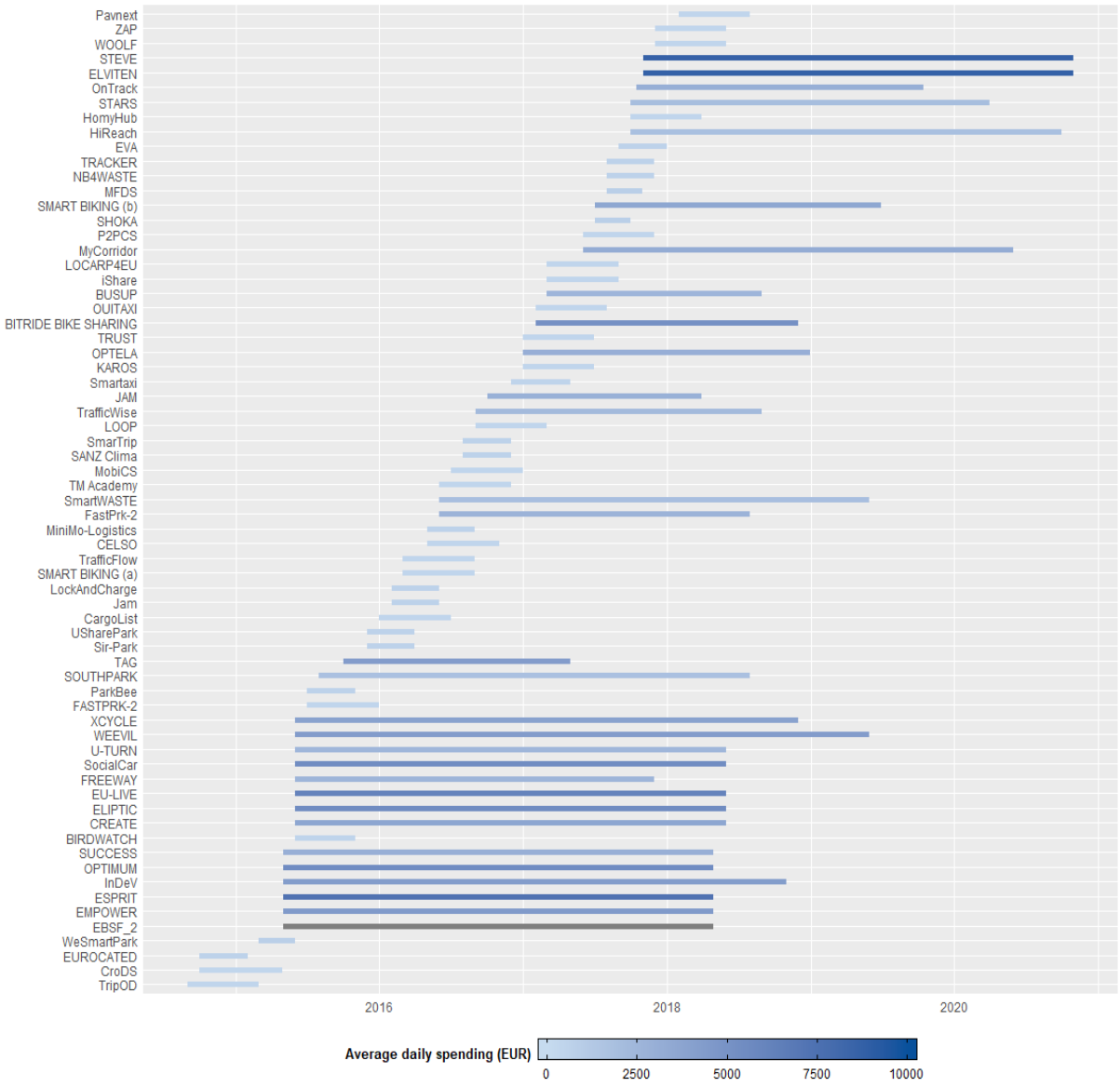
3.4 Transport mode analysis

This final section of the results chapter provides an overview of the SMO 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.

Figure 11 shows that in the field of road transport most projects received a large amount of funding. This includes the EBSF_2 project, on the European Bus System of the Future, which received almost EUR 10 million in funding. A total number of 67 road transport research projects were funded, which typically cover a 3-year period.

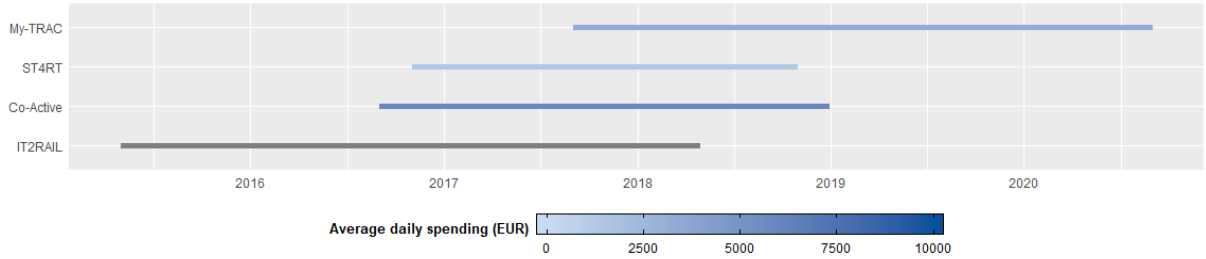
Figure 11. H2020 SMO projects in road transport



Source: TRIMIS.

Figure 12 shows the rail transport-related SMO projects under H2020. There are considerably fewer rail transport projects compared to road transport. It should however be mentioned that many projects on rail are present in SMO research, but typically fall under the multimodal category.

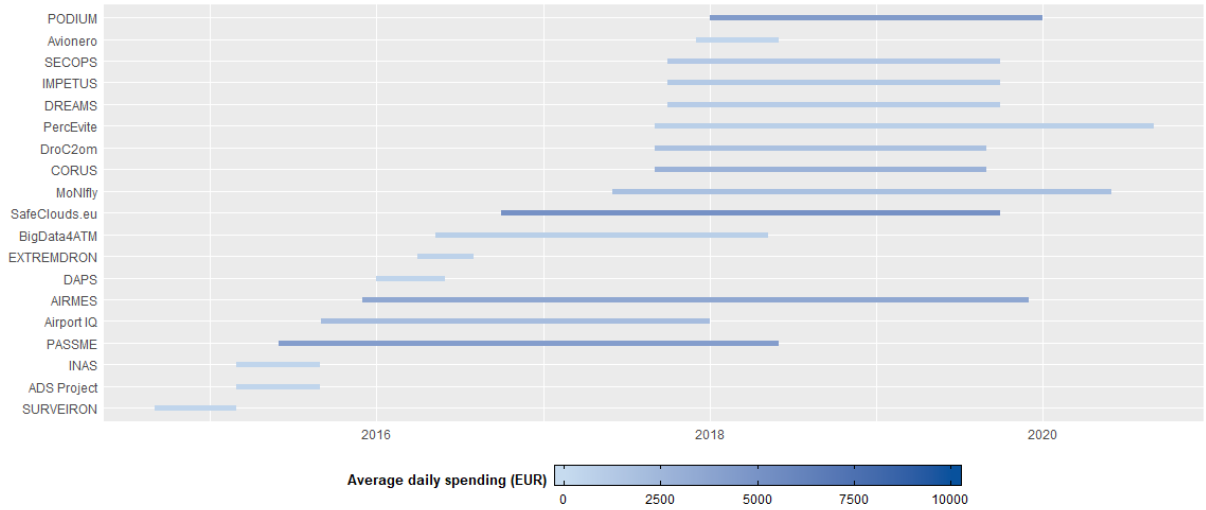
Figure 12. H2020 SMO projects in rail transport



Source: TRIMIS.

SMO in air transport mostly entails research on drones and occurs through medium-sized projects. The projects are spread throughout time and are larger in number than the rail projects, namely 19 (see Figure 13).

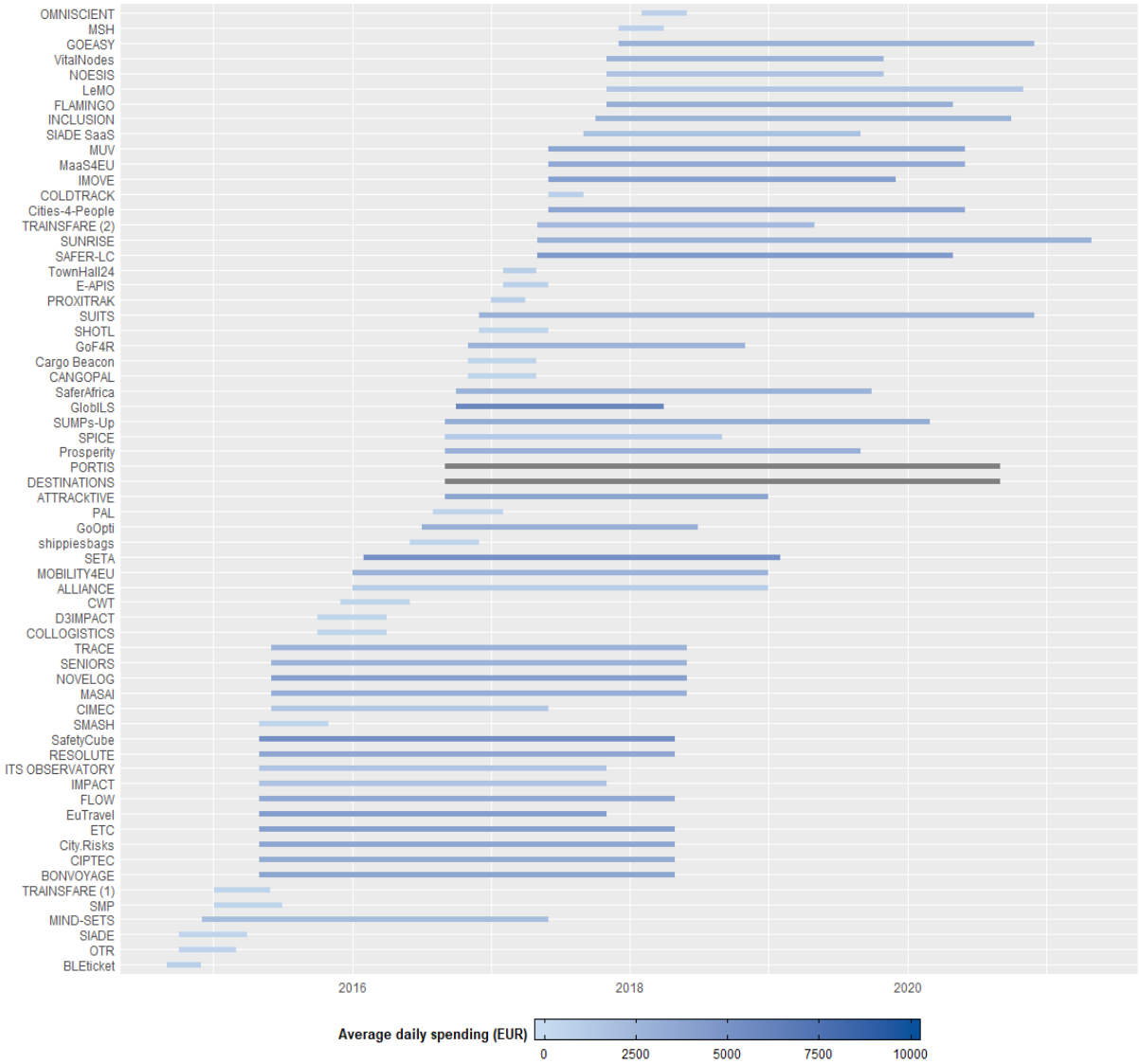
Figure 13. H2020 SMO projects in air transport



Source: TRIMIS.

A total of 64 projects were identified on SMO multimodal research. The field includes many large projects with a duration of over 3 years (see Figure 14). This includes two very large projects, namely 'Destinations' and 'Portis'.

Figure 14. H2020 SMO projects in multimodal transport



Source: TRIMIS.

In conclusion, SMO research is mostly focused on road and multimodal transport. The latter category also includes rail transport, so that it is researched more than it may seem from the analysis shown in figure 12.

4 Conclusions

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

It was found that the spending on SMO 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 multimodal projects, which is in line with the roadmap's focus on integrating transport systems. Projects that focus purely on waterborne transport are absent and rail projects are few. Rail transport is however often analysed within a multimodal context.

The SMO research funds are spread across Europe, but areas with many beneficiaries are clearly visible. Large cities in Western Europe and the North of Italy are particularly well represented. The question arises if geographical areas that are less active in the field of SMO could be better involved through future projects.

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

- The report focused on projects within the H2020 FP. Projects that fall outside the FP's 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 SMO research across Europe. The report therefore provides relevant insights to update the STRIA SMO 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
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

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
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
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	Number	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	Number	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY

	Indicator category	Focus	Indicator	Description	Unit	Source	Currently available
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	Number	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	Number	CORDIS/TRIMIS/ COMPASS/CORDA	PARTIALLY
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	Number	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	Number/ Description	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	Number	CORDIS/TRIMIS/ CORDA	PARTIALLY
28	Socio-economic	Output	Patent's application	Number of patents applications for each company participating in Transport R&D projects	Number	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	Number	CORDIS/TRIMIS/ CORDA	PARTIALLY

References

European Commission (2015), *Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation* C/2015/6317 final, Brussels.

European Commission (2017a), *'Europe on the Move: An agenda for a socially fair transition towards clean, competitive and connected mobility for all',* Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2017) 283, available at: https://ec.europa.eu/transport/sites/transport/files/com20170283-europe-on-the-move.pdf (last accessed 3 May 2018).

European Commission (2017b), *Towards clean, competitive and connected mobility: the contribution of Transport Research and Innovation to the Mobility package* SWD/2017/0223 final, Brussels.

European Commission (2017c), *Transport Research and Innovation Monitoring and Information System (TRIMIS) programmes and projects database*, JRC109363, http://publications.jrc.ec.europa.eu/repository/handle/JRC109363, Ispra (last accessed 14 November 2018).

Tsakalidis, A., Gkoumas, K., Pekar, F., Grosso, M., Haq, G. and Marelli, L. (2018), *EU Transport Research & Innovation Status Assessment Report 2017: An overview based on the Transport Research and Innovation Monitoring and Information System (TRIMIS) database*, EUR 29032 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-79-77358-7, doi:10.2760/39908, JRC109784.

List of abbreviations and definitions

AT	Austria
BE	Belgium
BG	Bulgaria
CAT	connected and automated transport
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
IT	Italy
JRC	Joint Research Centre
JU	joint undertaking
LT	Lithuania
LU	Luxembourg
LV	Latvia

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
SMO	Smart mobility and services
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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