A Guidebook:

"Recommendations for transnational cooperation within European Union Transport research"

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T ransport
N etwork
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Context: About "research and innovation" and cooperation within the European Union

Research and innovation (R&I) stems from the desire to find solutions to overcome the great challenges Europe and the rest of the world face in areas such as climate change, energy security, health, ageing population, ICT and demographic developments to name but a few. Such specific challenges can be complicated further by the overlay of the generic challenges of 'geography' - both physical and human. These geographies can, however, also provide the key to progress.

The European Research Area (ERA) is a concept of the European Union (EU) comprising all of the R&I development activities, programmes and policies within Europe with a transnational perspective. Its aim is to enhance the coordination between Member States (MS) and the European Commission (EC) regarding RD&I measures at programme and project level. As such the EU has a long history in promoting research cooperation across borders, with programmes targeted at optimising such cooperation activities, for example Eurostars, EURAXESS, Marie Sklodowska Curie Actions, and the creation of European Commission's Joint Research Centre.

The EU is a world leader of R&I, responsible for 24% of world expenditure on research, 32% of high impact publications and 32% of patent applications, while representing only 7% of the population[1].

What was missing?

However, the EU has identified that it needs to strengthen dialogue between current Member States and Associated Countries, as well as with international partners to build the critical mass for tackling challenges thrown before it[2]. Cooperation activities need to be consistent and complement each other. Deepening and strengthening the partnership between the Commission, Member States and Associated Countries is therefore an important element of a strategic approach.

The White Paper on Transport (2011)[3] sets out the case for transforming the European transport system into a sustainable and competitive system that will further increase mobility and thus continue to support economic growth and employment. With its ambitious objectives, the White Paper will require research and innovation capacities to be mobilised so as to support the transport policy objectives and societal goals.

At any point in time, the R&I community has finite resources available to it. In order that we may continue to achieve results, develop and grow, we must be attentive not only to the sustainability of R&I activity but also focus on the nature of that activity. This is where cooperation plays a major role in R&I development; across the EU, it seems fair to reason that trans-national cooperation is a key step (albeit un-fulfilled) in the process of growing R&I critical mass and capability. After all, global challenges thrown to us do not respect our

[1] "Enhancing and focusing EU international cooperation in research and Innovation: A strategic approach" COM (2012) 497 final.
[2] "Enhancing and focusing EU international cooperation in research and Innovation: A strategic approach" COM (2012) 497 final.
[3] "Roadmap to a Single European Transport Area - Towards a more competitive and resource efficient transport system" COM (2011) 144 final

geographic borders, so the more we can cooperate trans-nationally, the stronger we become individually and as a whole.

In a European Commission's Communication "Research and innovation for Europe's future mobility" (COM 2012, 501 final), it is stated that Europe does not fully exploit the benefits that could be gained from a better alignment of Transport R&I efforts among Member States, or within different transport industries. This is due to the Transport sector being highly diverse in terms of sub-sectors, each with different market pressures, drivers for innovation and user requirements. In some sub-sectors, a mismatch between those developing products and services and those active in deploying them prevails. This leads to the belief that a true European Research and Innovation Area for Transport is a justified need, but is yet to be realised.

Practical moves to address this are present in EU Communications and funding mechanisms, not least of all the Horizon2020 draft scoping documents for the 'Transport' 2016-17 Work Programme which has raised the profile of transnational cooperation by actually discussing the desire to see international cooperation by European partners. It states: "Activities at the international level are important to enhance the competitiveness of world leading European industries by promoting the take-up and trade of novel technologies, in particular where the applicable regulatory regime is international and can thus result in barriers to the market introduction of innovative solutions coming from EU actors. Demand for high-end European produced vehicles as well as for European know-how is very strong in the emerging markets. With most of future transport growth occurring outside Europe, access to knowledge and to new markets will become increasingly important, and therefore cooperation as well as exchanges on transport R&I strategies and investment priorities with major partner countries, for example US, Japan, China, Brazil and the Euro-Mediterranean region will be pursued." There is a train of thought that partners being well versed in the methods and means of the former may only appropriately tackle the latter once transnational cooperation is prolific.

What did we aim for?

In the field of Transport R&I, cooperation is often a deliberate policy to address common problems and find effective and resource efficient solutions. Transport related problems do tend to be common across EU and non-EU countries. Transnational cooperation in Transport is becoming a higher priority and, as a result, creating a critical mass of collaborative working efforts across the EU (and internationally).

The European Transport Network Alliance Plus (ETNA Plus) project, a 3-year coordination action, which commenced January 2013, was designed to support this movement. The project aims to foster innovation in transnational cooperation in Transport, with a focus on promoting the active participation of new actors and regions in EU calls and proposals.

16 partners from EU Member States have been involved as a consortium over the lifetime of the project. Many of the partners' representatives within the project are Transport National Contact Points (NCPs) for their countries. A further 55+ Associated Partners from around the globe are involved; these partners are officially nominated as Transport NCPs, but are not involved in the project as beneficiaries per se. Combined, this is a wealth of knowledge and expertise in the field of Transport R&I, funding, strategy and policy.

ETNA Plus is targeting transnational cooperation through different activities, following a two-fold approach; on one side, specific initiatives to raise awareness on the EU transport R&I landscape will be carried out, on the other side, efforts to improve the level of expertise on EU funding (e.g. Horizon 2020) will be undertaken both at NCP and researcher level.

The desired outcomes of the project include:

- The development of a web tool on both public and private EU funding opportunities relevant to Transport;
- An analysis of Transport R&I strategies implemented in industrialised countries and how they augment or restrict transnational cooperation;
- The support of stakeholders to build transnational consortia and the reinforcement of Transport National Contact Points' (NCP) and researchers' expertise through several training and twinning measures and networking.

These outcomes are being achieved through concurrent, interrelated, actions organised into several work packages and undertaken by the project partners. Work Package 3 specifically addresses the second of these outcomes, leading to the development of this Guide highlighting good practice within, and ideas for overcoming barriers to, transnational cooperation within Transport R&I.

What does this Guide hope to achieve?

It is commonly understood that Transport is an increasingly competitive sector, which needs to innovate constantly to produce future products, systems and services to become more attractive to new investors. So, how can we ensure that we are doing our best to cooperate adequately with regard to Transport R&I? Some countries are doing this adequately; others are not yet developed or are at early stages and are looking for assistance and ideas to help develop methodologies.

We will take a look here at transport R&I strategies within some industrialised EU Member States and Associated Countries, and some non-EU countries to see what good practice is evident, what barriers exist and what can be learned from these for those EU countries aiming to develop their own efforts through transnational cooperation in Transport R&I.

Taking stock - a summary of work undertaken to produce this Guide

Transport research and innovation is a subject commonly approached worldwide on a strategic level even though these policies are not always visible, especially when it comes to transnational cooperation embedded within the policy framework.

The ETNA Plus project's overall objective is "to foster innovation in trans-national cooperation in Transport, with a focus on promoting the active participation of new actors and regions within in EU research calls and projects". One way in which this is being targeted is through the project's Work Package 3 "Trans-national cooperation within innovation strategies", conducting specific initiatives to raise awareness of the EU transport R&I landscape, including an analysis of innovation strategies implemented in industrialised countries.

We wanted to first understand the available practice found in already-available (albeit fragmented) sources, either for individual transport modes, or just focusing on either transport research or transport innovation. As such, we undertook comprehensive research into Transport R&I strategies, including the way in which they are implemented, within ten representative EU Member States and seven representative non-EU countries that have significant ties with the EU.

In both scenarios, the selected industrialised countries were chosen as they provided a significant array of transport policy scenarios in elaborating and implementing transport research policies with a transnational view. They all also highlight the interaction between industrial/business needs and societal needs. As such, it was considered they would provide fertile ground from which to generate recommendations that could assist transnational cooperation within EU transport research.

There were similarities of results in terms of there being good practice examples found in both EU and non-EU countries and, almost reassuringly, there was one issue common to both sets of countries - the difficulty in completing the innovation cycle from research to market is a lengthy process, giving rise to conflict with relatively short-term policy objectives seeking value-for-money results (i.e. the delivery of products or services to the market, or the provision of close-to-market solutions) at an earlier stage.

In summary, the following characteristic findings were most apparent in specific countries:

- *Cooperation encouragement 'by design':*
  Austria has embedded the requirement for trans-national cooperation into a transport research programme whilst strictly retaining the need for the work to be conducted towards progressing Austrian national priorities.
- *Governmental, policy-driven, sustained trans-national cooperation:*
  Also 'by design'– **Germany** and **France** set up a bi-lateral programme, DeuFraKo, in 1978. This Rail-mode programme has very strategic objective to strengthen German French scientific and technical cooperation. Further, it has been designed to receive bottom-up proposals but retains opportunity for the large industry partners on the decision-making committee to issue joint calls for proposals on specific topics.
- *Correlation of R&I policy with Transport policy:*
  Whilst this may seem a coherent approach, it is not the norm, perhaps in part due to national resource allocation considerations. However, **France** achieves this to a degree and **Denmark** has taken this dueling of policy objectives one step further by focusing on just those transport modes prioritized within with national policy. This could also, however, be construed as a barrier to trans-national cooperation due to the low or non-priority of a particular mode.
- *Use of ICT:*
  Finland has had, since 2009, a dedicated strategy for intelligent transport. This strategy was updated in 2013 and recognizes the growing part ICT has to play within the sector, encouraging its full-scale exploitation by both public and private sector in transport R&I for application within society.
- *Involvement of SMEs:*

Several countries involve SMEs in their policy elaboration, but it is the **Netherlands** that gives special attention to SMEs by providing them with specialized support tools, regarding them as the driving force behind transport research and therefore assisting them to generate competitive capabilities.

- *Funding considerations:*
  Development of large R&I requires access to funding of a flexible nature and **Spain** seems to have the most appropriate method of assisting this – their policy framework promotes public/private sector interaction as well as co-financing schemes, enabling the correct mix of financial support to be provided in each case.

- *National Innovation Agency driven:*
  Sweden possesses a dedicated innovation agency – The Swedish Governmental Agency for Innovation Systems – that promotes collaborations between companies, universities, research institutes and the public sector. This stimulation of greater use of research is achieved by making long-term investments to maintain a strong R&I arena, and by interacting with international research financiers and innovation-promoting organisations. The results include transfer of know-how in transport innovation by interacting with international research financiers and innovation-promoting organisations.

- *Private funding of transport research:*
  Industry heavily funds research in **Australia**, in particular the automotive sector. This enables industry players to strongly direct the research sector as to their developmental needs and priorities, these often being close to market services or products, to gain and retain competitive advantage. Further, Australia's connections with Indian and Chinese organisations in this vein have given rise to international cooperation opportunities to jointly develop innovative products and services, and for Australia to learn from these countries' research.

- *Multi-faceted policy approach:*
  Without a mode bias, **Canada** has a balanced mix of policies and research programmes seek to holistically progress close-to-market solutions for a variety of transport relates issues.

- *Focused policy approach:*
  Japan analyses domestic and international transport technology and market trends, then effectively chooses specific projects for research and innovation activity, based upon the desire for specific purpose and outcomes. This focused approach gives Japan the opportunity to compete in the global market place.

- *International expertise sharing - best practice:*
  A very successful 'transport research know-how and technology transfer' occurred from **South Africa**'s Council for Scientific and Industrial Research to India, resulting in research policy best practice learning in India's Central Road Research Institute.

  In similar fashion, **South Korea** shares its expertise in developing research frameworks and is benefitting from a unique position of being able to assist developing countries with their research frameworks, whilst also directly learning from more developed countries.

- *Funding considerations:*
  To progress research and innovation policies into action, appropriate funding levels and mechanisms are vital. This is achieved by the **United Arab Emirates**' transport research strategic frameworks is backed by significant funding support and coherent modal coordination to enable the UAE's Government to drive forward transport R&I and become a global leader in the arena.

Following the above, a questionnaire was issued to ETNA Plus partners regarding barriers to trans-national cooperation in transport research and innovation (R&I) strategies in particular countries. These have been identified and compiled including a description of how these barriers impact stakeholders and/or elements of cooperation. Recommendations have been developed for innovative approaches and tools to remove barriers and encourage integration and trans-national cooperation within European transport research and innovation strategies. These could give rise to option or common approaches to be adopted by countries experiencing similar barriers, benefitting from the role of NCPs.

In this way, the output of the our work aims to not only encourage cooperation through R&I, but also to provide solid inputs for the reshaping/redevelopment of Transport National Research Strategies in order to ensure the long-term application of proposed measures and recommendations.

Barriers to trans-national cooperation in transport research

Austria

The barriers in Austria are common across all transport modes, but have origins in different areas.

At policy level, the lack of a dedicated transport research and innovation policy is the most evident barrier to transnational cooperation mechanisms in transport R&I in Austria. There is quite a developed landscape provided by one strategic framework that serves as a recommendation for future actions and an actual innovation strategy, but this is not specifically dedicated to transport R&I containing strong specifications for transport.

The result is a reduction in efficiency at the strategic level. Although strategic R&I is well determined in Austria, room for improvement exists when it comes to defining which transport innovation topics take priority, by better correlating public funding with private investment in Austrian R&I- the latter of which is well above 50%.

At the advisory level there is insufficient representation of SMEs within the policy building process. This lack of SME representation signifies there might be gaps in understanding SME needs and thus inability for these to be tackled in a transnational scope of any transport R&I policy developed.

Finally, at the delivery level, Austria suffers from a lack of transport R&I programmes that allow transnational cooperation (there was one, but eligibility to participate was restricted to foreign organisations with and Austrian presence). This, in turn, does not give much scope to translate any transport policy objectives into reality.

Denmark

A lack of a transport targeted R&I policy, strategy or programme is the most evident barrier within Denmark and as such, no correlation with possible collaboration at international level could identified. There are however certain governmental initiatives, which aim at identifying potential fields of interest for R&I for given programming periods. In specific cases, they also include issues related to transport, but only in case of waterborne transport sector, does it receive enough of recognition to be awarded with own programme – Blue Denmark.

This makes it very difficult to initiate strategies for international collaboration. The only potential tool that can be used in a formal way are the EU Framework Programmes but they may not be sufficient to reach national goals and, for such, bilateral or multilateral collaboration should be envisaged.

On the good practice side, Denmark is correlating future R&I policies to one another, which should allow better coordination of programmes in the area of transport, amongst others. Stakeholders should be involved in the process, giving them opportunity to contribute to the development of strategies that take into account possible routes to internationalisation (ERA-NET schemes). The appointment of a single body responsible for identifying areas and running programmes and strategies would then be advantageous.

Finland

Four main issues around transport R&I have been identified within Finland, the first two cited here are linked to some degree. In the first instance, there is no transport related R&I policy. This is most apparent for transport actors – public, private, research or industry – when they are preparing for Horizon 2020 funding opportunities, as there is no strong targeted policy to base their positions upon. Further, at the programme level there is a lack of a fully open transport R&I programme that allows and funds transnational cooperation. Although Finland has a strategic vision which includes transnational cooperation and even programmes that rely on it, their funding is limited to national entities. This situation might be considered positive compared to other EU countries but there are still some missing elements that keep these programmes from transcending into fully open programmes. Ideally, existing programmes could be modified to allow partnerships to include foreign partners, whose expertise can fill know-how gaps and engender a transfer of capability between countries.

Thirdly, at advisory level, there is insufficient representation of SMEs as advisors in the policy building process. Although there are several innovation programmes dedicated to SMEs and companies these are not currently as exposed as they should be in the policy building process. The transnational scope of SME involvement signifies that the more SMEs are included as stakeholders or advisors, the more options for collaboration can be explored. To resolve this, increased involvement of SME representatives could be encouraged, who in turn can be delegated as liaison SMEs between policy makers and SME groups of interest, so as to pool and employ information for policy building.

Finally, the different planning and funding schedules, decision making rules and procedures in different national funding institutions and organisations participating in transnational cooperation makes alignment of aims, activities and expenses difficult to achieve.

France

Transport R&I is an important component in France's R&I landscape. Several co-funded collaborative projects exist and are well used by stakeholders, for example DEUFRAKO). However, the main barrier faced is that partners involved are each funded by different agencies, which do not have the same rules, run by the same timescales, etc.

This programme level barrier is common across all transport modes, even though there is a mode-specific strategic approach as regards funding from the French government. Efficiency of programmes is affected - there can be delays and uncertainties in the start of projects, additional administrative work to comply with more than one funder's management reporting and auditing criteria, and extreme situations funding may be discontinued in one country but not in another which can lead to transnational projects not reaching their objectives.

Germany

Germany is a prime example of a well prepared and executed research strategy and policy build-up approach. Many ministries and agencies are involved in the processes, which results in creation of some strategic documents identifying potential fields for research and innovation in transport. This is supplemented with contributions from research and industrial landscape, providing valuable content to form well-rounded programmes.

However, most of national R&I programmes in Germany exclude any kind of collaboration with international partners. This might be a result of country's high involvement in EU Framework Programmes and parallel initiatives (JTIs, ERA-NETs and others) which leads to division between the international and national prioritization of programmes.

On the other hand, certain cases actively include bilateral collaboration (i.e. DEFRAKO between Germany and France, as mentioned in France's summary, above). This clearly shows that there is a potential for extending research to EU partners; this would require identification and agreement at policy level. It could also be worth considering opening some programmes to EU stakeholders, especially where those programmes would tackle EU-wide transport challenges.

Italy

Italy's National Research Programme outlines the general strategy for R&I and, within it, there is attention to R&I in transport via sectors such as new materials, integrated logistics, energy efficiency and sustainable mobility. However, there is the lack of a specific Transport R&I policy. This has a strong impact on the quality, or indeed the presence, of any transport related transnational cooperation by the country.

The effects of this at policy and programme level present as limitations in the socio-economic sector because of the scarcity of a strong and well-structured transport R&I policy for any mode. This has repercussions on economic growth and job opportunities.

Another barrier compounding the above is that any transport R&I related elements of the National Research Programme do not correlate in any way with Transport Policy. This is where the involvement of SMEs and Industry representative advisors would be helpful in any future policy elaboration process, bringing market needs to the fore of research priorities.

Netherlands

Transport R&I in The Netherlands is impressive; policy-making and strategy development is important and well organised. Many organisations are involved, comprising Ministries, regional authorities, national agencies, Universities, research institutions and industry.

According to the surveys conducted at European level, barriers for cooperation at the programme implementation stage are not really critical. From both legal and programme management standpoints, there are several opportunities for transnational research cooperation activities but it must be recognised that there are the 'usual' issues to be considered including:

- Diverse programming approaches, diverse programme management procedures and complicated and time consuming calls for tenders;
- Lack of administrative capacities, staff and financial resources;
- Divers opinions on public access and use of IPR;
- Potential for conflict in inter- and intra-ministerial cooperation;
- A low level of cooperation between national and foreign industry partners;

This list is not exhaustive! However, barriers become do more serious at the policy determination stage. There is presently a pressure building regarding political legitimacy in the use of public research funding budgets; national research budgets are to be spent with regard to current national political interests. This potentially has the effect of stymying transnational cooperation and/or creating multiple funding opportunities to solve the same or similar problem at national level only.

Spain

The principal barrier for transnational cooperation is, quite simply, the lack of a dedicated transport research and innovation policy in Spain. Although there are funding mechanisms to support transnational cooperation, these are not specifically dedicated to transport R&I. The aim of the National Plan for Science, Research, Development and technological Innovation is to advance the country in the international sphere, including the use of special funding conditions and instruments.

Regardless, transport stakeholders find it difficult to use the instruments due to the lack of specific transport R&I oriented policy.

In building R&I policy, there is a notable lack of involvement of SMEs in the dialogue that although large industry is involved, could lead to a gap in knowledge of market needs when considering (transport) specific R&I priorities.

 Sweden

Sweden has a clear strategy for transnational cooperation and can be presented as a good practice example in terms of its transport innovation framework, containing mode specific policies and regional level cooperation programmes. However, three main barriers can be cited. On the 'home front', there is insufficient representation of SMEs as advisors, or even stakeholders, in the policy building process. This missing SME representation in the policy elaboration flow gives rise to issues with translating SME needs within the strategic objectives of transport innovation policies.

This seems peculiar, as Sweden in fact benefits from substantial private co-funding in air and road transport innovation; hence there is a lot of potential for the private sector to switch its attention towards transnational cooperation. In this regard, SMEs are a valuable asset since their flexibility allows them to participate in a variety of programmes. This, however, is true only if the competences and capacity SMEs is known and if their opinions on the future of the field are taken into consideration. This brings us back to the opportunity to better involve SMEs in the policy elaboration process, perhaps especially for those transport modes where private sector co-funding already exists. Fragmented opinions of SMEs can be pooled, compiled and forwarded to the policy maker as appropriate.

Second and third barriers are more shaped by external influences: Different national funding rules and regulations in different countries can create major problems for Swedish participants, especially where the decision making process around accessing funding is complex and time consuming. In extreme cases, time delays coupled with strict deadlines can result in the cancelling of a project. Following this vein, it is sometime the case where a funding institution can only fund one or certain organisation types, such as SMEs, academia, industry, etc.

 UK

The UK runs a relatively straightforward, centralised policy building process within National Government. The Technology Strategy Board (TSB) is the UK's innovation agency, and works towards the delivery of the UK's "Innovation and Research Strategy for Growth". There are no obvious barriers to trans-national cooperation as the UK government, through the Technology Strategy Board, is keen to encourage participation in European projects.

There are a number of transnational collaboration initiatives in which the UK participates, e.g. EUROSTARS, EUREKA, as well as H2020 instruments, including collaborative R&I, ERA-Nets, etc. In addition, there are non-H2020 initiatives, including INTERREG, CEF (TEN-T), and so on. For all these there are EU-wide networks of National Contact Points.

However, one potential barrier is in relation to those organisation-types that can receive UK funding support in specific programmes, i.e. MARTEC ERA-Net, where only companies can receive funding, and in EUROSTARS, only SMEs. The UK's Technology Strategy Board is focused on supporting businesses with research and development, which could be viewed as a barrier to, for example, UK HEI/University and other research organisation's participation.

 Australia

There is a distinct regional character to Australia's transport R&I. In recent years, the country's industrial needs, coupled with the fact that the automotive sector is one of the largest investors in R&I in Australia, has led to a modal shift from rail to road (previous efforts had been the reverse). Overlay this with recent important political changes, an obvious barrier to transnational cooperation lies with the reduction in public funding overall.

A further barrier is the physical distance of Australia from other countries; researchers can be reluctant to travel to the countries, since they are obliged to make a long stay. As a result of this and joint development activities already established, there are some opportunities for transnational collaboration with Indian and Chinese organisations, but not so much for EU countries.

 Canada

One of the greatest problems Canada has in establishing transnationals cooperation is the difficulty in understanding, or non-awareness, of stakeholders that Canada has several initiatives and strategies implemented for developing R&I. This difficulty is caused by the decentralization of the Canadian authorities. There are two governmental levels a Federal level and then a Provincial level each with its own managing authority, rules and regulations. This distribution of the decision-making roles results in each Province having its own programmes and strategy, thus increasing the complexity of the Canadian R&I landscape.

Transport Canada manages the transport sector for the Canadian Government and is divided into 5 regions. As a whole, it believes that innovation is the key to addressing transport challenges. The challenges to deliverers of interpreting and working with different Provinces' programmes and strategies are then compounded by the EU's own rules and regulations when transnational cooperation with Canada is considered.

 Japan

Japan has very structured approach to priority setting and funding of strategic R&I, flowing from the Prime Minister, through the Cabinet, through appropriate Ministries and to independent administrative institutes (IAIs) that then conduct their own and/or manage programmes with R&I funding. However, there is no specific transport R&I policy in Japan, and the policies that are in place to address technological areas are most focused on sectors or modes. This policy level barrier's main impact is that there are therefore only a small number of transport technologies that connect with the cross-sectional priorities of the Japanese R&I policy. Transport's private sector does try to fill the gap by investing heavily itself in those 'missing' technology areas; continuation of this contribution is critical to the continued advancement of R&I in the sector and results gained from it.

 South Africa

The lack of a dedicated transport research and innovation policy is the policy-level evident barrier to transnational cooperation, an issue that is shared by South Africa with several

other countries. Although other fields in South Africa benefit from a dedicated strategic framework, this is not the case for Transport R&I, and it will continue to hamper the progress of such focused cooperation until resolved.

Compounding this is a lack of programmes to fund transnational cooperative initiatives. Without such, there is not much room to translate any specific policy objectives into reality, although South Africa does have experience of international cooperation and working transnationally to share/transfer technology, which will stand the country in good stead if such transport-specific R&I strategy and policy arise.

South Korea

Barriers for South Korea are multiple and broad in nature, affecting transnational cooperation in R&I from policy through to implementation levels, in all transport modes. Core barriers have been cited as cultural differences and regulatory difficulties including language barriers, employment permit regulations, salaries and regimes, heavy regulatory barriers at national level, and the added weight of institutional inertia and bureaucratic procedures.

Additional barriers, including; differences in Intellectual Property Rights and regimes, limited financial capabilities and funds, competition policy and the high cost of information, are certainly significant in their own right, but may seem secondary to the core barriers.

Favouring of the potential for transnational cooperation, South Korea exhibits good practice in terms of long-term planning, project management and awareness of the importance of environmentally friendly and green technology and transportation - these are endemic within the majority of organisations.

United Arab Emirates (UAE)

There are some improvements in the higher education and research investments and the Government identifies the transport sector and innovation within it as one priority for the governmental strategy, investing heavily in infrastructure for some years now. However, the main problem for transnational cooperation is the distance between the two regions (UAE & EU). This makes it difficult to develop strong R&I relations between them.

The UAE are primarily involved in collaborations with the Gulf Cooperation Council area and at the current moment there are no specific research cooperation agreements with the EU.

There has been a EU Delegation to the UAE in Abu Dhabi since the 2013, but there is no specific involvement in transport research currently developed. Indeed, there is a lack of specific strategy for Transport R&I, making transnational cooperation policy difficult, if not impossible, at present.

Unites States of America (USA)

The USA has a long lasting recognition of the importance of the transport sector for the country's development. Perhaps this contributes to why transport-related R&I programmes run by US Department of Transport are open only for national participation and do not foresee participation of EU (or any other countries) members. This is caused by the

programmes assumption and approach undertaken by the DoT; in many cases, programmes are announced for just a short period and thus do not allow time for identification and engagement of similar EU programmes and stakeholders that might have contributed with their expertise. This is a common situation for all modes of transport considered in any of the programmes and policies developed by DoT and related agencies.

However, American stakeholders are active in EU Framework Programmes, considering collaboration with European counterparts important: The EU-US Agreement on S&T is in place to encourage transnational and this could be a useful starting point to develop R&I collaboration in specific areas including Transport.

Synopsis of Barriers and some possible 'quick solutions'

Analysing the data obtained from the questionnaire "Mapping the barrier to transnational cooperation in Transport R&I", on the above **17 countries**, **27 issues** were cited in total. Some have been noted within more than one country, which has led to the identification of **10 discrete barriers**. The following summarises the obtained data, noting the barriers of highest prevalence, and where any peculiarities arose. In most cases, 'quick solution recommendations' were offered in the questionnaires returned; these are also elaborated:

1. By far, the barrier of highest incidence is "the lack of a dedicated transport R&I policy". This figured highly enough in 7 countries to be included at the top of the list for each; Austria, Denmark, Italy, Finland, Spain, Japan and South Africa.

   In some of these countries, there exists a strategic framework and/or policy for R&I that contains references to 'transport', although not strongly enough to figure as its own topic. A possible quick solution would be for the transport elements to be drawn out from the general R&I strategy, and elaborated in the context of market and social needs, national resources available and potential benefits to be gained from the inclusion of transnational collaboration.

2. The second most prevalent barrier is "the lack of transport R&I programmes that allow transnational cooperation". This figured highly for 5 specific countries; Austria, Finland, Germany, South Africa and the USA.

   Without such programme(s) to enable transnational cooperation initiatives, there is not much room to translate policy objectives into strategy. This could be addresses by establishing specific programmes, or modify existing programmes, to enable such cooperation and thus enable participation of foreign partners whose expertise can be used to fill knowledge gaps.

   In the case of the USA however, there is an EU-US Agreement on Science and Technology which allows American representatives to be involved in EU Framework Programmes. This gives an opportunity for transport related R&I to be a focus through, for example, the Horizon 2020 Programme in coming years.

3. In third place, the issue deemed to be prevalent in restricting transnational cooperation in transport R&I are the "insufficient representation of SMEs as advisors in the policy building process". This has been cited in 3 countries, specifically Austria, Finland and Sweden. Quick solution; ensure SMEs are included within the Advisory and/or stakeholders groups throughout the policy elaboration process. This could be for specific, more strategically important modes, and it would be straightforward to work through those SMEs as communication channel to and from representative groups as and when appropriate.

Following the identification of these main barriers, discussed above, there followed an array of different issues cited which affect transnational cooperation in transport R&I, listed below (in no particular order) with 'quick solution' suggestions for each:

- Where co-funded collaborative projects do exist, a barrier presenting in Finland, France and Sweden is that partners are funded by different agencies, all with differing programme rules and timelines of project management criteria. Resulting from such differences in programme intricacies, it can be easy for funding to be discontinued in one country and not another, or for a project proposal to simply fall foul of deadlines and subsequently be cancelled. As a solution, funders could coordinate their reporting documents, timescales and possibly even their monitoring and evaluation techniques. At the very least, working together at proposal development stage to check on differences in funding rules and regulations to be aware of solutions required will help to avoid any 'surprises' later on in the process.
- A physical issue deemed to be prevalent in restricting transnational cooperation in transport R&I are geography – the distance of 2 countries, Australia and UAE, from EU and/or other countries. This must be viewed as a 'full stop barrier'. A limited solution, to work around the issue over the longer term, would be the building of political and economic relationships with EU countries with the aim of working towards collaborative efforts in the field of R&I.
- Whilst the top-ranking barrier is that of "lack of dedicated policy", another exists which is aligned with this, to some degree. In the Netherlands, where the expectation is for national budgets to be spent with regard to current national political interests, it is difficult to enable transnational cooperation, even if that dedicated policy was to exist. This could be assisted by the country in question designing specific strategies to encourage transnational cooperation including operational flexibility and funder's discretion at local level.
- A potential barrier in the UK relates to organisation types that can receive UK funding support from specific programmes – these can be SME and/or large company to the exclusion of, for example, Universities and other research organisations. This is viewed as a 'full stop barrier' that cannot be overcome without intervention to amend national and/or EU programme eligibility criteria.
- Recent political changes in Australia resulted in an overall reduction in public spending. In the transport sector, this has translated into practice with the funding available being focused on the road sector, thus impacting on other modes. Again, this is viewed as a 'full stop barrier' that cannot be overcome without longer-term political intervention.

- The R&I landscape can be complex due to a decentralised Government, as experienced by Canada. Both the Federal and 'more local' Provincial government levels have their own decision-making capacity that also leads to each Province having its own programmes and strategy. A proposed solution here is to conduct targeted awareness raising to stakeholders seeking transnational cooperation possibilities so they are aware of the government levels and different programmes' requirements.
- Information gathered from the questionnaire process identifies one particular country as somewhat of an 'oddity' regarding transport R&I collaboration. Whilst well developed itself, South Korea in fact displays multiple barriers endemic politically and socially that combine to make transnational collaboration – indeed, of any nature – with them challenging and potentially not possible at all, given current conditions. The solution is a long term one, requiring the country's Administration to formulate and adopt appropriate enabling policies, programme management structures, rules and regulations, addressing training and human resource management issues, and establish research themes of common interest. In one way, South Korea is a 'blank canvas' with regard to transnational cooperation in transport R&I. Another way to view this, however, is that the country already has an established "go it alone" regimen that works.

Recommendations to promote and improve trans-national cooperation in Transport Research at EU level, with special focus on EU13 Member States:

Don't

blame it on the lack of budget.

Measures to enable transnational cooperation are set at the design stage of national programmes.

If no budget is available, it means that the priority is low.

Based on our findings from the previous chapters, we could clearly identify a number barriers to transnational cooperation in transport research in industrialised countries. We take into consideration that some barriers are actually implemented and explicitly disallow transnational cooperation while others may be unforeseen consequences of particular aspects of the national programme design.

Based upon the potential causes, impact and manifestation of these, we distinguish several recommendations and enablers meant to alleviate the negative impact or even remove these barriers altogether. These include explicit mechanisms or measures designed to highlight the positive effects of transnational cooperation that take the shape of rules/instruments/policies specifically meant to increase the impact of national transport research programmes and strategies

To create a clear picture of the end-goals we are trying to achieve, in our perception, the options for transnational cooperation and mutual opening between national research programmes take several forms.

The main ones include:

1. Allowing national funding beneficiaries to use programme budgets to participate in transnational research or technology transfer projects
2. Utilising research capacity and expertise from other countries by allowing foreign experts to participate in the national programme (with or without funding)
3. Utilising research capacity and expertise from other countries by allowing participants to use foreign experts as subcontractors
4. Using programme budgets to support cross-border mobility or training of researchers
5. Using project evaluators from other countries
6. Allow participants to share information regarding national programmes cooperation opportunities via the National Contact Points network

In order to achieve the above-mentioned goals we have identified several recommendations to foster transnational cooperation in transport research. These are grouped into strategic level, programme level and operational level recommendations.

- STRATEGIC LEVEL -

Implement a specific strategic framework

The overall basic condition for seamless transnational cooperation in transport R&I is to have on a national level a dedicated strategic framework. This framework may be correlated or independent from the national R&I policies and although it is not mandatory, it does set up a favorable context to set specific transport research priorities and better identify national capacity and added value of cooperation. Based on the current experience at a national level, the strategic framework may be spun-off from the R&I national strategic framework or imported and adapted from other EU Member States.

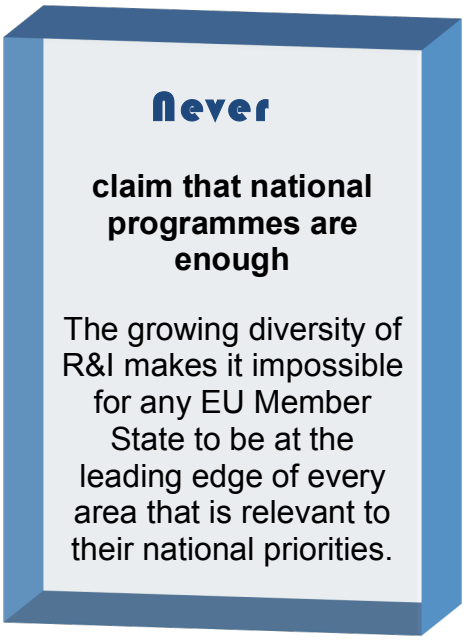
National strategic priorities should be complementary to, or synergistic with, EU or global objectives

Having a common understanding on what the global and EU transport R&I trends are should serve as a benchmark for setting national objectives. This would ensure that "desired" capacity would be built and potentially exported or that missing capacity is identified and compensated through transnational cooperation. This basic recommendation is a key step in addressing the fragmentation in transport research. Additionally, the basic cooperation and coordination of national R&I strategic objectives would enable subsequent funding programmes to address issues they could not solve alone. Ultimately, transnational cooperation would transcend a simple compensation mechanism, in which states would just export needed know-how and import missing know-how. Ideally, national frameworks would take the form of fully integrated cooperation mechanism with joint policies, joint programmes and joint research teams.

- PROGRAMME LEVEL -

Create programmes that specifically allow transnational cooperation (funded or unfunded)

National funding schemes should allow or encourage the use of programme funds for transnational activities. Having rules that prevent spending on even basic activities such as international networking, prevent any transnational activity from ever taking place. If any such rules or restrictive eligibility criteria are in place, a good place to for change may start with using foreign subcontractors and allowing self-funded partners. This would allow engagement in transnational cooperation activities, which do not change substantially the funding flow while convincing programme managers that transnational activity is worthwhile. The subcontracting option is clearly being used to overcome this barrier in some of the more open programmes while the adoption of training & mobility activities and participation in European multilateral framework programmes are often a politically acceptable introductory mechanism.



Include selection criteria that encourage cooperation

Since no explicit selection criteria that encourage transnational activity are in place, most likely, programme beneficiaries will take the path of least resistance and will just resort to their usual national contacts to form consortiums. This barrier is particularly prevalent in industrialised economies, where there is less need to cooperate due to comprehensive research infrastructures. Many programmes that would just allow applications related to transnational projects while not being backed by the selection criteria may discriminate against them because of the intense competition for funding. This can sometimes also be a problem in smaller economies where a protectionist policy leads to low quality results and a lack of competitiveness in EU R&I markets.

The programme should be designed to address more than country-specific issues

Starting from the assumption that it is rather unusual for any transport R&I programme to be truly country-specific, the recommendation here is probably more about awareness than opportunity. Some national programmes base national priorities on related economic structure, industry clusters, scientific strengths and weaknesses. However, as our barrier inventory has shown, in practice, there are very few issues in transport R&I programmes that are unique to a country alone. Still, even today, awareness that sharing intellectual property, knowledge and strategies with other countries has significant added value, is still not as widespread as desired.

- OPERATIONAL LEVEL -

Changing the legal framework to allow payments to non-residents

Try to forget

that change is unnecessary

As long as the majority of governmental policies promote globalisation and reaching international markets, transnational cooperation in transport R&I should follow suite.

The relatively high prevalence of cases in which non-residents are not eligible to be financed from national sources leads to obvious hesitation from the beneficiaries' side to engage in transnational cooperation. In many cases, allowing payments to non-residents does create additional problems such as twin financial regulatory systems in which the programme rules might collide with foreign national rules. These downsides are however relatively easy to overcome on EU level given some degrees of integration of financial rules and may also be solved by capping the budget for non-residents to keep cost spinning out of control. We recognize that, in some cases, programme managers could refuse to change these rules only due to the fact that there is no precedent or that national bodies may be restricted by their governance systems, the eligibility rules for some programmes being explicitly limited to national applicants. However, this recommendation may be implemented as a "pilot" for a limited number of grants and build on this experience.

However, researchers from other countries may be interested and able to cooperate, without being directly funded, as they may be able to be reimbursed by their own programme if that is open to transnational activities. Based on the principle of reciprocity, being engaged with partners from countries with "open" programmes may set the foundation for opening own national programmes. This is particularly true between countries with relatively similar scientific priorities or challenges.

Integrate transnational cooperation activities within the current policy maker/ programme manager

In countries where there is a more fragmented structure for research programmes there is a very clear separation between its national and international programmes. This makes it very difficult for national programme administrators in such countries to engage in international networking with their peers in other countries. Some of these issues were addressed by the ERA-NET Scheme, which has allowed a new degree of networking for the first time. However some financial administration systems are not designed to cope with non-national contracts and simply do not

It's wrong

to claim it's too much effort

Since industrial and scientific markets are trending towards internationalisation, it should encourage national programme managers to adapt their tools

have the necessary staff competence and capacity to cope with overseas contracts and foreign currencies. From this perspective, the integration might be a very lengthy process with questionable success. A simpler approach is to start with allowing international subcontracting by national research participants and deal build expertise of pan-European collaboration where there is limited to be had.

Summary of the process undertaken and some final remarks

The ETNA Plus project's aim is "to foster innovation in trans-national cooperation in Transport, with a focus on promoting the active participation of new actors and regions within in EU research calls and projects". One way to assist in this aim was to analyse Transport R&I strategies implemented in industrialised countries and how they augment or restrict transnational cooperation. This Guidebook is the result of that analysis, whereby we looked at transport R&I strategies within some industrialised EU Member States and Associated Countries, and some non-EU countries, so as to see what good practice is evident, what barriers exist and what can be learned from these for those EU countries aiming to develop their own efforts through transnational cooperation in Transport R&I.

In summary: We analysed 17 countries, revealed 27 issues, from which 10 barriers to transnational cooperation in transport R&I have been identified. We have clarified what we mean by transnational cooperation in transport R&I, illustrated some current and relevant barriers to it, noted some good practice examples and made some recommendations – at strategic, programme and operational levels - which should give 'food for thought' to those seeking to increase transnational cooperation.

Some final thoughts if you are a seeking to become a partner to a transnational cooperation effort[4]:

Preparing strategically for transnational cooperation:

- Assess your own R&I capacity, capabilities and specialisms.
- Assess and ensure your legal and financial frameworks are in place, ready to work with partners from one or more countries other than your own.
- Assess the risk of / opportunities for accessing new or emerging markets – in other words, if the R&I ends up with a positive outcome, you should have a plan in mind to exploit it!
- Look to see if there are government incentives to assist your future cooperative efforts – as example, some assist small businesses to engage in R&I programmes designed to develop transnational cooperation through tools such as IPR support, creation and protection, links to R&I-rich universities and adaptable business-tax systems
- Have a framework in mind for evaluating the effectiveness of the cooperation, so you can continue to learn from experiences.
- Plan for the short and medium term, with an eye on long term cooperation aims – just as you would with any forward thinking business plan.

[4] Reference: "Enhancing and focusing EU international cooperation in research and Innovation: A strategic approach" COM (2012) 497 final.

- Take advantage of existing European Union (EU) funded programmes that support transnational cooperation. There are opportunities to support researcher development, mobility and exchange of knowledge, including; Marie Sklodowska Curie Awards, ERASMUS, COST, EUREKA.

When the opportunity for transnational cooperation presents itself:

- Be clear about the goals of the work to be conducted; focus on specific elements to add value to the cooperative effort. This could include intellectual property rights, so be aware of the basics.
- Make the effort to engage with other countries, and present yourself and/or your organisation to potential partners in the frame of the European Research Area (ERA) aims (please see Annex 1 for an overview).
- Target your cooperation activities to optimise scale and scope of impact; for example take cognisance of the different country groupings you could be working with. There will be partners from countries that are already aligned with ERA objectives, those from countries with emerging economies aiming to increase their competitiveness, and potentially some from countries that are still developing and seeking to build partnerships to contribute to the sustainable development of their country. Interactions with each will likely require different approaches.
- At the micro level, be aware of any employees you put forward to work in transnational cooperation efforts on behalf of yourself and/or your organisation. Try to surround yourself with people who are personable, solutions focused, curious, creative and dynamic, and above all committed to helping the 'team effort'.

Above all, enjoy the journey!

Annex 1: Definition of terms used throughout this Guide

- **Cooperation**

Cooperation is defined as "the action or process of working together to the same end". EU Cooperation is thus defined as cross-border cooperation between 2 or more EU Member and/or Associated States, but may also include cooperation by EU states with international partners

From www.ec.europa.eu/regional_policy/cooperate/index_en.cfm; "European (Territorial) Cooperation is central to the construction of a common European space, and a cornerstone of European integration. It has clear European added value: helping to ensure that borders are not barriers, bringing Europeans closer together, helping to solve common problems, facilitating the sharing of ideas and assets, and encouraging strategic work towards common goals."

- **European Research Area (ERA)**

The ERA is a concept of the EU, comprising all research and development activities, programmes and policies within Europe with a trans-national perspective. It aims to enhance the coordination between Member States and the EC regarding research, development and innovation measures at programme and project level. The ERA has 5 priorities:

1. More effective national research systems
2. Optimal trans-national cooperation and competition
3. An open labour market for researchers
4. Gender equality and gender mainstreaming in research
5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA.

- **Industrialised country**

An industrialised country is one where industrial development has occurred on a large scale. For the purposes of this work, industrialised countries have been selected from the United Nation's Development Programme – Human Development Index (HDI), both for EU and non-EU countries.

- **Transnational**

In its most literal sense, this means to reach beyond or transcend national boundaries, relating to or involving several nations or nationalities.

- **Transport policy**

"Transport policy" deals with the development of a set of ideas/propositions to achieve particular objectives relating to social, economic and environmental development, and the function and performance of the transport system. Governments are often the most involved in the transport policy process since they either own or manage many components of transport systems.

"Transport planning" deals with the preparation and implementation of actions designed to address specific problems.

"Policy actions" are interpreted in this context as actions arising from the creation/ modification of transport policy and the corresponding planning for improvement to transport infrastructure, vehicles, systems and safety, based upon the policy.

- **Transport research and innovation**

This may be defined as research works and industrial innovations - conducted by universities, research institutes, companies, practitioners, and public authorities – within the context of the transport modes of road, rail, aerospace and waterborne. Transport research topics include, for example, challenges in transport and mobility of people and goods, with respect to energy, environment, safety and security and socio-economic issues. The innovation element here is making changes to that which is already established, by bringing together various novel ideas/innovators in a way that results in introducing something better (and, as a consequence, new).

- **Transport Strategy**

This is referred to here as a top-level plan, bringing together ideas, skills/expertise and resources with the aim of achieving specific transport-related objectives and aims, often in the face of adversity such as a resource-limited environment. A strategy needs to initially to be formulated and agreed, then translated into action plans by associated policy actions (as above).

Annex 2: Questionnaire "Mapping the barriers to transnational cooperation in Transport R&I"

Barrier short description	
**1-2 paragraphs on the barrier's definition*	
Area of effect	*Policy / programme level / other level (please specify)*
Scope	*Transnational cooperation / transport policy implementation, transport programme implementation, transport policy elaboration, participation of stakeholders / other*
Transport mode	*Road/ Rail/ Air/ Waterborne/ Overall*
Type	*Full stop barrier (specifically disallowing transnational cooperation) / efficiency barrier (classical sense barrier where the opportunity cost is higher than*

	current option)
Impact	
** 2-5 paragraphs on the impact of the barrier. How does it manifest and how it disrupts "normal" stakeholders and/or elements of cooperation*	
Quick solution recommendations	1. 2. 3.

Please return your completed questionnaire(s) to belinda.fairbairn@ncl.ac.uk and bogdan.cernat@ancs.ro. Thank you for your input.