

Executive Summary:

DETRA - Developing the European Transport Research Alliance
Summary for the full period, M1-28, 1 June 2010 - 30 September 2012

Developing the European Transport Research Alliance (DETRA) was a strategic project between key transport research organisations to make an analysis of the state of the European Research Area (ERA) development within the transport domain. The concept of DETRA derived from the 2008 Lyon Declaration whereby the signatories, ECTRI, FERSI, FEHRL, EURNEX, HUMANIST, ISN and NEARCTIS, committed themselves to work together on the deepening of the European Research Area (ERA) objectives in transport, in order to address the Grand Challenges. From this commitment, the objective grew to create the European Transport Research Alliance (ETRA) that would strengthen the transport domain. The key priorities of this Alliance would be to examine the strengths, weaknesses, opportunities and threats (SWOT) in the domain and develop a common understanding and approach to reduce fragmentation and overcome barriers.

The results of the DETRA project have been based on consultations and inputs from main stakeholders and experts to provide a series of key deliverables setting out the current situation, the identified barriers and recommendations for the next generation of the Transport ERA (ERA-T). Each of the six key ERA themes was examined in detail:

- "Mobility for researchers" examined how to develop a new generation of transport researchers in Europe, increase their skills, improve their employability and favour their trans-national mobility in a multicultural and multidisciplinary context. This included the analysis of actions conducted in Europe regarding training and mobility in the transport domain and subsequent recommendations for improvements that will help in the shaping of future EC programmes in this domain. More specifically actions included the design of a European PhD in transport, organisation of an "ad hoc" training programme and setting up a dedicated mobility web portal in transport research.

- "World-class transport Research Infrastructures" built on previous work undertaken in projects such as TREE (Transport Research Equipments in Europe). The task analysed European and international RIs, future demands and missing gaps and opportunities. Recommendations were developed for four research infrastructures.

- "Strengthening research institutions" focused on how transport research organisations have already adapted to the ERA objectives and the actions still to be taken to develop excellent research organisations (scientific excellence, relevance excellence, governance excellence) providing high quality services for the Knowledge Triangle (research, education, innovation).

- "Sharing knowledge" examined how knowledge is currently shared between public research organisations and industry in the transport sector and with the general public and civil society organisations. This included the processes for sharing and the institutional bottlenecks. The role of standardisation as both a barrier and enabler was considered and recommendations for sharing knowledge produced.

- "Optimising research programmes and identifying priorities" benchmarked relevant transport-related research programme roadmaps on national, European and international levels and, in conjunction with key stakeholder representatives, presented a joint research programme for pan-European adoption and its key priorities. The optimisation of

research programmes and priorities considered the instruments fitting with the various stakes of the knowledge triangle.

- "International cooperation" examined the overall status of the ERA for international transport research. The scope, status and success of international transport research cooperation were examined. The task defined the barriers and constraints, best practices and perspectives in the context of the future ERA. Finally recommendations for ERA supporting world-class research within international transport research cooperation and prioritisation of mutually-agreed research topics.

Project Context and Objectives:

Developing the European Transport Research Alliance (DETRA) was a project between key transport research organisations to make an analysis of the state of the European Research Area (ERA) development within the transport domain, the ERA-T.

The DETRA project has provided a detailed examination of the current status and structure of transport research, bringing together the competences of all the partners together with their networks and associated links to provide the most comprehensive assessment of all the aforementioned aspects of ERA development. The project has also set out and begun implementation of the next steps in developing a European Transport Research Alliance (ETRA). Building on their roles in the relevant ETPs and links with ERA-NET Transport and ERA-NET ROAD, DETRA partners have promoted the strengthening of research governance towards the joining of forces between the existing Transport ETPs, which when achieved would be a concrete realisation of many of the main elements of an ERA-T.

Activities to building the ERA-T

To build the ERA-T and associated transport research programmes, the "Ljubljana process" is recognised as critical by the DETRA partners. This ERA concept combines a European "internal market" for research, where researchers, technology and knowledge freely circulate with the effective pan-European coordination of national and regional research activities, programmes and policies together with initiatives implemented and funded at European level.

In the spirit of this objective, the DETRA partners have been working along the following ERA themes:

a) Creating the adequate flow of competent researchers with high levels of mobility between institutions, disciplines and sectors. Some substantive progress has been achieved through various initiatives and DETRA aimed to determine how this can be enhanced. One important focus was on recommendations for a European PhD in Transport and strengthening the activities associated with the People programme in, and for the benefit of, the transport domain.

The main scope of the "Mobility for researchers" task was to build up a new generation of transport researchers in the EU and its Associated States, increase their skills, improve their employability and favour their transnational mobility in a multicultural and multidisciplinary context. Work done included the analyses of actions conducted in Europe regarding training and mobility in the transport domain in order to make some recommendations to get them improved and help in the shaping of the future EC programmes in this domain. It also included some initiatives to converge towards a joint action plan, and some methods and tools to improve training and mobility in the transport domain (design of a European PhD in transport, organisation of an "ad hoc" training programme, and setting up of a dedicated mobility web portal in transport).

b) Establishing world-class RIs that are integrated, networked and accessible to research teams from across Europe and the world. This aspect includes not only individual 'hard' RIs such as civil engineering laboratories facilities, as well as the networks of electronic

communication infrastructures that will link geographically-dispersed facilities with each other and with researchers, but also the soft infrastructures based on databases and libraries. The DETRA partners have considered not only the technical requirements for facilities that will be required to address the still emerging issues related to, for example, climate change adaptation, but also the issues of improving the coordination of RI management and means of access to reduce fragmentation.

"World-class transport RIs" built on previous work undertaken in the TREE (Transport Research Equipments in Europe), TRANSFORUM (Scientific forum on transport forecast validation and policy assessment) and other projects. Topics analysed include European RIs, international RIs, future demands and missing gaps and opportunities. The opportunities that exist to develop the RIs needed for strengthening the ERA of today and the challenges and opportunities faced by transport for the future were investigated.

c) Developing excellent research institutions and communities that include engagement with effective public-private cooperation and partnerships.

"Strengthening research institutions" focused on how research organisations have already adapted to the ERA objectives and the actions still to be taken to become mid-21st century excellent research organisations (scientific excellence, relevance excellence, governance excellence) providing high quality services for the Knowledge Triangle (research, education, innovation).

d) Developing effective knowledge-sharing between policy makers, public and private research, industry and society through their links with industry and notably through their roles in many European Technology Platforms (ETPs). "Sharing knowledge" examined how knowledge is currently shared between public research organisations and industry in the transport sector and with the general public and civil society organisations. This included the processes for sharing and the institutional bottlenecks. The role of standardisation as both a barrier and enabler was considered in the different modes and sectors of the transport community. Recommendations for sharing knowledge in the future have been produced.

e) Promoting international cooperation is a core concept for the DETRA partners. The opening of the ERA to the world is a key aspect for raising the level of scientific expertise, addressing global challenges and creating a more dynamic and competitive sector.

"International cooperation" examined the overall status of the ERA for international transport research with reference to previous Framework Programme projects like "Contributions to a European Rail Research Area (CETRRA)" and "Stimulating Research with International Cooperation Partner Countries and EU Neighbouring Regions" (SIMBA and SIMBA II).

The main tasks included:

- Evaluating the scope, status and success so far of international transport research cooperation
- Defining the barriers and constraints, best practices and perspectives in the context of the future ERA

- Recommending improvements to ERA supporting world-class research within international transport research cooperation and prioritisation of mutually-agreed research topics

f) Finally, a significant emphasis has been placed on well-coordinated research programmes and priorities, including jointly-programmed public research at European level involving common priorities, coordinated implementation and joint evaluation.

The objective of "Optimising research programmes and identifying priorities" was to study and benchmark all transport-related research programme roadmaps on national, European and international levels and, in conjunction with all key stakeholder representatives, result in a joint research programme for pan-European adoption and its key priorities. The optimisation of research programmes and identification of priorities recommends type of instruments fitting with the various stakes of the knowledge triangle.

It was clearly recognised that each of the ERA themes needed to be examined in detail, but, reflecting the need for greater integration between each element, the main project outputs have focused on more cross-cutting aspects. For this reason, a working structure was organised that reflected each ERA theme. These were then integrated transversally into the major DETRA outputs covering the main strategic issues to be addressed in shaping a coherent ERA-T programme to 2020.

Project Results:

The results of the DETRA project have evaluated progress towards the realisation of the ERA in the transport sector. It has identified the SWOT of, and to, research in this domain. Aspects evaluated include the specific barriers impeding the realisation of ERA in the fields of Mobility for researchers; World-class transport RIs; Strengthening research institutions; Sharing knowledge; Optimising research programmes and identifying priorities, and International cooperation. Recommendations given below in each of these areas consider the opportunities to overcome fragmentation. One immediate impact of this project is the reduction in the fragmentation of effort between the different transport research organisations involved in the project. This provides a sound basis for the strengthening of the ETRA, which will in turn strengthen ERA progress.

1. Mobility for researchers

Mobility of researchers through the Marie Curie and European partnerships is absolutely critical for "passing the ball" around and between the European transport research team. This will improve the interaction between frontiers and focused scientific knowledge. The training and education of a new generation of scientists, engineers and technical staff is important for academia, industry and policy-making institutions, but a key challenge is the creation of a new generation of professionals linked to the evolution of the transport system.

DETRA partners set out to define activities related to mobility and training in transport at a European level to prepare and train the next generation of surface transport scientists and professionals. This included identifying currently-implemented actions pertaining to researchers' training and mobility and analysing existing European projects related to these topics.

Analysis of existing European actions and recommendations for improvements

Results of this analysis highlighted weaknesses, such as the lack of information about projects that favour researchers' mobility. This could be corrected by implementing the EURAXESS platform, which should collect and advertise all European researcher positions. Within the transport field, this could also be solved by using the dedicated "Mobility web portal in transport" set up at <http://www.transport-research-job-careers.eu> by the DETRA project. This portal aims to gather PhD, post-doctoral and researcher positions from organisations that are members of the seven European entities of DETRA. In a second step it aims to advertise job offers to European universities, research laboratories, and enterprises working in the transport area.

Other projects, such as European Council of Doctoral Candidates and Junior Researchers (Eurodoc), have recorded some concrete hindrances to mobility and suggested some possible solutions. The DETRA project has tried to go further by analysing what went wrong and envisaged a lack of systemic approach in European mobility and training projects both at proposal stage level and project implementation. The lack of a common and shared approach in defining what is a "mobility and training project" and which outcome can be expected to be a hot topic. The EU must face this topic if it wants to build a new generation of researchers.

Europe needs to adopt coordinated schemes requiring indicators to measure the "growth" of researchers within each project. Considering the

importance attributed to researchers' mobility by the European Charter for Researchers, it could be useful to introduce among the parameters of European project evaluation a specific entry that considers positively the projects that provide some forms of mobility. A good example is found in the COST programme, where the evaluation of the proposal at both stages (pre-proposal and full proposal) provides specific criteria devoted to measuring the presence, participation and plans for further involvement of young researchers. One additional recommended action could be to ask for real feedback on the above initiatives, as well as a follow-up to be provided from the funding agencies.

A real policy for young researchers is still far from being satisfactory and at this point some good practices and examples should be supported by the EC. In particular, two good practices have been identified by this research. The first successful practices are the training sessions provided by the ECTRI-FEHL-FERSI Young Researchers Seminar, where young researchers are supported and followed by senior experts (tutors) as they write high-level scientific papers and present them to expert audiences. The second practice is the organization of "brainstorming activities" (workshops) in which young researchers are asked to deliver specific outcomes on defined topics, in order to strengthen their ability to work together and interact on complex themes, covering various aspects and involving several areas of expertise.

"Mobility for Researchers" also included some methods and tools to improve training and mobility in transport domain (the design of a European PhD in Transport, and the organisation of an "ad hoc" training programme).

Design of a European PhD in Transport

First of all, a list of the following relevant European stakeholders working in transport research and training to be involved in the PhD design was drawn up:

1. Universities in charge of PhD programmes and providing high level courses
2. Research centres that host PhD students, allowing them to work actively in the research field
3. Network of Excellences (NoE) that encourage the training and mobility of researchers
4. Industries interested in capitalising on the researcher's results and suggesting which knowledge is important for their needs

Questionnaires on mobility and training and PhD activities were sent out to these stakeholders and the results have shown a high interest towards a profile of researchers. In fact, the majority wants to be actively involved in training students and is keen to recruit "European Doctor in Transport" graduates. Very few institutions are not interested in this new profile.

The proposed format of the European PhD is not far from current practices, requiring at least the master degree to enter the PhD course through an admission process based on a selection with an oral examination. The length should be from three to four years with a variety in the credits to get, where 180 seem a reasonable choice. The focus of the PhD period should be mainly (greater than 70%) on the research activities with less time devoted to the training. A period abroad of at least three months should be provided, and an internship in an enterprise

or research centre dealing with the student's research matter is welcomed by most of all respondents.

The training programme should aim at developing the following main points:

- Acquisition of knowledge from the basic disciplines such as mathematics or statistics to tackle the complexity and to manage a complex system
- Acquisition of a specific and high-level knowledge through specialist courses at the doctoral level on the topics covered by the transport disciplines

The courses on data analysis, research methodology and epistemology, literature search methods, descriptive statistics and multivariate statistics, seem to be crucial as preparatory courses for this programme. This is because transport-related courses tend to focus on transport modelling, transport planning and transport economics. One important aspect to add to the PhD students training is the acquisition of experience in project management through the development of:

- Leadership capability, working in teams and the capability to integrate specific knowledge in a common framework
- The ability to manage discussions mediating several and contrasting points of view, to resolve conflicts and find good compromise solutions
- The ability to communicate and capacity to dialogue with the stakeholders and understand their point of view, translating it into a problem to solve

The training should provide a common vision and framework in transport research to face the current and future needs of the decision-making process in the transport sector that must be dynamic and ever changing to keep pace either with technological, societal or individual developments.

The annual advancement check of the students is considered to be very important and should be mainly assigned to the tutor/supervisor, while for the final defence the external supervisor is preferred. This final defence should include a written dissertation and an oral defence of the dissertation, most likely to be in English. The structure of the examiners board should include at least one member of another European country.

The most preferred format of the PhD follows some of the current guidelines. A standardisation in all EU countries of such a format could create some problems in the countries where there is a strict legislation, providing precise rules to manage the PhD. In the case where the regulation is in the hands of autonomous universities (such as in the UK), the eventual constraints could be different in respect to the proposed format. Of course, the ETRA could be the right "vehicle" to drive the partners towards a common objective, create a new generation of young researchers able to move across different countries without having problems related to different legislation or procedures. This would be also in line with the work already done at Bachelor and Master level with the Bologna process and this proposal could streamline the process at PhD level.

2. World-class transport RIs

World-class European RIs are critical for the transport sector, not only for opening new frontier knowledge but also for preparing the answer to the political and/or societal challenges and addressing competitiveness issues. The types of investments here include new hard RIs as well as new

soft RIs, particularly new databases from demonstrations, Field Operational Tests (FOTs) or scientifically adapted to the new challenges.

DETRA partners are convinced of the need to improve or create all the required RIs, hard and soft, and increase the research capacities complementary to the European Strategy Forum on Research Infrastructures (ESFRI) agenda. This issue is critical for the roadmap and implementation phase of the ERA Vision 2020 in the field of transport because of the international competitive advantages that it would offer transport European research.

The DETRA project identified ways to better utilise existing RIs in the transport sector by improving the network. This will increase and facilitate knowledge exchange amongst the scientists and experts working with these RIs. Actions that can be taken to facilitate networking include:

- Utilising the RI online catalogue developed as part of the DETRA project. The online catalogue (see <http://detra.fehrl.org/facilities> online) aims to provide an up-to-date overview of existing world-class RIs, both in Europe and internationally. It is also a tool for identifying missing RIs to address current and future needs
- Building a forum for knowledge sharing. It is recommended that it be built by already established organisations such as ECTRI, EURNEX and FEHRL. Creating common seminars/workshops focusing on topics related to the use of RIs could be one option. Establishing a common COST project that deals with specific topics could be another possibility

Apart from fully maximising the usage of existing RIs, there is a need for additional new common world-class RIs within Europe which can be summarised as follows:

1. To solve the common future challenges, e.g. climate change, globalisation, demographic changes, need for efficient transport and limited resources. The RIs will also be key drivers for innovation, knowledge exchange, research development and the economy
2. Financing of world-class RI is a key issue, and to be able to realise the necessary RIs it is important that the transport sector applies a new common strategy that focuses on a coordinated approach with cooperation between countries/researcher, open access RI and a common roadmap, contrary to the status quo which is fragmented and focuses predominantly on the local needs of each country
3. The need to facilitate strategic international cooperation for complex critical global RIs, ensuring their global access and interoperability with added value for the money spent

Within the DETRA project, four new RIs have been identified of great relevance to solving the future challenges in a coordinated approach. They are:

1. Naturalistic Road User Behaviour Centre
2. European Multi-modal Traffic (EMT) model
3. Resource Centre for European Transport Infrastructure Construction (ETIC) and performance data
4. European Road Infrastructure Testing (ERIT) facility

As highlighted in the separate DETRA report entitled "Transport Research Infrastructure Roadmap", two different roadmaps were outlined to implement these RIs.

1st Roadmap - ESFRI route

ESFRI produces and continuously updates a European roadmap on RI. Until now, transport-related RI does not appear in the ESFRI roadmap. A concerted effort should be made to ensure that large RIs associated with the transport sector form part of the ESFRI landscape. In order to achieve this, the following steps would be required:

I. National research centres and universities, in association with national transport authorities, should initiate national dialogue on the need for major national transport-related RI to address current, emerging and future transport needs and initiate the drafting of strong motivations for these. Institutional actors such as CEDR, FEHRL, ECTRI and others for coordination at European level could also be used to initiate the process. National representatives on ESFRI should also be involved. The end goal is to ensure that transport-related RI features on national roadmaps.

II. The drafting of ESFRI proposals for transport-related RI, derived from national and/or sectorial roadmaps, and subsequent endorsement of these proposals by an ESFRI delegation and/or by a Council of an EIROForum member organisation before submitting to the ESFRI Executive Board.

III. Upon approval by the ESFRI Executive Board that the proposal can be subjected to the ESFRI review process, a Thematic Working Group would then be constituted and tasked to take the process further. It is essential that the champions for the proposal(s) submitted to ESFRI form part of this Working Group. This Working Group would be responsible for scanning the long-term scientific landscape in the field and assessing the scientific case as well as the technological and financial feasibility.

IV. If the outcomes of the Working Group are positive and endorsed by ESFRI, the RI would be listed on the ESFRI roadmap, which will certainly assist with the implementation of the RI. This, however, is not the end of the road, but rather the beginning of the implementation phase, which could be quite cumbersome (detailed design, including e-infrastructures; location of the RI, whether it is a single site or a distributed entity; establishment costs and financial sustainability; governance and administration; etc.).

2nd Roadmap - 'informal' implementation

Other options for the implementation of new RIs should also be considered. One such option is to work through national structures and bodies such as CEDR and use the ERA NETs (ERA NET ROAD or ERA NET TRANSPORT) for the implementation of new RIs. Pooled funding could be raised for the development of concept documents and master plans for the implementation of ERA RI in the field of transportation, as well as for the financing of the implementation itself. The advantage of this approach is that the ERA NET member countries that agreed to sponsor the concept documents and master plans could essentially be the same countries that support the implementation of the proposed RI.

To succeed in sourcing financing for new large-scale RIs within the transport sector, it is essential that the transport sector first agree on the needs and prioritise the required RIs accordingly. A coordinated action including all transport modes are a key to success. Based on the results from the DETRA project, it should be possible to finalise such a statement and use this to approach ESFRI as well as other bodies.

A number of constraints are usually highlighted as reasons for not cooperating around RIs, but these are mainly the same issues dealt with

in most research and development projects. Hence, it should not be too difficult to set out the rules for how these issues should be handled.

The recommendation is that the next steps be taken to establish both increased networking around existing RI as well as to develop new common RIs. In both cases, the first step, based on the results from DETRA, is to formulate a common view on the needs of RI (the why), the anticipated impacts (the results), the means of cooperation (the how) and finally the prioritised RI (the which). If these short summarised statements could be agreed upon by the transport sector (not only by a single mode), there will be a great potential to actually create the RI in the transport sector that could form the backbone of a strong ERA.

3. Strengthening research institutions

"Strengthening research institutions" focused on how research organisations in the different modes of transport have already adapted to ERA objectives and defines actions to become excellent research organisations (scientific excellence, relevance excellence, governance excellence) that provide high-quality world-class services by the middle of the 21st century.

Identifying how research institutions have already realised policies for overcoming fragmentation and integrating transport sector research in the ERA is an important issue for strengthening European research institutions. This first activity was followed by the identification of barriers causing weaknesses and/or characteristics that successfully contribute to strengthening research institutions. The resulting recommendations are based on the outcomes of workshops, previous work and discussion within the group and concerned stakeholders. Recommendations are accompanied by lead criteria and trends that permit a regular assessment of progress.

The strengthening of research institutions is connected with the development and improvement of institutions in providing skills, competences and key enabling technologies. Therefore the development of Joint Research Initiatives (JRI), Joint Technology Initiatives (JTI) and Supportive Actions to foster skills, competences and key enabling technologies to strengthen research organisations and institutions for a more competitive industrial base make up a main recommendation of "Strengthening research institutions".

The general recommendations to strengthen research institutions within an ERA network as a world-class player are strongly linked to the commitment to invest in research, a European scheme that drives national policy makers to invest in ERA (e.g. matching funds initiatives) and engagement in international cooperation which will result in the participation in European projects, JRIs and the networking of international clusters.

Recommendations for strengthening research institutions lead to the following action points for European and national policy makers:

- Strengthening cohesion, knowledge sharing, scientific knowledge excellence, innovative scientific/industrial research base by fostering frontier to focused/applied research to demonstration and prototyping through the development of JRI and Joint Programmes of Activity (JPAs)
- Actions to foster skills
- Joint programming should be further encouraged and expanded as a first step, with the:

- Setting of common work programme content (avoiding overlapping etc) throughout the ERA
- Common financing mechanisms and funds
- Simplification of administrative procedures based on the principle that "rules are abided" until one organisation is proved (through ex post auditing) wrong
- Greater involvement of DG MOVE in specifying transport research tasks jointly with DG RTD and INFSO in order to include more policy-related research in the programme
- Concerning the NoE's, the EC should assess on a case by case basis whether past achievements, potential, EU added value and prospects of self sustainability justify further funding under Seventh Framework Programme (FP7). To foster an innovative step change character of research institutions by preparatory research led by academia/research institutions with roadmaps defined by industries
- Use of existing instruments like CSA to strengthen self-standing NoE entities and launch a competitive call where these NoE's/VCE's get support for moving further towards integration and ERA deepening/completion
- Inside the institution, the capitalisation of the experience of NoE draws on the fact that new research governance and management is part of the excellence as the relevance for our customers (public bodies, society, and industry)
- Outside the institution, besides the EIT and to accompany the research reforms including articulation between frontier and focused research there is a need to reinforce the research organisations (research corner of the Knowledge Triangle) as stated in the Lund Declaration
- Strengthening institutions through consolidation of networks, projects and infrastructures towards capacity building or research programmes

4. Sharing knowledge

Knowledge sharing and dissemination of research results is a vital part of the strategy of transport research organisation. Objectives of the process are to support international cooperation, help their members to increase their efficiency and promote their role as a key player in the European transport sector.

The work conducted in the DETRA project examined the processes followed by the transport research organisations such as ECTRI, EURNEX, FEHRL, HUMANIST, ISN and NEARCTIS for sharing knowledge in terms of strategies and actions. Analysis has also been conducted to identify the barriers and bottlenecks causing weaknesses of this process and preventing successful exchange of knowledge internally and externally toward other research organisations, industries in the transport sector and with the general public and civil society organisations.

Organisations have recognised that knowledge constitutes a valuable intangible asset for creating and sustaining competitive advantage. As one goal of knowledge transfer and exchange efforts is to influence decision-making processes, the knowledge that is produced and exchanged help organisations to make well-informed decisions about the various policies, programmes and projects in which they are involved.

The analysis has shown that knowledge sharing strategy is guided by the following theoretical principles:

- To reach the right people through their preferred channels
- To provide clear, relevant, accessible, on-time and "labelled" information

- To be open and honest at all the times
- To communicate in a cost-effective and sustainable way

Detailed analysis of the knowledge sharing and dissemination strategies followed by the DETRA partners showed this strategy is two-fold with internal and external communication activities.

1. Internal communication

A means of recognition and motivation

A means to improve the feeling of membership

A way to allow the members to communicate/exchange through well defined processes

2. External communication

To better inform the external world on activities developed by the transport research organisation

To promote the transport research organisation's achievements to key opinion formers at European and national level

To increase and promote the perception of the transport research organisation

To develop transport research organisation's opportunities

To foster the visibility of the transport research community

Several main issues have been identified for optimised knowledge sharing:

- Determining the target audience: tailoring the knowledge transfer and exchange strategy to the audience's needs, knowledge, and the sorts of practices they face on a daily basis is critical in an effective knowledge transfer and exchange activity
- Defining the type and the presentation of the message: how research or any type of findings and information are packaged and presented impact how readily the knowledge is to put into practice
- Choosing the relevant media/tools to support the process of sharing knowledge: Collaborative Working Environment (CWE), Knowledge Management System (KM System), physical meeting versus electronic forum, connection with social networks are the various means and tools used to share and to exchange knowledge. Advantages and weaknesses of each of these modalities have been discussed

The work showed that knowledge-sharing activities are generally supported by technology, however this constitutes only one of the many factors that affect the sharing of knowledge in the transport research organisations; the other factors can be culture, trust, and incentives.

One prominent obstacle of sharing knowledge is the notion that knowledge is property and ownership, a major challenge encountered by organisations is resistance to sharing by some of their members. To counteract this, transport research organisations must overcome this weakness by reassuring their members that they will receive some type of incentive for what they create. The risk in knowledge sharing is that members believe they are rewarded for what they know, not what they share.

The work concluded that nobody really questions the necessity and the relevancy to share knowledge in the area of transport research. Nevertheless, the process of knowledge sharing is time- and cost-consuming, and in practice it requires a real effort, first of all to gather the information and secondly to make it easily accessible to whoever is interested.

A Stakeholders Forum workshop was organised to discuss the recommendations for sharing knowledge in the future with relevant external stakeholders. An example of positive experience in the field was provided by representatives of SETIS (see <http://setis.ec.europa.eu/online>), which is a system for sharing knowledge through the strategic energy technology information.

According to the main results of the work and based upon the workshop discussions, the following recommendations can be made:

- Supporting the growth of cooperation in research, accessibility and use of research results by increasing effort to support an effective process of knowledge sharing between the main key transport organisations
- Strengthening the position of key transport research organisations by improving knowledge sharing and dissemination of research results through incentive actions promoting dissemination benefits for each member
- Improving the process of sharing knowledge by supporting the development of electronic databases that gather knowledge from the various relevant transport research organisations
- Rewarding members for participating in sharing their knowledge for the benefit of the research organisations
- Promoting knowledge sharing and removing knowledge sharing obstacles to encourage discovery and innovation through the creation of an organisational culture among research transport organisations
- Fostering the setting up of common and/or compatible tools to manage the knowledge-sharing processes between the key European research transport organisations in order to sustain competitive advantage at an international level

Although implementation and knowledge transfer has been demonstrated among DETRA's partners as being a priority, the process can be improved upon in the framework of the ERA-T as one of the Grand Challenges. Most institutes indicate that both transfer of knowledge and subsequent implementation do not happen spontaneously and requires effort. The process can be stimulated with tools that increase the availability of research results and interest/involvement of fellow researchers. Indeed, through their links with industry and notably through their roles in many ETPs, DETRA partners are and will continue more heavily in the future to be engaged in developing effective knowledge-sharing between policy makers, public and private research, industry and society.

5. Optimising research programmes and identifying priorities

Within the context of the DETRA project, significant emphasis was placed on well-coordinated research programmes and priorities, including a jointly-programmed public research investment at European level involving common priorities, coordinated implementation and joint evaluation. This was the objective of "Optimising research programmes and identifying priorities". This goal was initially pursued by a survey on the existing research programmes and roadmaps developed in single European states at the EC level as well as internationally (e.g. in Japan, USA), related to all areas and modes of transport. The purpose of this process was to collect all the research priorities for each transport sub-area that concerned any existing or emerging gaps for any transport mode.

More than 60 such research priority recommendations and/or roadmaps were analysed, stemming from several types of organisations such as the ETPs (e.g. ERTRAC, ERRAC), research institutes associations (e.g. FERSI, ECTRI, FEHRL), industrial associations (e.g. EUCAR, CLEPA, ACEM) and citizen representative organisations (e.g. POLIS, FIA, FEMA). Special

emphasis was given to the EC roadmaps and documents, for example the "White Paper - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system" and the "Europe 2020 Flagship Initiative Innovation Union".

The collection of these materials was followed by the classification and categorisation each research document using a common template, according to the four major categories of transport designated at the beginning of the DETRA project (Safety and Security, Congestion and Capacity, Environment and Energy, Globalisation). In addition, this template helped the key elements of the documents to be analysed.

Research Priorities

Starting from these four key areas that constitute the backbone of the DETRA project, and according to the information collected by all the documents analysed, a list of research priorities has emerged that contains around 20 research areas and nearly 90 themes. This categorisation of transport research priorities concerns all transport modes (road, rail, maritime and aeronautics) and reflects their research needs. For each of these themes and modes, research priorities were extracted which reflect a balance between consensus topics among most stakeholders and emerging promising concepts and technologies proposed by some stakeholder groups. This is not THE ultimate set of research priorities in the surface transport domain for the future, but significant input towards it to be further discussed and used as a reference document by the relevant research platforms and EC services that will ultimately decide which of them to follow and under which time scales.

Transport Research Work Programmes and Roadmaps Database

The determination of Research Priorities also provided the structure of the "Transport Research Work Programmes and Roadmaps Database" which was developed for the collection, sorting and analysis of the research programmes and roadmaps.

The objective of this database was to provide a tool which will facilitate the detailed and clear presentation of all the relevant research documents. In this web-based tool (see <http://detra.fehrl.org/index.php?m=39> online), anyone can search for the documents that they are interested in, as well as suggest further documents regarding research priorities and roadmaps in transport.

Towards a Modular, Pan-European Transport Research Programme
The final outcome of this whole process, as mentioned above, is the development of a single trans-European Transport Research Roadmap containing all the relevant research priorities for each separate field of the transportation research area. A first draft of this document has already been prepared, presenting the main research priorities of the road transport area as far as the sectors of Safety and Security, Environment and Energy and Congestion and Capacity are concerned.

This first draft of the "Optimised pan-European Transport Research Work Programme, Roadmap and priorities" has been developed by the analysis of the various transport roadmaps and work programmes derived mainly from EU research and industry organisations. Based upon the benchmarking of database results, a set of commonalities and differences between the different transport research work programmes has initially been

structured. These commonalities and differences have been obtained relying on the research areas presented above.

More specifically, during the analysis of each document, emphasis was given to the research needs and priorities described in it, which were related to the different domains and sub-domains of the surface transport area. All these research needs and priorities were categorised according to the research area list defined in the DETRA project and, using this procedure, a set of commonalities were established that concern all the same or relevant needs and requirements that have been designated by the several different organisations as far as the fields of the whole surface transport domain is concerned.

The work concluded that transport research in Europe seems to be at a crossroads. Individual technologies (i.e. on ICT) have matured and vehicle/vessel construction has seen significant improvements in terms of safety and capacity. And although several mode-specific research topics exist, the common transport research trends are being formulated across the following axes:

- Environmental protection and security aspects have formulated the two highest recent priorities and will continue to dominate in the near future. Nevertheless, relevant technologies will have to be researched
- in combination to other key priorities, such as safety, capacity, accessibility and cost-efficiency
- Technologies to prioritise further research globally include electrification of transport, cooperative systems and application of new materials and micro/nano sensor technologies
- As key services to develop across modes, highlights are seamless traffic management, personalised info-mobility services and effective training of users and stakeholders
- The two major challenges for future research are the integration of transport services through seamless and integrated multimodal services (with "one stop shop" info and ticketing support), as well as pan-European wide interoperability (through de facto or de jure standardization)
- Harmonisation and standardisation research actions need to focus upon systems certification, accessibility of overall service chains to all citizen categories and communication/charging protocols and standards to enable ICT and alternative fuel technologies to gain rapid market penetration
- Evaluation related research is moving in all fields towards large-scale FOTs and naturalistic behaviour experiments.
- Europe is now the global leader in the maritime sector and in a good position in the road and rail areas. It is now time to exploit technological breakthroughs through large-scale integration, pan-European instantiation and application and ultimately standardisation and harmonisation; to derive to the set political aim of Europe becoming the leading player worldwide in the transportation domain

6. International Cooperation

Consultations and lessons learned from project partners and European and international research partners as well as stakeholders, ETPs and governmental organisations (US Department Of Transportation (DOT)/Federal Railroad Administration (FRA) Russian Federation etc.) resulted in the definition of good reasons, objectives and expected mutual benefits of international cooperation with suggested methods to maintain Europe's competitive edge. A common strategic and sustainable approach to increase the level of international cooperation mainly in the areas of global and

societal challenges and resulting specificities, while at the same time protecting common European interests, is essential to help provide long-term perspective to stay competitive, enter new markets and keep pace with developments taken place elsewhere.

International Cooperation and competition simultaneously ongoing can be known as "Coopetition" and are key aspects to raise the level of scientific excellence, addressing global challenges and creating a more dynamic and competitive sector.

"International Cooperation" built on previous work undertaken in the CETRRA, SIMBA 1, SIMBA 2 projects and considered the documentation of the "EU-US Transport Research Collaboration". The work consisted of three major tasks:

- Evaluation of the scope, status and success so far of international transport research cooperation
- Definition of barriers and constraints, best practice and perspectives in the context of the future ERA
- Recommendations on improvements to ERA supporting world-class research within international transport research cooperation and the prioritisation of mutually-agreed research topics

This work concluded that the current status of International Cooperation in science, technology and innovation (STI) has not yet reached an adequate level as identified in the objective of the EUROPE 2020 Innovation Union, while at the same time protecting common European interests. There are indications that Europe is losing its attractiveness as an international research partner and the steps the EU and Member States need to take to combat this are four-fold:

- Develop a common strategy and priorities for Research and Innovation (R&I) and international STI cooperation, in particular to tackle global societal challenges
- Make considerable effort in further information and intelligence gathering to conduct the strategic assessment of potential partners and identify possible mutual interest and synergies between target countries and European capacities
- Overcome the fragmentation of Europe's research landscape both within and across the transport modes
- Strengthen the excellence of Europe's research landscape, as well as knowledge sharing and added value for the money spent

Far from having one "national" identity, the EU and Member States must improve the following effective integrating mechanisms to facilitate cross-country collaboration:

- Education and training of the scientists and engineers of the future
- Dissemination material in local languages
- Following an international cooperation roadmap model, including the main enabling technologies with the support of policy makers and investments
- More emphasis on researcher mobility
- New culture of cooperation where researchers take on the main responsibility of starting to overcome fragmentation, foster knowledge sharing, harmonisation and standardisation
- New challenges of transcontinental transport projects such as the EU-Asia Land Bridge with a cooperation on a global level and need for strategic reflections and decisions of a higher order

Recommendations to improve ERA supporting world class research need to focus on a sound market analysis, benchmark and lessons learned concept, building critical mass and risk and revenue sharing for the global and societal challenges jointly to be solved. They also follow the central objective of the EC 'Horizon 2020' to achieve a transport system that is resource efficient, environmentally friendly and safe and seamless for the benefit of citizens, economy and society.

Main drivers for international cooperation in transport R&I are acknowledged to be:

- Global challenges, common problems
- Cross-border interoperability
- International standards and global systems
- Access to knowledge, access to markets

The EU transport policy objectives that tackle the global and societal challenges consider international cooperation as a strategic issue to be covered in a holistic approach, in areas covering all modes of transport and multimodality for:

- System operation including Systemic approach, multimodality and integrated system management
- Environmental and societal impacts of transport
- Environmentally friendly vehicles and energy sources
- Demand management and traveller information

Strategic and operational recommendations will together provide the groundwork and critical mass for the stakeholder and EU/partner countries to build the framework for successful international cooperation to lead to in concrete thematic issues.

Some of these functional and concrete specificities in the EU and cooperation partner countries, e.g. USA and Russia, have been identified in the areas of:

- Provision of resilient infrastructure (Forever Open Road (FOR) and FOR x 4 programme)
- Electrical vehicles (High-tech batteries, inductive charging)
- Further Integration of Transport Systems across and within modes
- Sustainable environmentally friendly transport systems with
 - USA-Europe interests and thematic issues e.g. HiRel High Speed Train/Infrastructure and Urban mobility
 - Russia-Europe interests and thematic issues e.g. Low maintenance infrastructure, Highspeed Rail for densely populated central areas/ industrial regions, resilience to adverse weather and EU/Asia Land Bridge

The overruling and stabilising criteria for successful International cooperation to run smoothly from research to market uptake will be the definition of mutually agreed needs, demands and challenges by the partners and other European stakeholders. This includes clearly defined objectives and principles for the collaboration of appropriate institutional structures and processes to be put in place and credible "champions" of a trustful partnership.

Potential Impact:

The impact of the DETRA project is expected to be long-lasting through its creation of the foundations for the European Transport Research Alliance (ETRA). The socio-economic contributions will be realised through the ETRA building on the specific outcomes of the DETRA project. These outcomes are referenced in the founding principles of the ETRA.

The main objective of ETRA is, to:

"work towards promoting further cooperation, coordination of activities, and common focus in European transport research provision, as part of the process and in full alignment with the objectives of creating the European Research Area in the field of Transport, i.e. the ERA-T".

The Alliance has defined also a number of other, more detailed, objectives which complement the above main one, creating a momentum for cooperation and providing value added to its partners. These, more detailed objectives, have been defined in the Terms of Reference signed by the founding members of ETRA as follows:

- a. Providing a structure for the interchange of knowledge and making joint efforts to foster research results through to their full implementation,
- b. Promoting the setting of joint transport research priorities and coordinating research programmes and initiatives,
- c. Promoting cooperation in all relevant areas and, where possible, developing cross-modal and interdisciplinary joint research activities (including JRIs),
- d. Preparing common position papers (e.g. SRA, road maps) on key transport related issues for added value to the transport users and the community as a whole,
- e. Joint strengthening of the European research expertise, research infrastructures and mobility of researchers through specific joint actions and initiatives,
- f. Promoting the uptake of European transport expertise and innovation internationally,
- g. Supporting the continued development of TRA as the major European and international conference bringing together all stakeholders in the sector,
- h. Other related initiatives as necessary (especially with regard to facilitating the cooperation and more resource efficient functioning of its partner Associations in their quest to provide their planned services to their members).

In fulfilling the above objectives and providing added value in the ways mentioned above, the ETRA is always complementing the work of its partner Associations.

In relation to its above purpose and in providing such value added, the ETRA's purpose and scope of activities can be further defined as:

- a. Facilitating the free and unimpeded flow of competent transport researchers and achieving high levels of mobility between institutions, disciplines, sectors and countries (this has also been long recognised by the Alliance partners as a key desirable objective).
- b. Facilitating the development of European world-class research infrastructures in the field of Transport that are integrated, networked and accessible to research teams from across Europe and the world.

- c. Facilitating the development of global "networked" research institutions and communities in the Transport sector that include engagement with effective public-private cooperation and partnerships able to participate fully and contribute to ERA-T proper functioning.
- d. Developing effective knowledge-sharing mechanisms and practices between policy makers, public and private research, industry and society towards developing a fully integrated and multimodal Transport system and achieving a fully integrated and cross-disciplinary European transport research establishment to support it.
- e. Promoting International cooperation as a core concept for the ERA-T i.e. the opening of the ERA-T to the world for raising the level of scientific expertise, addressing global challenges and creating a more dynamic and competitive European transport sector at global level.
- f. Finally, promoting well-coordinated and funded research programmes and priorities in the Transport sector, at European level and internationally, including jointly-programmed public transport research at European level, in order to solve not only technical problems and develop new technologies but also to face the evolving new priorities in meeting the grand societal challenges, achieve coordinated research implementation and joint evaluation, and other important horizontal issues.

Examples of "horizontal" research priorities that ETRA will try to promote, for more "societal value added" and which have been largely ignored in the past, are:

- i. Reduce the climate, air quality and noise impacts of transport;
- ii. Make transport infrastructure and transport systems more resilient to a changing climate;
- iii. Reduce energy consumption in the transport system and increase the security of supply;
- iv. Reduce transport system impacts on ground water supplies;
- v. Consider transport in the context of land-use planning;
- vi. Increase the effectiveness of transport necessary for food production (including in developing countries) and improve transport logistics to reduce food waste;
- vii. Improving safety and security, reducing traffic accidents fatalities and injuries;
- viii. Adapt transport and mobility systems for an ageing population;
- ix. Shape and maintain a transport system that reflects the needs of developing globalisation and help European transport system stakeholders to adapt accordingly.

The ETRA will work in full synergy with its partners. The essence of its creation and activities will not be towards creating and promoting totally new activities but rather towards forming the platform where existing ERA relevant activities from the Alliance partners are brought together and conducted in common. In doing so, the ETRA will try to help make more efficient use of the resources spent by common members in its partner Organisations.

Building on the above, as well as on the wider vision, scope and rationale of the Alliance, we can state that all the above activities that fall within ETRA' s scope of purpose will be promoted to the best possible extent within the frame of functioning of ETRA. Inevitably, however, and in this initial stage of ETRA's development, a smaller number of priorities have to be defined for ETRA's work in the immediate future, and these are the following:

1. Facilitating the development of world class and world research Infrastructures (RI). Such infrastructures include the:
 - "Hard" research infrastructures such as civil engineering laboratories facilities, large scale transport research infrastructures, and similar.
 - "Networks" of electronic communication infrastructures that will link geographically dispersed facilities with each other and with researchers, and
 - "Soft" infrastructures based on databases and libraries.

The particular role of the Alliance in respect to RIs is envisaged as:

- promoting harmonisation of technical requirements;
- promoting common use and utilisation of RIs by the European and world research community;
- facilitating the development of new RIs e.g. for addressing the new emerging global issues ;
- improving the coordination of management and means of access to RIs by the European and world research community;
- reducing fragmentation.

2. Facilitating the human resource improvement in the field of transport research and creating effective knowledge-sharing mechanisms and practices between policy makers, public and private research funders and the society. This would include a number of actions such as further supporting the mobility of transport researchers, the facilitation of job finding in transport research "without borders", training and education actions, and so on. A more detailed account of expected activities in this respect is given in ETRA's 4-year activity plan.

3. Promoting International (i.e. world) cooperation in transport research through contacting major international transport research Organisations and Associations across the globe and promoting common actions and cooperation on behalf of, and in coordination with, the ETRA partner Organisations. Examples of actions on that respect could be organising scanning tours, common workshops and Conferences, MoUs on specific issues, creation of common structures for international research cooperative work, etc.

4. Liaising and supporting the Commission and DG RTD in particular, on issues related to the promotion of ERA-T and promoting the principles of the Lyon declaration.

5. Finally, promoting feasible and practical ways of creating value for its partners while minimising or rationalizing their required resources. The possible pooling of resources between the Alliance partners Organisations at Institutional level is an area where the ETRA could usefully offer alternative arrangements that would reduce operating and other costs (e.g. shared offices in Brussels, or common administrative personnel).

The execution of ETRA's work programme and activities will rely on the assistance of its partners, and that of their members, on a purely voluntary basis. The Alliance aspires to infuse the necessary incentives and justification for this voluntary work on the basis of demonstrating the benefits that will be achieved to all, in the short and long term from a closer cooperation, focus, and coordination of activities along the lines described in this document and the 4-year activity plan.

Through the ETRA, the DETRA project will therefore contribute to lasting socio-economic development and wider societal impact through its benefits for the definition and execution of transport research and the wider impacts on that research on transport and society.

List of Websites:

<http://detra.fehrl.org>