ECTRI CONTRIBUTION to STTP
"Strategic Transport Technology Plan"

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The European Conference of Transport Research Institutes (ECTRI) is an international non-profit association that was officially founded in April 2003. It is the first attempt to unite the forces of the foremost multimodal transport research centres across Europe and to thereby promote the excellence of European transport research. Today, it includes 28 major transport research institutes or universities from 20 European countries. Together, they account for more than 4,000 European scientific and research staff in the field of transport. ECTRI is committed to provide the scientifically based competence, knowledge and advice to move towards its vision to have "an efficient, integral European transport system that provides completely safe, secure and sustainable mobility for people and goods".

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1. Background and context

1.1 Introduction

The European Conference of Transport Research Institutes (ECTRI) is a Brussels-based Association of 28 major Transport Research providing Organisations located in 20 European countries. ECTRI is representing primarily the research "supply" side in the field of transport in Europe.

ECTRI works with all transportation stakeholders from academia, industry, public agencies, and other areas. Its activities encompass a multidisciplinary, interdisciplinary, and systemic approach to transportation issues in Europe independently of any specific mode or vested interest (industrial or otherwise). The central approach taken in ECTRI's activities, reflected in its membership criteria, is "multimodal", considering the interdependencies and interactions between transport modes, and looking at the transport system in an integrated way. ECTRI's representatives participate in all major European transportation-related Technology Platforms, including rail, road, water, and air, logistics, and the e-Safety Forum and Intelligent Car Initiatives.

1.2 The role of transport research and innovation

ECTRI is convinced of the paramount importance the transport sector plays when addressing the major issues of our time: economic recovery that has to evolve into a sustainable growth in order to address the environmental challenges and provide in the welfare of a globalized and ageing society.

As mentioned in ECTRI's position paper on FP8[1], transport research, and innovation, can be the catalyst of new developments and have major impacts:

1. A profound knowledge of the interdependence of the economic system and the transport system is needed: in an increasingly competitive globalized economy, an effective and efficient transport system that is able to address the needs of the European economy and society is an engine for economic recovery. At the *macroeconomic level*, i.e. the importance of transportation for a whole economy, transportation (and the mobility it confers) is linked to the level of output, employment and income within a national economy. In many developed countries, transportation accounts between 6% and 12% of the GDP,

2. The transport sector is a major field of application of Research & Development & Innovation (R&D&I), as it relates to a number of technological innovation fields and their integration, combination and application, such as Information and Communication Technologies (ICT), nano technologies, new materials, energy / propulsion systems, automotive technologies,…

3. Research, Development, and Innovation in mobility and transport will also make an important contribution to other potential research sub-programmes and topics such as the supply and use of energy, industrial competitiveness, environment and climate change, ICT and the digital agenda, in creating multiplier effects,

[1] See ECTRI POSITION on FP8: "Towards a Common Strategic Framework for EU Transport Research and Innovation Funding", February 2011.

4. In terms of market potential, transport innovations represent today a percentage equivalent to that of computers and information technology. Thus the market uptake and exploitation of the R&D&I results, is much more feasible and relatively easily achieved,

5. Transport is strongly linked to the other Grand Societal Challenges mentioned in the Lund declaration (global warming, ageing, etc). Regarding environmental issues it is part of the problem but it is also part of the solution, with an innovative transport system being a major enabler to addressing the challenges,

Transport as a whole is an area where Europe can claim today a "comparative advantage" with respect to other regional economies and where it certainly has the potential to develop further, in competing with them.

ECTRI underlined the importance of a "policy support pillar" in the architecture of future Framework Programmes[2], which will aim at producing policy driven research i.e. research for supporting the major EU 2020 strategy policies and its flagship initiatives, but also research on the Grand Societal Challenges. As previously stated, we consider Mobility and Transport as a key area for policy support, and acknowledge that the just released "White paper on Transport" and the "Strategic Transport Technology Plan" (STTP) are both calling for a stronger alignment of R&D&I and the transport policy. ECTRI believes that innovation in transport is an essential tool to achieve the policy goal of a more efficient, sustainable safe and user friendly transport system.

Therefore, after having participated in the "STTP Stakeholders hearing on Research Coordination Structures" on February 17, 2011, the scope of this written document is to further contribute to the emerging discussion on the future of the "Strategic Transport Technology Plan".

We would like to do it based on our broad involvement and commitment to European transport research and our perception of the transport system.

We hope that this contribution will provide the Commission services with a clear, relevant and, above all, objective position representing the transport research providers, in Europe today.

2. General questions

2.1. Transport Vision and Activities

2.1.1. Current state of play within transport?

***Indicate**: market readiness/penetration of the different technologies within the activity area for each mode or cross-modal issues; on-going or planned public, public-private or private initiatives relevant for the STTP; type and scale of initiatives at which level -International/EU/MS/Regions*

The transport system is complex, encompassing infrastructures, vehicles, support and information systems. They all have different lifecycles and a different readiness to incorporate innovations. Infrastructure requires huge investments and has a very long life cycle. This influences generally the innovation readiness in a negative way: e.g. magnetic levitation requires an infrastructure that is not compatible with the existing railway networks.

[2] See ECTRI POSITION on FP8, pages 9-12.

At the level of vehicles only cars have a short lifecycle. But there you see that, given the size, and dynamics of the car market, the transport system is a major field of application of Research & Development & Innovation (R&D&I), as it relates to a number of technological innovation fields and their integration, combination and application, such as Information and Communication Technologies (ICT), nano-technologies, new materials, energy / propulsion systems, automotive technologies,…

Another level of analysis is the (multi-) modal approach. Although considerable market penetration exists for different technologies at ***uni-modal*** level there is relatively little "cross-modal" technology development and application. Systems that are needed at cross-modal level include those for: cross-modal data collection and analysis, cross-modal information and data provision to the user, traffic control and management systems to coordinate different transport modes especially at terminals, ports and airport areas.

Also of great importance is the issue of establishing global, harmonised **standards** that will enable better cooperation between modes at the operational level for cost savings, seamless connectivity, and global interoperability. Concurrently global harmonised policy frameworks that will support the achievement of such cross-modal applications of technologies and harmonised standards are also needed.

At another level, within one mode or area of transport operation there is need for greater market readiness to integrate different technologies within one "activity area". A good example is the multitude of traffic monitoring and management systems and related applications that have taken place in the last 20 years. Technological applications introduced by the Member States, private operators, Public Private Partnerships (PPP), and other entities in the various fields need to be integrated in a common architectural framework that will form the basis for a multitude of applications based on private or public-private initiatives. Consider for example the "activity area" of *Monitoring and controlling traffic on a road network*.

Applications already exist in the fields of:

- ✓ On-line (over GSM/GPRS) security systems for vehicles, 'e'-call,
- ✓ Toll road initiatives,
- ✓ Integrated vehicle or person navigation systems,
- ✓ Preventive maintenance and warning systems,
- ✓ 'Pay-as-you-drive' insurance,
- ✓ Traffic management Centers,
- ✓ Road pricing schemes, and so on.

Majority of these systems are based on GPS technology and use GSM (GPRS) as carrier. They all are designed on the requirements and choices of the Member States, or local authorities, and interoperability, transfer of information and, even more, seamless use by all European citizens is still missing. The efforts so far have been centered on provision of interoperability through the development of common standards (e.g. Datex) or other intermediary systems and layers. So, a truly integrated approach – based on a common architectural framework and especially based on state of the art technologies and systems that are now proven to work effectively in other sectors, does not exist. As a result a road vehicle in order to use ITS systems and services in a pan-European scale today needs to be equipped with several devices and systems depending on the country where the vehicle travels.

This is a prime example of an "activity area" where market readiness/penetration of the different technologies is ripe for development and implementation, but there are others (see answer to section 3).

2.1.2. Likely evolution of transport?

***Indicate**: major trends in the transport sector (technology and actors); evolution of transport needs (volume and quality); likelihood of structural changes as a result of new business models, globalisation, competition; influence of the market structure on future market potential; possible effects of legislation etc*

Demand for transport will continue to rise stimulated by the growing globalized economy and the general welfare. Transport is becoming relatively cheap as compared to rising incomes and as a part of the total production costs of goods (trend: lower weight and higher value). There will be more long distance trips (flights) and a more differentiated demand regarding space, time and motives (e.g. tourism). Therefore, there will be need for continued efforts to address the transport related challenges.

On the shorter term, the financial and economic crisis has taken a heavy toll on public finances, businesses, employment and households. At all levels, public policy makers will have to find ways of triggering economic dynamism and applying new technologies with limited budgetary margin. In such a frame, one has to consider the major transport trends in terms of new priorities and context that can be outlined as one favoring:

- Greater emphasis on providing overall efficient and sustainable mobility rather than effectiveness at modal level;
- Greater sustainability and environmental sensitivity of systems and technologies to be used;
- Greater cost effectiveness through integration of systems and technologies;
- Greater societal acceptability and involvement; and
- Greater innovation at all levels.

One distinctive challenge in the transport sector will be that of creating a smarter, greener transport system compatible with the current social, economic and environmental objectives.

2.1.3. Key technology penetration targets (2020, 2030, and 2050)? What are the main assumptions underlying these estimates? What are the main barriers to overcome to achieve them?

***Indicate**: main constraints and showstoppers, risks, needs for technological breakthroughs, resource/feedstock availability, consequences for the current infrastructure, etc*

As stated before, the transport system is complex and the life cycles of different sub-systems play an essential role in the incorporation of innovations into the system. ECTRI with its integrative and multimodal focus does not pretend nor aim at addressing all the different subsystems and transport modes. In general terms it can be stated that the perceived high risks for long life cycles will tend to have a negative impact on the propensity to innovate. Betting on the “wrong horse” is too risky, betting on too many horses too expensive. There is a need for an integrative approach to innovation including supportive legislation and standardization, innovative financial instruments (PPP), education and training of professionals, acceptance by the potential user/buyer, alignment with (other) policy goals and instruments.

A number of non-mode specific and promising areas of innovation are:

a. New fuels for clean transport systems (road, rail, air, maritime).
   - ✓ Biofuels
   - ✓ Electrification
   - ✓ Hybrids
   - ✓ Hydrogen
   - ✓ Fuel cells

- ✓ Fuel and power train alternatives especially heavy duty vehicles.

b. New Materials for vehicle design (especially for air and maritime transport)
c. New Materials for infrastructure construction (road, rail, airports, and ports)
d. Urban mobility (creating a fully integrated system for sustainable mobility of passengers and freight – urban logistics - and easing congestion)
e. Intelligent freight and logistics
f. Various ITS systems and services, for:
   - ➢ Cooperative Mobility (towards fully connected drivers, travellers and goods)
   - ➢ Safety and security (towards zero accidents)
   - ➢ Information to the user (real time information - fully informed user)
   - ➢ reduced impact on the environment

2.1.4. If these targets are met, what will be the contribution to EU policy goals in the field of transport?

***Indicate**: Contribution to (1) achieving low-carbon transport (reducing CO2 emissions and dependency on imported oil), (2) achieving seamless mobility in a Single European Transport Area (establishment of a seamless European TEN-T network that is intelligent, efficient, and green, single European 'transport ticket' for passengers and freight), (3) competitiveness and innovation (e.g. future market sizes for a given technology, European share of new market, additional jobs, export revenues), (4) other policy goals (such as reduction of congestions, local/urban pollution, noise reduction, damage to cultural heritage, etc.)*

It is important not only to focus on new technologies. Especially given the already mentioned long life cycles in the transport sector, the policy targets set will not be met by concentrating only on new technologies. Innovation in maintenance and rehabilitation of the existing infrastructure and vehicle stock, the development of affordable intermediate technologies and solutions that deal with depleted financial resources in the public sector will also be necessary.

2.1.5. Contribution to the overall ('well to wheel') energy efficiency?

***Indicate:** Effects on energy efficiency in electricity and fuels supply, as well as in use; evolution over time and depending on market penetration, etc*

We would like to put forward the following considerations:

Freight transport is a vitally important component of the quest for energy efficiency as it suffers from serious inefficiencies today. Various projects aiming to improve freight and logistics services, especially urban freight services and city logistics do exist. These propose a wealth of technologies to improve freight transportation in general and in urban areas in particular, but the challenge is now to have these deployed across Europe.

Also, European cities need urgent traffic control solutions to help them to improve mobility efficiency, lower congestion delays and costs, reduce fuel consumption and CO^2 emissions.

The provision of personalized traffic and travel information in urban areas is of importance to energy efficiency. An informed driver makes a safer, greener and more efficient route choice and eco-driving that can improve energy efficiency by as much as 20%. For example, route guidance, traffic information services and driver assistance systems can contribute by informing users of traffic jams and the best routes.

2.1.6. Are there any interactions with other community policies and initiatives?

***Indicate**: Potential contribution of the technology to other EU policies; need for measures and initiatives in other policy areas to support the market penetration of the technologies*

Transport technology can contribute to diverse EU policies: climate change, energy efficiency/transition, industrial policy, "Digital Agenda".

Low carbon vehicles (LCVs) are entering the market, often with incentives both for manufacture and purchase, but obstacles to their mass adoption by the travelling public is constrained by their low mileage range for general purpose use, the limited energy supply infrastructure and their cost. Measures to address the cost imbalance with conventionally powered vehicles will continue to be a priority. While their continued take up will accelerate the move to a low-carbon society, LCVs will for the medium term at least constitute a small part of the total vehicle fleet and thus technology to improve conventional engine fuel efficiency, alongside fuel supply and price will remain important drivers.

2.1.7. Which are the main competing or synergetic technologies within the activity area? (in relation to the indicated market penetration targets)

Energy and ICT technologies could be considered as the main supporting synergetic technologies.

2.2. Achieving the Vision

2.2.1. Is your vision achievable under a 'business as usual' scenario?

***Indicate**: Current support programmes and policy measures and their expected impact*

Our vision is indeed not achievable under a "business as usual scenario". There will have to be changes and new initiatives mainly at both "business" and "governance" structures enabling for example:

- New business models, new client / value chains, etc,
- More emphasis on "European" legislative structures enabling overall European approaches to solving problems,
- Pan-European (and global) standardization activities,
- Optimizing performance at all levels,
- Common Architectures,
- Better Interfaces between private and public cooperation,
- Inter-operability at all levels, through:
  - ✓ Fast standardization
  - ✓ Harmonized performance criteria
  - ✓ Open architectures
  - ✓ European-wide services
  - ✓ Consistent and balanced involvement from public & private sectors.

Also, development or adaptation of the legal framework offering investment security for the industry, and relevant incentives from Member States to launch the new markets for systems and services, consistent with similar incentives at EU level giving particular importance to the needs for training and educating as well as commitment to the citizens' needs and aspirations will be necessary.

2.2.2. Are there barriers to innovation? Is there a need for change in the innovation system?

***Indicate**: For the mode in question any weaknesses in the current system*

There is a clear need to strengthen the whole innovation chain from basic research to product development. Thus to help inventions and new approaches to reach the market take up phase sustainably, i.e. while at the same time considering that inventions and innovations are based on research. The way forward comprises not only financial instruments but a comprehensive programming and dissemination strategy. At this moment potential promising ideas often fail to reach full maturity because of lack of follow up support.

Furthermore, sustaining the mobility needs of the European citizen whilst tackling the negative effects of transport, will be a real barrier and a challenge in the next decade.

Conventional approaches such as the extension of the road network, are reaching their limits, are too expensive or will not give the necessary results on the timescales required by the importance of these challenges. Innovative solutions are clearly needed if we are to achieve the rapid progress to improve mobility across the modes and systems.

2.2.3. Does the considered mode/sector already benefit from or plan to set-up initiatives to bridge the gap between the current state of technology and a cost-effective market entry? What would be the critical mass (e.g. investment) needed for such initiatives? What new approaches could be considered to accelerate innovation?

***Indicate**: i.e. how could the STTP help the sector; which actions of it would be most effective; what impact could be expected with respect to 'business as usual (i.e. No STTP)?*

STTP should be the facilitator of innovation processes through the provision of tools smoothening innovation paths. Technology foresights and market analyses will help making risks more transparent for the stakeholders. New coordination instruments as the European Innovative Partnership's should be developed in a way to be lean and adaptive and reducing considerably the administrative burden that currently hinders cooperation considerably. STTP should support the development of innovative financial instruments and risk sharing facilities.

The European Commission should avoid "picking winners", but help avoiding fragmentation in research through a thorough dissemination strategy and follow up for R&D results in the transport sector.

2.2.4. What actions need to be carried out at European level? What actions would be better implemented at national and or regional level? Is there a need, or a potential benefit, to integrate or to better coordinate action carried out at different levels?

Here no clear cut answer can be given. National and regional needs and specificities determine choices made at that level. Here again the Commission/STTP can help by creating transparency through dissemination of results and it can provide tools to facilitate cooperation, e.g. through promoting the ERANET-instrument also for inter-regional cooperation.

2.2.5. International Dimension - Is there a potential for international cooperation? What type of cooperation?

***Indicate**: Major initiatives in other countries; assessment of specific opportunities for international cooperation*

ECTRI has made an in depth analysis of opportunities for international cooperation with the US in the framework of the ECTRI - TRB cooperation: "EU/US Transportation Research Collaboration: Challenges and opportunities"[3] . Many of the lessons and recommendations are applicable for other cases.

3. SECTOR/ISSUE SPECIFIC QUESTIONS

Research coordination structures:

1. ***RTDI in at least 3 interlinked transport components, i.e. vehicle/vessel, infrastructure, fuel/energy carrier have been dealt with somewhat separately, sometimes with additional fragmentation generated by non-coordinated objectives, planning and timelines, different funding schemes, limited R&D result communication leading to sub-optimal market uptake, etc. What are the essential elements in designing a coherent approach to overcome such fragmentation? What would be the ideal target for such a coordination effort to keep it both practical and creative?***

Our proposal would be to create, in the next Common Strategic Framework ("CSF"), a new type of research instrument which ECTRI (together with other stakeholders and some of its members) have identified as *Focused Joint Research Initiatives (FJRI*[4]. This new instrument, *FJRI*, will be aimed primarily at reinforcing networked research focusing on a specific theme where such research is particularly suited, e.g. on one or more Grand Challenges, and creating "smart specialization" through a new generation of scientists, the reinforcement of the portfolio of test beds for demonstrating new technologies and systems, and in creating common hard and soft research infrastructures in line with the overall ERA concept. The FJRI should be considered as supplementary to the *Competitiveness and Innovation Framework Programme (CIP)* research and innovation partnerships between academia and industry or between industries.

2. ***Could you identify at least 3 non-mode specific examples where enhanced coordination at EU level (supported by regulatory measures / economic incentives if relevant) may prove beneficial in your view to achieve the goals of improving RTDI performance in the transport sector in terms of enhanced results' market uptake?***

A successful EU 2020 strategy must be built on a good analysis of the constraints facing policy makers in the coming years, and on the correct identification of the challenges to be tackled.

A. The promotion and implementation of the ***vision for e-Freight in Europe***. This would call for enabling a more efficient, greener, safer, and cost effective freight transport system with "***Zero paper***" documents in the planning, executing and completing any freight transport operation within EU, independent of the:
   - ✓ parties involved;
   - ✓ Cargo type;
   - ✓ Transport mode or combination of modes;
   - ✓ Loading unit;
   - ✓ Authorities involved;
   - ✓ Type of service demanded;
   - ✓ Transport corridor;
   - ✓ Liability regime.

[3] "European-United States Transportation Research Collaboration, Challenges and Opportunities", ECTRI and US-TRB, February 2009
[4] See ECTRI POSITION on FP8, page 12.

Connected to this vision is the vision of the "*Single window*": interaction between Authorities and between Authorities and commercial stakeholders that is being sought after in the past decade or so.

B. The promotion and implementation of a ***Standard Framework for passenger or freight Intermodal data collection and Information Exchange***. The vision is for a full transition, *enhanced and enabled by coordination at EU level,* from the current "island" solutions with limited data exchange networks and lack of interoperability, towards a co-modal data exchange network and seamless mobility services, where people, goods and vehicles are continuously and ubiquitously connected, receiving or sending useful data/information. This is a goal that has been in the research agendas for over a decade now and some serious RTDI work and achievements are in place. It incorporates the push for a new concept and framework of a truly integrated pan- European system for data collection (e.g. for traffic – vehicle movement) based on modern technologies such as e.g. GPS/Galileo, and data exchange channels such as GSM (GPRS) or other means, and utilization of such data for many related applications that will be inherently accessible to all European travelers.

C. The promotion and implementation of ***clean transport systems and eco-mobility at pan- European level***. The need to adopt a more environmentally and climate friendly transport system is now widely accepted and this has also, rightly, been considered as a way to overcome the current financial and economic crisis. Here, transport RTDI could play a vital role in helping industry and policy makers achieve the correct perspective between the many competing technologies and systems. In developing further prototypes and evaluate the performance and implementation strategies for systems such as Fully Electric Vehicles (FEVs), or Hybrids, or producing and delivering clean fuels such as hydrogen for use in the "clean" vehicles of the future, would be a task of paramount importance for all modes of transport and for our societies at large. It would also enhance mobility and boost Europe's dynamism to unleash an innovative and creative potential vis-à-vis the rest of the world.