

**FOURTH OPINION
OF THE EXTERNAL ADVISORY GROUP FOR THE
SUSTAINABLE MOBILITY AND INTERMODALITY
KEY ACTION
PERSPECTIVE FOR FUTURE RESEARCH ACTIVITIES**

I. INTRODUCTION

1. The External Advisory Group (hereinafter the EAG) of the Key Action “Sustainable Mobility and Intermodality” (Competitive and Sustainable Growth Programme) advises the Commission on the strategy for future research to be reflected in the Sixth Framework Programme (FP 6).
2. The EAG met on 23/01/2001, 27/03/2001, 16/05/2001, 27/06/2002, 27/09/2001, and 08/11/2001. It primarily concentrated on the issues to be resolved in assessing future EU research needs in Sustainable Mobility and Intermodality rather than on research methodology (centres of excellence etc.), which appears to be the central theme of the 6th Framework Programme.
3. In its third opinion, the EAG presented a strategic reflection on transport Research and Technology Development (RTD) that became a major contribution for this present recommendation. Its key points were:

Work programme structure and strategy

- 3.1. The *top-down approach* for transport policy research is understood and appreciated by the EAG, as it should provide a sound basis for supporting policy decision-making. Nevertheless, bottom-up ideas could bring new and better solutions and it is quite possible that this alternative approach is being hampered. The ideal combination of both the top-down and bottom-up approaches could be achieved if and when there is a clearer problem solving definition of the work programme. This will leave more freedom for the proposers to creatively address well-identified problems.
- 3.2. The *problem solving approach* is appropriate, considering the need for solutions of the present transport problems. But an RTD programme has to look also to the long-term, in the case of transport, to anticipate and validate policies for the future. In this sense the “problem understanding” approach, should be part of the work programme strategy. There should be a positive acceptance towards taking risk for targeted actions on long-term problem solving.
- 3.3. The issue of *Modal vs intermodal* for the Transport RTD has presented the EAG with a dilemma. The *transport system approach* should close this futile discussion by widening the view. The transport system should take account of transport demand and other social needs. Following this, the Transport RTD should aim to generate the knowledge and technologies that may contribute to

this end. This implies mainly equipping each mode to serve the functions to which they are best suited, and facilitating and promoting synergies between modes in ways where they add real value.

- 3.4. The philosophy introduced by the *European Research Area* communication from the Commission about networking RTD activities to optimise the European RTD system has to be taken into account. It is particularly relevant in the case of the development and application of best practices; here is an example where the top-down approach should be abandoned in favour of a partnership approach with National, Regional and Local research initiatives. The non-technical barriers that prevent the introduction of research results should also be addressed.

Work Programme Implementation

- 3.5. The EAG considers that moderating the transport growth and its negative impacts is not only a transport issue. Other policies have to be brought forward in order to limit the utilization of scarce resources and the generation of environment burdens, especially on threatened ecosystems. This will not only require implementing the ambitious set of transport policy measures (described in the White Paper). It will also be necessary that Europe takes consistent measures at national and local levels in conjunction with other policies (economic policy, urban and land-use planning policy, education, etc.).
- 3.6. It is within this overall framework that future transport research has to be conceived. It is obvious that its alignment with the final objective of the European Union (integration of transport in sustainable development) will call for innovative approaches and, at the same time, play its role in incorporating today's technologies and solutions (one should not forget the important increases in traffic that today's networks will have to cope with in the next ten years).
- 3.7. A focused call for proposals may lead to substantial impacts. Such *targeted actions*, which may integrate tasks from different areas of the work programme, can contribute to a more effective system approach that should deliver actual solutions covering all relevant aspects of the problem to be resolved.
- 3.8. The *Targeted action* promoted by the Framework Programme should be prepared to accept a degree of risk where prospective benefits merit this.
- 3.9. It is recommended that an effort is made in setting up *research networks of excellence* that could assist in the evaluation and proposal of new actions for the transport system

Dissemination and exploitation strategy

- 3.10. In the case of policy research, making the results available and accessible to all potential users is as important as the research itself. Therefore a strong, well-organised and continual dissemination strategy should receive high priority.
- 3.11. The co-operation with National, Regional and Local authorities, as advocated by the *European Research Area*, could increase the efficiency and effectiveness of the dissemination. There is also a need to encourage governments to translate EU transport policy objectives into national/regional targets.

Priorities for research.

- 3.12. The **first priority** for research is to provide for monitoring through an economical, fast and secure access to reliable, harmonised, and consistent data, that is currently lacking in the following areas: transport demand, vehicle flows and factors that affect them. In addition, information on policy measures implemented by the Member States (co-ordination of National Research Programmes, for example) and other relevant players need to be analysed. This work should be done in close collaboration with the Member States and Eurostat (using a Thematic Network as a framework), with DG Energy and Transport (DG TREN) acting as a catalyst. Taking stock of new technologies and concepts developed under other priority themes of FP6 should also be an important part of this subject.
- 3.13. Effective monitoring of the Common Transport Policy (CTP) also requires further refinement of forecasting tools (generation, modal split, assignment) and models used to evaluate externalities caused by transport.
- 3.14. The **second research** priority should aim at translating the targets proposed by the Common Transport Policy to national, and regional levels. These short-term targets and indicators should include the economic, environmental and social impact of the transport sector and integrate the characteristics of each European region.
- 3.15. This priority area should also include the analysis, development and dissemination of best practices, and innovative policy packages designed to achieve the CTP targets. Emphasis should be put on the new policies introduced in the CTP, such as pricing and financing, and new approaches to control regulation of open market structures. Harmonised evaluation methods should also be developed and extended for the enlarged EU. Part of this research priority should also contribute to the pursuit of interoperability and standardisation issues for the European transport system. Support from discussion forums involving the Member States (e.g. Thematic networks) would provide the platform for the promotion of best practices and innovative policies at national and regional levels.
- 3.16. The results of this area should facilitate periodic updates of the CTP and ensure its most cost-effective implementation at national and regional levels by the effective conversion of the EU level targets to appropriate policy structures and by establishing the optimum dimensions of the various policy measures and instruments.
- 3.17. The **third priority** area is aimed essentially at medium to long-term measures beyond 2010. The object is to develop measures and policies – some of which are radical - that will extend the policy paths for transport development beyond the initial stabilisation foreseen time period of 2010 by the Common Transport Policy.

- 3.18. As it has been pointed out, today's objectives (especially in the field of optimising the use of the different transport modes) are extremely difficult to attain. Consequently, it is even more difficult to state by which means, more ambitious and longer-term transport targets can be accomplished. Research will have to be launched in relation to required **changes in socio-economic and industrial activity in the Union**, proposing methods and approaches to determine long-term targets for transport taking in account the different elements of sustainability. Two inter-related research areas in policy development are apparent:
- 3.18.1. In the socio-economic field, longer term transport policy in particular but not exclusively for passenger transport, can be better understood by considering transport demand, supply and mobility patterns related to societal developments that are formulated through research that anticipates new tendencies in the economy and society. This research would include such issues as demographic changes (e.g. ageing), new patterns of social interaction associated with economic activity and industrial progress (and also resulting from changes in government and governance), and the social consequences of the e-economy. This research will provide a clearer view of how future transport policies can lead to a mid-century sustainable transport system that is closely related to societal development.
 - 3.18.2. From the industrial viewpoint, future transport policy will draw on development in how work, and industrial and commercial activity are going to be organised. Research should look into new trends in industrial locations, new approaches to supply chain management, impacts of e-business, reverse logistics, and the changing orientation of industrial and commercial activity resulting from incorporating Accession Countries into a larger European Union. The outcome of this research will be to foresee a transport system that strongly supports the world trading capability of Europe as the century develops.
4. It is strongly felt that in the Commission's proposal of February 2001 (eight research priorities), the Research Programme does not adequately recognise the importance of the Transport Sector. This view was reflected in the Chairman's letter to Mrs. Loyola de Palacio dated 14th April 2001. Managing a "virtual" transport research programme will become a necessity and a major priority for the Commission.
5. The EAG has identified 9 major research priorities:
- 5.1. Sustainability: optimal use of efficient transport systems
 - 5.2. Improving data and methodology
 - 5.3. Infrastructure
 - 5.4. Human factors in the operation of transport systems
 - 5.5. Supply Chain Management
 - 5.6. Safety and security

- 5.7. Environmental issues
- 5.8. Consequences of new propulsion systems
- 5.9. Multimodal transport

6. These priorities are developed below (the list is not comprehensive but presents the main topics).

II. - RESEARCH PRIORITIES IDENTIFIED

II – Research priorities

The Common Transport Policy forecasts a growth in transport demand by 2010 in the European Union of 38% for freight and 24% for passenger transport.

However, as pointed out in the Memorandum to the European Commission on the policy guidelines on a common transport policy "As demand for transport keeps increasing, the Community answer cannot be just to build new infrastructure and open up new markets...". It is emphasized that "... the transport system needs to be optimised to meet the demands of enlargement and sustainable development...." In other words, a modern transport system must be sustainable from an economic, social and environmental viewpoint.

Still, while a modern transport system that fulfils these requirements is a necessity, it should also be considered whether there are other – possibly complimentary – ways to obtain a sustainable transport regime. A key issue is whether a reduction in the growth in transport demand may be attained at the same time as economic growth in EU is maintained, or even enhanced.

A. - Sustainability: optimal use of efficient transport systems.

An effort has to be made to increase the **efficiency** of all transport modes; this will lead to the optimal use of transport systems and to **sustainable** economic growth. Investments in existing and new infrastructure will be needed accompanied by changes in management systems, new technologies and most important, better understanding of transport demand.

Research Needs

- A.1. Evaluation of the capacity and efficiency of the different networks. Calculating the potential of each network under different operational strategies (best allocations between freight and passenger traffics, for example) will be required.
- A.2. Continuing efforts in the field of interoperability of networks. For all modes the idea of European Networks should evolve into Single European Networks. In each mode the needed research will change. In the case of Rail, technical and organisational issues interoperability seem to have priority; in the case of Air,

demonstration projects should be launched; in the case of road there should be substantial support for new technology and better maintenance of the under-supported infrastructure.

- A.3. Use of information technologies to improve capacity utilisation in all modes (applications of Galileo or other available tools to increase capacity by efficient and effective management in Road, Water, Rail and Air).
- A.4. Analysis of best practices in demand management (especially pricing strategies) in highly congested urban networks. It is felt that the evaluation of strategies followed in order to foster the acceptance of different pricing strategies and the understanding of how users respond to them will help better implement these kinds of policies.
- A.5. Revision of the modal choice models currently used in the analysis in both passenger and freight networks. Understanding what actions might trigger an improvement in the behaviour of users or convince companies to pick a more sustainable, multimodal solutions for their freight. It is particularly relevant to assess the logistics needs of small and medium size companies in selected sectors (development of common logistic platforms and solutions).
- A.6. Strategies to moderate the demand for transport in Europe without impairing economic growth.
- A.7. Study the effects on transport of enlargement of the European Union
- A.8. Analysis of alternative transport systems and transport chains that meet market needs and demands: their practical ability to resolve European transport problems including the environmental performance of the alternatives.
- A.9. Analysis of strategies aiming at spreading demands both in time and space without affecting efficiency (flows in off peak periods, use of alternative terminals to established hubs in maritime or air transport).
- A.10. Impact of advanced electronic communications in reduction of transport demand.
- A.11. Urban design has, in principle, a major effect on the transport system. Current research indicates that land use policies have little effect in moderating transport demand (very long-term effects, policies are difficult to maintain). Nevertheless it is felt that the 6th FP should give support to the dissemination of best practices, helping to determine how critical factors (land use, social and economic systems) can contribute to ameliorate congestion or problems of poor accessibility/low mobility.

B. - Improving data and methodology.

Transport is a key sector for the European Union and, during the next decades, will be under heavy pressure. It is particularly recommended that an effort be made in ameliorating the tools available to planners and decision makers. In particular, it is felt that we lack basic information. Which data do we need? Why do we want it?

Research Needs

- B.1. Harmonised statistical data by transport mode (intermodal traffics should be taken into account) should be collected under a common European scheme. Maintenance strategies should be designed. An effort should be done to incorporate key aspects (as safety –an injury causation database at EU level is greatly needed-) and even transport modes (pedestrian, cyclists).
- B.2. Helping to develop a new methodology to evaluate transport networks would have a high European added value. Bringing experience from different research groups in issues ranging from environmental and safety impact assessment of transport to security of passengers and goods in mobility choices would help to the development of the new kinds of tools we need to manage a new transport challenge.
- B.3. Monitoring and supplying methodology to support the implementation of the Common Transport Policy (cost/benefit analysis, efficiency of alternative infrastructure funding regimes, development of long term forecasting models specifically designed for European transport, building of scenarios, development of major contingency plans, risk management).

C. - Infrastructure.

The tough requirements set upon the **infrastructure** call for research in the strategic area of physical asset management. In order to develop safer and more environmentally friendly transport, research has also to be pursued in the field of design of better infrastructures and transport equipment.

Research Task

- C.1. Assessment of future infrastructure requirements consequent upon economic and social development in Europe.
- C.2. Life cycle analysis and life cycle design methods including environmental and safety aspects.
- C.3. Calibration of deterioration models.
- C.4. Development of functional requirements that should be translated into performance based specifications (in pavement materials and construction, for example). A set of European performance indicators will contribute to harmonisation in the transport sector.
- C.5. Innovation in construction and maintenance techniques. These should include new devices to carry out a continuous monitoring function of the networks.
- C.6. Research is needed to allow the acceptance of 115 kN axle loads and 2.55 m width vehicles in the Accession Countries.

- C.7. Research on the relationship between the design of the road infrastructure environment and road user behaviour is needed to create a safe environment. This need is strengthened by the presence of an increasingly ageing road user population in all European countries.
- C.8. Develop and demonstrate new conceptual designs for improved safety and reduced environmental impact, including a holistic new approach regarding the safety triple (driver-vehicle-infrastructure).
- C.9. Safety and environmental assessment methods for design and equipment.
- C.10. New materials, material protection and antifouling for reduced environmental impact including recycling
- C.11. In maritime transport, new conceptual design for simple and environment friendly recycling, attractive both to the shipping company and the building yard

D. - Human factors in the operation of transport systems.

Advanced vehicle control systems could be instrumental for attaining a better use of the limited capacity of the networks (Water, Rail, Air, and Road). The use of new technologies might allow reducing headways without compromising safety.

Research Task

- D.1. Harmonisation of Intelligent Transport Systems (ITS) technologies standards and protocols (a needed step from an interoperability point of view, and a necessity for European manufacturers that strive for large production volumes).
- D.2. Centralised (IT based) traffic management (Road, Air, and rail).
- D.3. Driver assistance technologies (it is particularly important to address the issue of legal liabilities associated with most of this kind of solutions). Projects needed to demonstrate a positive or at least no adverse impact on safety, public acceptability and feasibility

E. - Supply Chain Management.

Supply Chain Management (SCM) has become a key competitive factor. Individual transport companies require increasing amounts of data and processing power to manage and control their operations. Few have foreseen the importance of interchanges with other modes / transport companies and their customers. In parallel it can be observed that companies in trade and manufacturing invest huge amount of resources in launching their Enterprise Resource Planning systems (ERPs). However, where these may include the necessary tools for timely inward supplies, these usually stop short of integrating the outward shipment requirements and procedures. The logistic provider must have full control over the flow of information in the logistics chain. The lack of integration between the information systems along the transport chain continues to cause problems, delays and extra costs. A study describes that the same transport information is being

registered up to 18 times during a freight transport from door to door. Reuse of data will result in large benefits. Data should only be registered once, and should be available to all actors that need the data along the transport chain, in what is sometimes called a “pipeline concept”.

Research Needs

- E.1. Development of value added supply chain systems; including full Electronic Data Interchange (EDI) facilities and which should be based on neutral commonly accepted standards. Existing techniques and experiences should thereby be built upon.
- E.2. Supply Chain Management tools, i.e. planning and execution of logistics operations both, to meet future lead times required by trade and industry and to simplify industrial use of sustainable transport, linking waterborne transport with the other transport modes.
- E.3. Developing Information and Communication Technologies (ICT) architecture(s) for multimodal transport operations, including links between systems for traffic and transport management. Standards for information handling in the logistics chain for all transport modes, and standards for exchange of information between traffic and transport management systems and the customers ERP systems should be established
- E.4. Reusability of information between all actors involved in transport (shippers, operators, a number of authorities) is a key issue in improving efficiency and quality of operation.

F. - Safety and security.

Transport safety research objectives need to be set giving priority to areas where the casualty reduction benefits are high, where the Community can act to add value and where the implementation possibilities are good. In view of the new EU-wide road fatality reduction target established in the Common Transport Policy White Paper demanding unprecedented levels of safety performance in most Member States and for the EU as a whole, road safety research supporting policy development is a clear priority. At the same time research is needed into the safety of the non-road modes to meet societal concern about individual tragedies and to identify the scope for cost-effective and practicable improvements.

Research Needs

- F.1. Studies are needed to contribute to more precise estimates for the cost of fatalities and serious injuries in transport accidents. In particular there is a need for data on the value placed on human life and the willingness to pay for safety measures. A scientifically established set of transport safety performance indicators for all

transport modes needs to be established. These would allow to run and benchmark integrated road safety management programmes

- F.2. Investigation into the extent of the contribution of cumulative fatigue in transport accidents and practicable measures to manage its effects in company policies and in safety regulation.
- F.3. Research into improvements in vehicle crash protection to reduce collision-induced injury to occupants and those outside vehicles Improvements in vehicle crash protection have delivered large reductions in road user injury. Since most vehicle safety legislation in the Single Market is agreed at EU level, this area is particularly important for Community research.
- F.4. Research on risk assessment methodologies for use on railways, including cost benefit analysis, and learning from the methods used both in other transport modes, and in other European regulated industries such as the process industries is required.
- F.5. Development of European Platforms/Services for car assistance and safety (operational procedures, services interoperability, regulatory framework).
- F.6. Development of a European Management System for Transport of Hazardous Material.
- F.7. Demonstrate a fully operational Vessel Traffic Management and Information Systems (VTMIS) system to prevent accidents in European Coastal Waters. The system should include upgraded electronic maps according to Electronic Chart and Display Information Systems (ECDIS) standard, automatic ship identification, shore-based pilotage, ship/shore interaction and supporting systems. Harmonising VTMIS and River Information Systems (RIS).
- F.8. Piracy prevention and detection. Develop and demonstrate technologies to detect, prevent and limit the consequences of piracy.

G. - Environmental issues.

Environmental protection regimes - taxation based or other - have limited influence on the consumer prices for products, but it may have strong direct impact on transport costs and transport patterns. We should aim at establishing the basis for legislation and incentive schemes which can stimulate reduction of environmental impact and contribute to making transport profitable and environmental friendly.

Research Needs

- G.1. Incentive based environmental schemes to make investments in environmentally friendly technology profitable, and environmentally friendly operation a competitive advantage
- G.2. Development of validated models for monitoring emissions and releases from transport and their environmental impact

- G.3. Assess the environmental economic effects of current and proposed legislation and on the competitive relationship between different transport modes.
- G.4. Best practices in recycling and infrastructure construction.

H. - Consequences of new propulsion systems.

Fuel cells and other **new propulsion systems** will, in a few years, be available on a commercial basis in cars. Nevertheless the overall integration of these new vehicles and their associated fuelling infrastructures into the transport system needs to be addressed. So far fuel cells have not been tested onboard ships. Diesel engines fuelled by Liquefied Natural Gas are now being tested, and a number of companies have gained positive experiences with gas turbines. Some of these newcomers have shown improved environmental performance. Future research should try to reduce fuel consumption and emissions of harmful environmental substances through testing and gaining experience with new machinery concepts

Research Needs

- H.1. How far can existing technologies be deployed? Study the improvement of existing technologies for maximum impact.
- H.2. Analysis of actual entry barriers to new technologies (regulations, economic impact, taxation, etc)
- H.3. Research in standardisation, demonstration projects (fuelling infrastructure needed, alternative deployment schemes, etc.) and acceptance.

I. - Multimodal transport.

There still is a widespread reluctance with trade and industry to engage in use of **multimodal transport**, based on uncertainties over reliability and probably also costs. Most important, however, is that a full integration of in-house and third party logistics systems will usually also require a change of mind and adaptation of internal procedures. Multimodal transport has to become more attractive to new groups of transport users by motivating operators to improve quality and reliability

Research tasks

- I.1. Improve efficiency in harbours and terminals, including reduced documentary and administrative procedures, to make multimodal transport an attractive alternative.
- I.2. Internationally accepted standards and procedures for multimodal operations (e.g. identification, tracking and tracing systems of cargo units/ cargoes) [Follow-up running projects]
- I.3. Revised standards for cargo units, taking into consideration requirements from traders, transport interfaces, safety and regulatory constraints plus technological/operational constraints and opportunities