

ERRAC

Response to the EC consultation exercise on thematic domains for the 7th FPRD:

Motivation to enhance research for high-speed, conventional and urban rail transport

December 2004

Executive summary:

The European Rail Research Advisory Council (ERRAC) was created in 2001. It has been implementing a strategic rail research agenda (SRRA) since 2002. In response to the EU consultation exercise on thematic domains for FP7, ERRAC makes the following 10 proposals:

1) The 6 strategic priorities identified in the SRRA (Strategic Rail Research Agenda) should be used in FP7 to allow the continuation of progress and achievements made since its publication.

2) FP7 should pool, in an intelligent way, the new (large) and existing (small) technological co-operation tools.

3) In the years to come, ERRAC may move from an advisory to an executive platform where projects are designed and built, where technologies are exchanged and where additional sources of funding can be identified.

4) ERRAC recommends that the budget devoted to railway research in FP7 be increased at least in the same proportion as the overall programme itself.

5) FP7 should take due regard of the national research programmes underway in the Member States and seek to develop links with these so that the European and national research programmes are complementary and build upon one another. The various European and national research programmes in the rail sector require better co-ordination in order to maximise their impact.

6) FP7 should take into account the issues surrounding the implementation of interoperability and technical and operational harmonisation.

7) FP7 should examine projects advocating increased intermodality and a

greater integration with the European Transport Chain.

8) FP7 should examine the "innovation" facet of rail infrastructure, its maintenance and the efficient use of the existing infrastructure. FP7 should investigate new economic models for funding rail infrastructure and rolling stock. The implementation of research results and innovation should be thoroughly evaluated with regard to the migration of existing and new technologies as well as operational concepts in any new economic models to be developed.

9) ERRAC stresses the need to investigate urban transport related issues.

10) FP7 should examine transnational issues in Europe such as the cross acceptance of rolling stock, conformity and standardisation where a European solution is required.

Introduction

The rail sector stakeholders - brought together under the ERRAC umbrella - have prepared this document in response to the EU consultation exercise on thematic domains for FP7.

The European Rail Research Advisory Council (ERRAC), the second technology platform launched in 2001, is an advisory body representing EU Member States, the railway manufacturing industry, main line railway, urban transport operators, infrastructure managers, end users, academia, environmental and urban planning organisations and the European Commission. ERRAC seeks to build consensus and improve synergies between EU, national and private rail research, to strengthen the competitive leadership of the European rail sector to contribute to the EU policy objective of bringing about a modal shift towards rail. **Since 2001 ERRAC has provided collective leadership on high-level strategic issues with a view to generating knowledge through RTD and providing a roadmap for using this knowledge to promote sustainable growth and competitiveness.** ERRAC, by spearheading various co-operative programmes and seeking consensus among the various stakeholders, has been delivering excellence through education, training and research and thereby contributed to product innovation, customer satisfaction and sustainable growth.

The 7th framework programme for research and development¹ (2007-2013) will unfold in a brand new railway environment. Assuming new funding sources are found, the TEN networks should be substantially completed. The urban networks will very likely be subjected to one or

¹ For the sake of convenience, we shall refer to it as FP7.

several directives resulting in increased harmonisation at a European, and ultimately world-wide level, whilst bolstering the competitiveness of the European rail manufacturing industry. For conventional rail, European interoperability directives will be in the process of implementation, spurred by the ERA², and the different domestic markets will be gradually open to competition as advocated by European legislation, through the so-called railway packages. These two dimensions of technical harmonisation and deregulation/opening up **are conditional to the achievement of the most critical dimension: the competitiveness, attractiveness and performance of the entire rail transport mode achieved through innovation and research.**

Therefore, ERRAC is of the opinion that transport research and in particular rail research should remain an integral part of FP7. This will support EU policies on employment, industry, the internal market, environment and transport.

A- Rail research contribution to European policy

FP7 is being prepared at a time when - **in ERRAC's opinion** - the **2001 White Paper, which describes a European vision for transport by 2010³, remains a valid policy objective.** ERRAC endorses not only its guidelines for implementing a strategy to charge transport according to the polluter-pays principle - as agreed at the Göteborg Council -, but also the measures to revitalise alternative modes to road transport, and to target investment in the trans-European network, with all this designed to reduce the impact on the environment and increase safety and security. **It is worth remembering that most of these guidelines dovetail with the basic assumptions made in the Strategic Rail Research Agenda (SRRA) for the 2020 time horizon.**

Needless to say the rail sector in Europe is also competing with other transportation modes, not only with car/trucks transportation but also now with low-cost air travel. This situation makes the case for more cost-effective innovation and targeted research in the European rail sector in Europe, which takes into account the cost of migrating existing operational practices as well as future innovative operational concepts and technologies.

Over the past years, the importance of the "research and innovation" dimension has been flagged up by the extensive work launched at the Commission's initiative⁴ which has resulted in the Member States setting themselves concrete objectives in the field of R&D and the knowledge economy⁵. These objectives however are contingent on Member States committing to devote 3% of their GDP to research by 2010. Stakeholders

² European Railway Agency.

³ Ref.: Press kit-lbfr – Sept 2001.

⁴ The EUR 20713 report "Raising EU R&D Intensity" (2003) is the culmination of this.

⁵ The Lisbon summit of March 2000 was followed up by an action plan (COM(2003) 226 final/2) adopted by the Commission on 30 April 2003.

from industry and the private sector will also need to step up their efforts in the field of R&D if this goal is to be achieved.

In its recent communication⁶ on the preparation of FP7, the Commission puts forward a proposal to double the budget⁷ devoted to research and divide it among 6 main objectives: (1) creating centres of excellence, (2) launching technological initiatives, (3) basic research, (4) making Europe more attractive, (5) research infrastructures and (6) co-ordination of national research programmes.

The rail sector is directly concerned by each of these 6 objectives as illustrated by the following examples:

- Centres of excellence are starting: EURNEX⁸, TRANSNET and EXTR@WEB.
- Further technological initiatives, especially to enable a cost-effective implementation of interoperability, are required, building on past and current projects such as ModTrain, EUDD and ProMain.
- Assign responsibilities in the field of basic research and ensure the continuation of corresponding projects (ICON, WIDEM).
- Establish Europe as the most attractive place to conduct railway research (Galileo applications, GSMR applications).
- Develop research infrastructures adapted to the need of a single European rail area (REPID, Libertin, Trainsafe, ESC users group).
- Increase synergies between European and national pre-competitive joint research (ERANET).

The rail sector represents in Europe a genuine economic and technological strength⁹:

- A turnover of 80 billion Euro generated by European mainline & local Mass Transit Operators with a workforce estimated at 1 000 000 people (2001)¹⁰
- A turnover of 36 billion Euro generated by the European Rail Supply Industry employing more than 100 000 people (2004)¹¹
- The European rail supply industry (manufacturers) is the world leader in the sector. Europe moreover accounts for 55%¹² of the world rail market
- Currently and albeit still too fragmented¹³, European rail research is seen as one of the best in the world together with Japan.

⁶ ref.: COM 2004 – 353.

⁷ In other words, 10 billion Euro per year for the 2007-2013 period. These figures have to be compared with the 17 billion Euro budget of FP6 (2002-2006).

⁸ Network of excellence, started in 2004 with more than 60 participants.

⁹ These figures relate to EU-15 i.e. before 2004.

¹⁰ In “A joint strategy for European Rail Research”, Sept. 2001.

¹¹ Figures relate for rail supply, TTS, signalling, services, telecom and electrification (excluding track works) and people directly employed (source: UNIFE).

¹² This figure is also the result of consultancy works undertaken by operators

¹³ See recent ERRAC contribution “The research implications of the railway investment programmes in some of the EU member states”.

However this dominant position, which could pave the way to a kind of “Airbus” in the rail sector, is under pressure from manufacturers stemming from other continents, in particular Asia. Nevertheless, the sector as a whole feels that the booming market in Asia, especially in China, is also an opportunity for it to showcase European technologies and know-how in this field, provided innovative activities are carried out in Europe.

Rail research is hence seen as a prerequisite for a successful European transport system in the years to come. Research helps to maintain and further expand the European innovative capability of the whole sector, to deliver efficient performance, to attract more passengers and goods and consolidate the European rail industry in its position as a leader in the railway world. All ERRAC members support the need to stimulate joint pre-competitive research and develop knowledge to enable the growth of the sector.

In that regard, research will help maintain the European innovative capability of a sector which will have to rise to considerable challenges. Research, which always has a medium-term impact on competitiveness, also helps build up new and important industrial partnerships that could only be sketched out by European research programmes.

Indeed, ERRAC feels that rail sector investment generates multiplier effects in an environment where transport demand between 2000 and 2020 is set to grow by 40% in the passenger sector, rising to 7 500 billion passenger-km, and by 70% in the freight sector, rising to 6 000 billion tonne-km. To rise to this challenge, new solutions must be developed and prepared.

B- The European Rail Research Potential

In the field of research, ERRAC notes that major inroads have been made over the past two years and that these should help guide discussions on rail research priorities for FP7:

1. The definition of a strategic Agenda common to all stakeholders, be they from industry, Member States or other stakeholders, is playing an important role within the sector and can be considered as a contribution to the various EU policies, including the action plan adopted by the Commission on 30 April 2003¹⁴. Published at the end of 2002, it not only serves as a consensus and benchmark document for defining a European railway research policy but is also being implemented since 2004.

ERRAC recommends that the 6 strategic priorities¹⁵ identified in the SRRA be used in FP7 to allow the continuation of the progress and achievements made since its publication.

¹⁴ See footnote 5

¹⁵ Seamless Passenger Services, Customised Freight Services, Integrated Mass Transit Services, Fully Interoperable Rolling Stock, Impact and Sustainability. ERRAC Strategic Agenda also puts forward “key technologies” (rolling stock and infrastructure performance, telematics solutions, environmental performance, innovative materials and products).

2. It should be noted that rail sector stakeholders have increasingly coalesced around the priorities of the FP6 calls as a result of which the quality of the proposals has increased and rail research has been managed efficiently at European level. Although the FP6 is only entering its third year the rail sector can already boast a very impressive record in terms of the project proposals submitted and the involvement and partnerships with European players: integrated projects like ModTrain, Sustainable Bridges, InteGRail and ModUrban demonstrate this improvement and the commitment of the whole sector. The same can be said for other projects such as BRAVO, New Opera, TREND and Reorient and for the mobility scheme “Marie Curie”.

It is worthwhile noting that this increased investment and co-operation in rail R&D has been taking place from FP4 onwards, leading to concrete results and products, such as increased interoperability, modularity, noise reduction, safety...For example, products developed in the Craft project, Squeal were sold to the New York metropolitan and also applied in various places in Europe. Safetrain setting new standards for passive safety and ERTMS developing the new European Control command system also implemented outside Europe (South Korea, Taiwan) are other examples.

*ERRAC recommends that this momentum be pursued for FP7 and that the **tools selected to implement the strategic plan be compatible with the sector. It is therefore important that FP7 pools, in an intelligent way, the new (large) and old (small) technological co-operation tools** (see also the following item on the matter).*

This variety in the implementation tools will enable FP7 to support on the one hand truly European projects with budgets running into several millions of Euro, and on the other hand, smaller projects aimed at developing innovative solutions for specific problems.

3. ERRAC has been working for 3 years as a platform in the field of rail research. ***In order to move from an advisory to an executive platform status where projects are built and designed, where technologies are exchanged, additional means, and in particular funding, are needed.*** This will act as a spur for achieving the 3% target of R&D expenditure in 2010.

Taking integration even further and bringing together rail research stakeholders, **ERRAC's tasks for 2005-2006 are designed along these lines, i.e. rail stakeholders will continue to improve the co-ordination of their pre-competitive research offerings and move towards the creation of a technological platform** capable of having a more executive role in the field of research, which could be properly in place by the beginning of FP7. A technology platform will also help minimise rail research fragmentation and schedule and manage more appropriately research activities at European level.

4. Reflecting a trade-off between stakeholder involvement and market pressures, budgets devoted to railway research are, generally speaking, on the increase in Europe. Operators and industry are working together on market- as well as technology-oriented research enabling them to scale down their costs and focus on their core business. For European manufacturers, the level of investment already surpasses 4% (1 billion Euros per year) of the turnover with the figures for operators lying at a little more than 0.4 %¹⁶ of their turnover.

ERRAC recommends that the budget devoted to railway research in FP7 be increased at least in the same proportion as the overall programme itself. In concrete terms, ERRAC is advocating a budgetary package of 400 million Euro for the rail sector, in other words double the amount earmarked in FP6.

The railway stakeholders, manufacturers and operators, accept the challenge to match the required budget by investing a similar amount of resources and jointly carrying out pre-competitive R&D on the basis of the Strategic Rail Research Agenda.

5. Since 2002 the ERRAC strategic Agenda (SRRA) has continued to mobilise all players in the European railway research field. In its recent work, ERRAC however has drawn attention¹⁷ to the discrepancies that existed between the SRRA priorities and the research themes in FP5. It has also flagged up the heterogeneous nature of the national programmes together with the decoupling between the different priorities in national railway research programmes and those set out in the FP6 surface transport programme of work, despite the fact that by and large national research efforts in the railway field outstrip those of the community.

ERRAC therefore recommends that FP7 (1) takes better account of national efforts when it comes to drawing up the rail research programme of work and, most importantly of all, (2) steps up efforts to develop links with national programmes so that all parties can gear their efforts towards the implementation of the 2020 strategic research plan. ERRAC therefore fully supports the Commission's objective (6)¹⁸ as well as any initiative designed to develop synergies and complementarities with the national dimensions of rail research and others. Redundancies need to be avoided, with a better co-ordination of research around the objectives of the ERRAC strategic plan. **ERRAC stresses the need to overcome fragmentation and unnecessary duplication in rail research. It advocates efforts to ensure other intergovernmental, national and private research activities complement each other.** The

¹⁶ Operators' research is aimed at providing more efficient, attractive and competitive services, whereas manufacturers rather invest far more in the research in order to meet the requirements of the operators for cost-effective innovation. These two kinds of research are complementary.




¹⁷ Cf. "A comparison of MS public research programmes with the ERRAC SRRA 2020" et "FP5 rail related Project in comparison with ERRAC SRRA 2020". See also on this topic the investigation made by UITP on the analysis of FP4 and FP6 rail projects on IST.

¹⁸ In IP/04/750 of 16 June 2004.

following table illustrates both complementarities and redundancies of some national transport programmes when compared with ERRAC's SRRA.

Coverage of the SRRA by the National Programmes

Country \ ERRAC Research Clusters & Research Areas	Considered EU Countries								
	Austria	Finland	France	Germany	Netherlands	Portugal	Spain	Sweden	UK
Interoperability									
Future Train/Traffic Management Systems	●	●	●	●	●	●	●	●	●
Technology to Facilitate Dedicated Freight Lines	●	●	●	●	●	●	●	●	●
Toolkit to Enhance Interoperability and Modularity	●	●	●	●	●	●	●	●	●
Definition of Common Operational Rules	●	●	●	●	●	●	●	●	●
Intelligent Mobility									
Seamless Transport	●	●	●	●	●	●	●	●	●
Harmonised Services for Operators	●	●	●	●	●	●	●	●	●
Harmonised Services for Customers	●	●	●	●	●	●	●	●	●
Safety and security									
Philosophy, Human Factors, IT, Customers...	●	●	●	●	●	●	●	●	●
Environment									
Noise Performance	●	●	●	●	●	●	●	●	●
Emissions	●	●	●	●	●	●	●	●	●
Energy Consumption	●	●	●	●	●	●	●	●	●
Design / Technologies	●	●	●	●	●	●	●	●	●
Innovative Materials & Production Methods									
Wheel-Rail Interaction	●	●	●	●	●	●	●	●	●
Engineering Sciences	●	●	●	●	●	●	●	●	●
Integrated Functions	●	●	●	●	●	●	●	●	●
Hybrid solutions	●	●	●	●	●	●	●	●	●
Logistics	●	●	●	●	●	●	●	●	●
Raw Materials	●	●	●	●	●	●	●	●	●
Production Technologies & Surface Treatment	●	●	●	●	●	●	●	●	●

-  Research area NOT covered by the programme
-  Research area PARTLY covered by the programme
-  Research area COVERED by the programme

C- The European Added Value of Rail research

6. As has been developed in proposal #1, ERRAC feels that the strategic priorities and key technologies as defined in the strategic agenda should remain the priorities of FP7. **ERRAC advocates however that FP7 take greater account of the implementation of interoperability as well as technical and operational harmonisation questions facing European mainline railways** which are often overlooked in national research programmes as well as in the high-level reports commissioned by the EU¹⁹.

It is no longer possible to conceive rail transport at national level, with the organisation of transport gradually taking on a European dimension, under the influence of the factors explained in the introduction. This shift must be flanked by research to help overcome the technical constraints resulting from over a century of parallel evolution, give Europe the means to engineer a modal shift in long distance rail transport and enable the development of cost-effective solutions to relieve urban congestion, even though the latter is contingent on investment in the implementation of interoperable systems or components, rather than in research solutions.

7. On a slightly different register, **the European rail sector also advocates increased intermodality and greater integration with the European transport chains**. This presupposes that the different transport modes need to work in unison, intelligently and productively throughout the European territory. This objective ties in with the concepts of "intelligent mobility" and "seamless transport"²⁰ developed in ERRAC's strategic plan. The pressure towards intermodality which is set to intensify in the years to come should be duly taken into account in the research priorities of FP7 to guarantee a holistic and sustainable EU transport system.

8. Rail sector investment allied with the financial and technical difficulties related to network maintenance also represent a major challenge that is almost certain to increase over the coming years. All countries, municipalities, mainline and urban rail operators are affected by this

¹⁹ See the Van Miert report (June 2003) which overlooks matters in connection with interoperability and technological innovation. The same applies to the TEN Invest study carried out by PLANCO in January 2003.

²⁰ Referred to as such ("intelligent mobility" and "seamless transport") in the ERRAC strategic agenda.

considerable obstacle, which is jeopardising the future of the entire European rail sector.

ERRAC recommends FP7 to incorporate the “innovation” facet of rail infrastructure construction, its maintenance and efficient use of existing infrastructure. The final objective, as European added value, is to contribute to attracting increased public and private investment.

9. The metro, urban and suburban light rail systems account for a very significant portion of the passenger urban transport market. 80% of European citizens live in built-up areas. A recent ERRAC study²¹ has shown that by 2020, the light rail market is set to increase to 40 billion Euro²², with the corresponding amount for metros due to rise to 116 billion Euro²³. **The same study highlights investment requirements for research, putting them at between 600 million and 1 billion for light rail and between 1.6 billion and 2.5 billion for metro systems²⁴.**

Even though **these figures** are theoretical, **they underline the importance of devising new economic models to fund these new infrastructures (and the associated rolling stock) whilst developing services increasingly better adapted to an ever-ageing population.**

Accessibility, the door-to-door concept, the integration of information technologies to better serve users, as well as the improved environmental performance of urban transport (noise), against a backdrop of providing optimum safety, all represent key issues which should feature clearly and transparently in FP7.

10. **Over the past years, European authorities have paid special attention²⁵ to questions related to conformity, cross-acceptance and standardisation²⁶.** Progress however is slow and a great deal of work remains to be done at European level. These problems continue to stymie manufacturers' efforts to achieve significant economies of scale and economies of scope²⁷, with the former having to contend with different rolling stock acceptance procedures in the various European Union countries. The same applies for the mainline and urban rail operators for operating trains, trams and metros in Europe.

²¹ “Light Rail and Metro Systems in Europe: current market, perspectives and research implication”, April 2004.

²² 30 billion for infrastructure and a figure comprising between 9 and 14 billion for rolling stock (enlarged EU). Figures exclude expenditures for infrastructure refurbishment and/or segregation.

²³ 95 billion for infrastructure and 21 billion for rolling stock (enlarged EU).

²⁴ Based on the assumption made by the European Commission that stakeholders spend 3% of their turnover on R&D for rolling stock and between 1 and 2% for infrastructure.

²⁵ Directives 2004/50/EC, 2001/16/EC and/or 96/48/EC.

²⁶ ERRAC expresses the view that a European standard could become a worldwide one through CEN-CENELEC and thanks to their co-operation with world standardisation bodies. As said in the introduction, this issue is a key factor for the competitiveness of the sector.

²⁷ See on this matter the report produced by group 3 of ERRAC “Future research needs for the transition process to a harmonised European railway market” (summer 2004).

6- Prospective synergies of ERRAC SRRA with the R&D programmes of other transportation modes (draft 3, autumn 2004)

7- Rail research in Japan in comparison with ERRAC SRRA (summer 2004)

8- Future research needs for the transition process to a harmonised European railway market (summer 2004).

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²⁸ Countries in capital letters relate to member states representatives.

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