IMPLEMENTING THE EUROPEAN STRATEGIC RAIL RESEARCH AGENDA – SRRA: THE EU PROJECT ERRAC ROADMAP EXPLAINED.

The European Rail Research Platform – ERRAC has been set up 2001, involving all rail stakeholders, including manufacturing industry, railway operators, infra-structure managers, research institutes and academia, representatives of the European Member States and Associated States and representatives of railway user groups which is quite unique. Besides this European Technology Platform (ETP) there is a number of other Technology Platforms active, such as 3 others focused on the other modes of transport (road, rail and aeronautics).

These ETP’s were set up and supported by the European Commission with the following goals in mind, to:

- Provide a framework for stakeholders, led by industry, to define research and development priorities, timeframes and action plans on a number of strategically important issues where achieving Europe's future growth, competitiveness and sustainability objectives is dependent upon major research and technological advances in the medium to long term.
- Play a key role in ensuring an adequate focus of research funding on areas with a high degree of industrial relevance, by covering the whole economic value chain and by mobilizing public authorities at national and regional levels. In fostering effective public-private partnerships, technology platforms have the potential to contribute significantly to the renewed Lisbon strategy and to the development of a European Research Area of knowledge for growth. As such, they are proving to be powerful actors in the development of European research policy, in particular in orienting the Seventh Research Framework Programme to better meet the needs of industry.
- Address technological challenges that can potentially contribute to a number of key objectives which are essential for Europe's future competitiveness, including the timely development and deployment of new technologies, technology development with a view to sustainable development, new technology-based public goods and services, technological breakthroughs necessary to remain at the leading edge in high technology sectors and the restructuring of traditional industrial sectors.

The above mentioned goals hold true for ERRAC and on the one hand rail research should support and enhance the competitiveness of the European industry while on the other hand it should lead to a strong position of the rail transport system within the overall European transportation.

Innovating and harmonizing products and technologies are a necessity for the rail market to deploy all its potential, and for its stakeholders to deliver cost-effective services for intermediate and final clients. Rail transport in Europe is a future-oriented industry and is striving to offer an even more attractive, affordable, safe, clean, competitive and reliable transport mode.

In 2001, ERRAC developed a strategic document, containing a Vision for the future and describing the way to this railway system of the future. The document was called: "A Joint Strategy for European Rail Research 2020 - Towards a Single European Railway System" and it stated a number of goals which today still are valid:

The principal objectives of the proposed interoperable railway system in Europe by the year 2020 are:
- **For rail to achieve a 10% market share of passenger traffic in the EU** with no detrimental environmental impact. This represents a doubling of passenger kilometers within less than twenty years
- **For rail to achieve a 15% market share of freight traffic in the EU** with no detrimental environmental impact. This represents a tripling of ton kilometers within less than twenty years
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- A threefold increase in productivity
- Elimination of avoidable fatal accidents within proposed interoperable European railway system;
- A 50% gain in energy efficiency over vehicle or product life cycles;
- A 50% reduction in the generation of pollutants over the life cycle of rail industry products and services;
- An increase in network capacity to accommodate the traffic projections given above.

The next step ERRAC made was to elaborate these objectives into a Strategic Rail research Agenda – SRRA. This document was published in 2002 and updated in 2007. Together with the “vision” document, these documents formed the basis upon which the ERRAC work was done and on which the advice on rail research priorities were given to the European Commission.

Soon after the publication of the updated SRRA, it was decided that one step further needed to be taken on the way from vision and strategy to implementation: a ROADMAP was needed, designing every step in the implementation of the strategy towards the proposed interoperable railway system in Europe.

Translating the 7 SRRA priority areas into the 5 priorities the European Commission uses to describe the ‘action lines’ of the Transport Program of the 7th Framework Program for Research led us to the backbone of what we call now the ERRAC ROADMAP project which is another step forward in the very constructive cooperation and coordination process of all European rail stakeholders.

The EU funded ERRAC ROADMAP project, in which again all European rail stakeholders are included, describes on an annual bases the research priorities and steps. It also forms the basis on which basis the European Commission will be advised as an input to their work programs and Calls for Proposals of the Framework Program. Even though we mainly work with these 5 strategic Work Packages in the project we regard the railways as a system with all components inter-acting as well as the Work packages of the project are inter-acting. And besides that, the working teams of the project are open to every interested party to give their contribution and the project has many links with the “outside world” as becomes clear from the picture below.
Within this project – which officially runs for three years from June 2009 till July 2012 – one can discern 3 important main activities:

- The actual “road-mapping” work carried out in the WP’s 1 – 5
- The setting up a rail research data-base to collect all rail research related information to provide a knowledge base and overview in order to build upon and to prevent doubling of activities
- The evaluation of finalized rail research projects especially with the focus on the degree of implementation of the deliverables project

This presentation will give you the global overview of the project and how all European – and even global – rail transport stakeholders can be involved in the process of identifying and Road-mapping necessary rail research areas and topics. On the other hand it will in short go into the unique process of evaluating as many as possible previous European rail research projects in order to measure the “market up-take” of the project results as well as the reasons behind this for success (or less success). This activity within the ERRAC Roadmap project’s WP06 is strongly used as feedback into the Roadmap process as well as into the build-up of future rail research projects.

The general framework of the activities for the next years is organized under the following working groups and for each Work Package with a defined leadership and involvement by the rail stakeholders:

- WP01 The greening of surface transport
- WP02 Encouraging modal shift (long distance) and decongesting transport corridors
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- WP03 Ensuring sustainable urban transport (including modal shift, light rail vehicles and metros
- WP04 Improving safety and security
- WP05 Strengthening competitiveness
- WP06 Past projects evaluation and Evaluation Database
- WP07 Communication

ERRAC cooperates closely with The European Commission’s DG Research and DG MOVE as well as with other European Transport Technology Platforms especially those in the transport sector and as well as on construction.

Cooperation with ERTRAC, the European Road Transport Research Advisory Council, was established under the ERRAC-Roadmaps WP02 and WP03 as well as with EIRAC, the European Intermodal Research Advisory Council. Cooperation on all the ERRAC activities was also set with emerging national Rail Technology Platforms such as in particular the Spanish (PT FE) and Czech Technology Platforms for Rail.

Remembering ERRAC’s goal to build consensus in defining future rail research needs, each ERRAC WP contributes successfully and influentially to the new FP7 Framework Programme Calls with the definition rail R&D topics priorities, submitted to the European Commission in December annually. In the past year, all ERRAC’s priority suggestions + their detailed descriptions of the research topics were taken on board, to be published as part of the 4th Call for Proposals which will open in July 2010.

Officially the ERRAC-ROADMAPS project started on 1 June 2009. However, things started rolling soon after the submission of the project proposal for the 2nd Call for Proposals of the 7th Framework Program for Research of the European Commission and Work Package teams for the future project were formed. The first task these WP teams set themselves was to prepare their contribution to the content, topics and topic descriptions for the 3rd FP7 Call for Proposals in line with the future roadmaps.

In December 2008, ERRAC, through its provisional Roadmap WP teams, sent the European Commission its recommendations for railway research priorities and the Commission took them into account in the published FP7 3rd call in July 2009, the new ROADMAP formula gathering the European rail stakeholders in ERRAC was shown to be a success.

Following the Call for Proposals, ERRAC has facilitated the forming of some of the proposals and has followed those that we knew were being prepared. Forming consortia were advised to use the “EU project checklist”, which was developed by the ERRAC Evaluation Working Group, in their proposal preparation. This list is based upon an ongoing ERRAC process of evaluating the impact or “market uptake” of EU-funded rail research projects and considers all factors that can have a negative or positive effect on the success of a project.

Fulfilling its advisory role towards the Commission ERRAC also submitted in December 2009 the sector research priorities for the FP7 4th call, expected to be published in June/July 2010.

To better respond to the FP7 Work Programs, the six main priorities in the updated SRRA have been translated into the EC priorities for Transport Research, adding an Evaluation and Rail research Database and a Management WP, resulting in the following six working packages.

WP01 – “Greening of surface transport” intends to provide three contributions to this large roadmap process. The first contribution will be an energy roadmap followed by a strategy for noise and vibration mitigation and finally a concept for optimized recycling and environmentally friendly products. The railway system will be significantly affected by the impact of climate change, with increases in temperatures leading to more severe operating conditions. However, the environmental benefits of rail in a European transport environment driven by carbon trading will foster political expectations that rail will take a much higher share of passenger and freight transportation than at present. Furthermore, even though the railway is the most energy-efficient and green transport mode, research is needed on energy efficiency and eco-design to further improve the performance of rail in a context where energy resources are getting scarce and legislation on emissions stricter.
Control of exhaust emissions (e.g. particulate generation and propagation in diesel mode) and the necessary reduction of dependence on fossil fuels (e.g. use of bio-fuels of 2nd generation) will therefore be examined. Furthermore, despite electric propulsion being environmentally friendly due to very efficient electric motors and the fact that eco-energy can be used, the way in which energy is lost in infrastructure, the rolling stock, the interfaces of the system and how these losses could be saved or how energy could be temporarily stored to maximize the global efficiency will also be examined.

As regards noise and vibration mitigation, these have to be considered in a system and holistic approach to reduce emissions and external perceived noise levels. Much has been done but the research efforts should go on by reducing noise from individual sources (freight trains, diesel engines, etc.), or developing technologies for active noise and vibration control. Software tools will assist the development of methods to reduce noise at source, to derive technologies and to enhance system assessment and decision-making processes.

Last but not least, becoming greener means that the overall railway life cycle and especially elimination of materials with a negative environmental impact should also be considered. Measures such as closed cycle waste management systems for a high level of recycling, historical legacy of old infrastructure (creosote sleepers), greener land use, pollution from the rail sources (chemical treatment against shrubbery) and the emissions of electromagnetic waves will thus be considered.

**WP02** – “Encouraging modal shift” (long distance) and decongesting transport corridors aims to identify research that can promote efficient supply chains that are more flexible in responding to customer demands. The objective is to achieve a seamless door-to-door transport for goods with the use of technologies, systems, processes, equipments and business cases capable of ensuring effective intermodality. This broad scope allows identification and prioritization of knowledge gaps to be researched in order to integrate the railways, co-modality, into an effective European freight logistics system meeting market demand and the need of society at large, ensuring rail freight business moves towards achieving the declared ERRAC objectives of doubling the freight traffic volumes by 2020. In order to obtain capacity or an increased rail freight volume, a dynamic approach to capacity management that enables more fluid traffic and energy savings can be explored. Tools for enabling should be based on the application of existing technologies in order to facilitate implementation and market uptake. This also means investigating and proposing ways to harmonize or standardize important interfaces.

As regards passenger traffic, the focus lies on identifying and proposing research to the European Commission, which supports seamless door-to-door passenger transport with a focus on long-distance rail services, also looking into interfaces with urban transport systems and other transport modes.

**WP03** – “Ensuring sustainable urban transport” (including modal shift, light rail vehicles and metros) focuses on ensuring sustainable (sub) urban transport by identifying future research priorities. Work is split into two sub-work packages: the first focusing on the rail point of view and dealing with suburban and regional rail, and metro and other urban rail-guided systems, while the second, developed in cooperation with ERTRAC SAFIER (a parallel research project allocated to the Technology Platform for Road which includes a work package on “urban mobility” led by POLIS) focusing on urban mobility, addresses the wider issue of sustainable urban mobility, including road transport and “soft” modes (bikes, walking…), as well as land use. This task is building on EURFORUM, a former FP6 R&D project coordinated by UITP (2004-2007) which dealt with European Research for Urban Mobility. From the rail side, the major aim is defining ways to improve the cost effectiveness of “local” rail systems. Meanwhile, from the urban mobility point of view, the ultimate objective is to develop new mobility and land use schemes that rationalize the use of private cars and commercial vehicles and promote public transport and soft modes.

As part of the rail sub-package, two studies are underway. The first study is investigating the market for metro and light rail systems in Europe. Essentially, it is an update of the study “Light Rail and metro systems in Europe” produced by ERRAC in 2005. The second smaller study is investigating the current and potential evolution of the light rail market in Eastern countries.

Two questionnaires have been circulated and results are being analyzed. The result will provide valuable information on existing systems and infrastructure, demand data and future projects and modernization plans. The results will feed into a report to be produced next year, which will identify research priorities for these two markets.
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WP04 – “Improving safety and security” aims to enhance awareness of and perform actions relevant to certain strategic issues that are key elements to improving safety and security in the railway sector. It tackles, in particular, issues relevant to the field of standardization, safety measures, interoperability, safety innovation and cost-effectiveness.

The WP04 has started to undertake a work of review of the main safety and security concerns in the railway sector and has identified the following five priorities:

Priority 1: When considering the reduction of cost induced by the rail sector, fatalities represent by far the largest preoccupation for the sector (65 per cent of total accident costs are spent to cover death and 5 per cent to cover injuries costs). Within the scope of reducing these fatal accidents occurrence, it is very important is to give priority to harmonization of the data collection to which the European Railway Agency is devoting a big effort. Such efforts should be supported in order to accelerate this process completion and hence provide actual meaningful opportunities to analyze, draw conclusions and run concrete mitigations actions.

Priority 2: When targeting mitigation actions for the occurrence of fatalities in rail transport, level crossings and rolling stocks in motion are the two situations of most critical interest.

Priority 3: A thorough analysis and identification of mitigation actions to decrease the occurrence of suicides on the railways is needed.

Priority 4: Increasing the unmanned controls and consequent automated actions to improve safety of both the infrastructure and the trains is of increasing importance. Giving the high incidence of fatalities occurrence at level crossings as well as on open lines, further research is urgently needed to see how the control of these specific assets can be increased, endowing them with extra inspection and monitoring systems which may alert and likely prevent from unauthorized or improper use of the assets (e.g., unauthorized trespassing of tracks, tunnels, tunnels and bridges, improper use of the train doors, etc.)

Priority 5: There is a need to investigate further on some other CSI’s (Common Safety Indicators), such as VPC (Value for Preventing Casualties) and VTTS (Value for Travel Time Savings) as they promise to have a high impact on railway safety performance and on the whole sector trends achievements.

WP05 – “Strengthening competitiveness” deals with the research priority areas of competitiveness, strategy and economics and infrastructure. Changes to the railway system to deliver the railway of the future will have an impact on the cost of rail transport. The first WP05 open workshops will therefore focus on investigating the railway system cost model to ensure that resources are not committed to reducing cost where this will have little benefit to the overall cost of rail transport, or that small improvements in services will not have a large unfavorable cost impact.

This process will use a top-down bottom-up approach designed to provide the following benefits:

- Suggest areas where the greatest economic benefit will be found
- Assist other work streams in understanding the possible cost impact of project proposals
- Indicate where further research is required to understand the cost structure
- Provide information to those responsible for transport strategy on what may be realistic targets for railway cost reduction
- Lead to a better understanding of trade-offs when considering improved services, capacity and sustainability

The high level cost structure for an integrated railway based on UK cost data, presented by the Institute for Transport Studies at Leeds University, and Network Rail at the first WP05 open workshop held in London on 27 October 2009, provided examples of detailed costs for infrastructure maintenance and renewal to demonstrate how large cost categories may be further investigated. The next open workshop developed the cost model against wider European cost data and suggested further research needs.
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**WP06** - The overall scope of the “Past projectsevaluation and Evaluation Database WorkingGroup” is to bring forward and enhance the work done in providing essential information and tools on the lessons learnt from the evaluation of past projects as well as to build up a database with information on as many as rail research projects as possible. This will allow relevant rail-related stakeholders and roadmap producers to make better informed choices and decisions when devising new rail research projects and to avoid doubling of research.

The top level rationale for railway research is rightly always expressed in terms of achieving results and contributing to solving problems or making further steps in improvement or cost reduction etc. This focus on results can be seen in all declarations from the Commission, national political groups and in the EC transport White Paper. It is a given that, of course, unless research results are actually used and implemented, they will have in no way contributed to all these high level ambitions.

During the past years, a great number of rail research projects have been funded by the European Commission in previous Framework Programmes and billions of Euros have been spent. Yet it has not always been easy to gain full awareness of all the relevant research that has been carried out. Valuable research results are often lost and the risk of overlapping and/or generating redundant rail project initiatives is significant. The aim of WP06 is therefore to provide a database of previous and existing national and European projects to support the ROADMAP Work Packages 1-5 in order to build on valuable results and also to ensure that valuable research undertaken in the past is not forgotten.

ERRAC Roadmap WP06 has defined the reasons for success, good criteria and best practice for all the projects funded by the European Commission over the last 20 years, based on the evaluations carried out by the ERRAC-Roadmap WP06 Evaluation work package.

The ERRAC Roadmaps WP06 Evaluation work package, consisting in a group of experts in the rail sector, finalised from June 2009 to August 2010 a significant number of project evaluations. Thanks to the fact that an initial work for some evaluations started before 2009, the WP06 was able to analyse the market uptake of 46 different projects.

This annual deliverable highlights which have been the reasons for outcome and lessons learnt from each of the projects evaluated. Moreover, a brief description of each of the projects and an overall summary of the lessons learnt and recommendation is also included.

The project evaluation methodology is based on an analysis of project results and deliverables, together with a set of interviews with project participants and other stakeholders. The aim is not so much to evaluate the contents of the projects per se, but rather to assess the actual implementation and market uptake of the project results once the work has ended.

The definition of a project with a strong market uptake has been defined as follows:

“A project will be evaluated with a strong market uptake if there is clear evidence of use of products or services, processes, dissemination of knowledge, tools, etc. in several countries/products and the major objectives of the project have been implemented. These projects will sometimes lead to additional research to realize their full market uptake.”

The definition of a project with a weak market uptake has been defined as follows:

A project will be evaluated with a weak market uptake if no known use of products, services, processes, knowledge, tools, etc. has been identified anywhere. No follow up project is needed unless the reason for the market uptake failure is clearly understood and removed.

The results of the project evaluations are being fed into the work of the “strategic Work Packages of the ERRAC Roadmap project (WP01 – WP05). Also they are included into the Rail research database as set up and maintained by the UIC (International Union of Railways) as well as integrated into the European Commission’s Transport Research Knowledge Centre TRKC.
On the basis of the evaluation work as carried out by ERRAC a “Market Uptake Checklist” has been developed, which is available as an important tool to use when preparing projects and project proposals.

Complementary to the evaluation work, the ERRAC-Roadmaps WP06 members offered in 2009 to all known coordinators of a project proposal for the FP7 3rd call the opportunity to discuss the project idea and structure and receive the advice that would help them to finalise a proposal with potential better market uptake. The WP06 is also publicly available for consultation of running or ended projects; advice on market uptake strategy can be given at any time in a project life-cycle: during the proposal, in the mid-term evaluation, during the development of the implementation plan or after the end of the research phase.

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