Way ahead to a Europe 27 integrated Research Area – CVUT a keymember within Eurnex

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Abstract: The Transport system in Europe is faced with a challenging situation. Recent forecasts anticipate tremendous overall transport growth for freight (> 60% by 2015) and passenger transport (> 20% by 2015). In parallel the re-structuring and consolidation of the European railway sector is an ongoing process.

Strengthening the position of the rail transport mode and further generation of growth in a dynamic but safe and secure environment demands for scientific and technological innovations enhancing the quality of service and the economic competitiveness.

This lecture will highlight the need and relevance of collaboration of industry, operators and science, esp. of joint research of specialized experts for the required innovations. It will therefore illustrate two emerging examples and their first encouraging experiences made.

Some of the most important European Commission funded research and development projects in the railway sector are the ongoing 'Innovative Modular Vehicle Concepts for an Integrated European Railway System' and the 'European Rail Research Network of Excellence'.

Both projects, concentrating on the development of advanced research to customer satisfying innovations, are set up along the new culture of cooperation of industry, operators and science.

Together with its partners the FAV focuses on "strengthening the strengths" by defining, developing and implementing future- and market oriented technology projects to contribute with European scientific and technological innovations to the development of the competitive, efficient and safe rail system of the future.

1. Introduction

The Forschungs- und Anwendungsverbund Verkehrssystemtechnik (FAV) Berlin (Transportation Technology Systems Network) is the Berlin region network manager of scientific institutes, industry, SMEs and operators/end users in the field of transport technology systems. It initiates, implements and manages projects of interdisciplinary design aiming at better and more appropriate solutions for mobility problems concerning people and freight. The development of the German capital region towards an international recognized “Centre of Excellence for Transport and Mobility” is the main objective of FAV. The work is focused on four strategic fields:

- Rail technology
- Automotive Engineering
- Aeronautics & Aerospace
- Logistic & Transport Telematics

- system engineering
- human factors & ergonomics
- economics and ecologies
The large scale international RTD projects such as European Driver’s Desk (EUDD), the Transport and Environment aLLiance for Urban Sustainability (TELLUS), the biggest ModTrain subproject ModLink and the European Rail Research Network of Excellence (EURNEX) are selected examples of FAV’s project management work. FAV Berlin responsible bodies are the Technology Foundation Berlin, the University of Technology Berlin and the Berlin State.

European Research Area

Europe has a long standing tradition of excellence in research and innovation, and European teams continue to lead progress in many fields of science and technology. However our centres of excellence are scattered across the continent and all too often their efforts fail to add up in the absence of adequate networking and cooperation. In the past, collaborative actions have been initiated at European and Community level, but now is the time to bring our endeavours together and to build a research and innovation equivalent of the "common market" for goods and services. That structure is called the European Research Area and is regrouping all Community supports for the better coordination of research activities and the convergence of research and innovation policies, at national and EU levels.

2. Selected ongoing major rail research projects

Some of the most important ERRAC supported and EC funded research and development projects in the railway sector are the ongoing 'Innovative Modular Vehicle Concepts for an Integrated European Railway System (ModTrain) ¹', and the 'European Rail Research Network of Excellence (EURNEX)'².

a) Innovative modular rail vehicle concepts to enhance effectiveness and safety of the rail system

The Integrated Project ModTrain is probably the biggest collaborative international railways project dealing with rolling stock technology. ModTrain aims at the definition and the prove of the standardised functional, electrical and mechanical interfaces and interchangeable components and modules which shall form the basis for the next generation of intercity trains and universal locomotives capable of 200 km/h and more. The concept of modularity aims at economic advantages for both railway suppliers and operators, such as reduced manufacturing costs and enhanced economies of scale, increased productivity of new rolling stock as well as improved reliability founded on a rise in proportion of service proven-components in rolling stock designs.

¹ The Integrated Project MODTRAIN is funded by the European Community under the 6th RTD Framework Programme, project n° TIP3-C-2003-506652

² The European Rail Research Network of Excellence EURNEX is funded by the European Community under the 6th RTD Framework Programme, project n° TNE3-CT-2003-506513
b) The European Rail Research Network of Excellence EURNEX: the scientific contribution to the rail system of the future

EURNEX, the European network of excellent rail research, supports the Railway sector and assists the members of the EU to operate an interoperable and competitive rail system across the continent.

EURNEX is therefore dedicated to contribute to major industrial and traffic policy aims of the European Union.

The main objectives of EURNEX are

- to integrate the fragmented European Rail research landscape to provide European leadership and world class excellence in that sector.
- to promote the railway contribution to the sustainable transport policy in Europe.
- to improve the competitiveness and the economic stability of the railway sector by creating a customer oriented and durable network.
- promoting technological innovations and knowledge management.
- implementing knowledge not only from scientific institutes but also from rail operators, infrastructure managers, supply industry including SME’s, focussing on the priorities given by ERRAC, but prepared to cover new critical items which might come up in the future.

EURNEX involves more than 60 scientific institutions (universities and research centres) from 19 European countries with more than 600 researchers. The international rail associations UNIFE (supply industry), UIC (operators) and UITP (light rail sector) are EURNEX participants – they directly represent the rail research customers. The network is coordinated by FAV Berlin.

An important achievement of EURNEX integration process since the start in 2004 was the establishment of a members family concept in a thematic oriented network substructure based on 10 poles clustering the excellent scientific institutions across Europe for specific rail research areas:

1. Strategy and Economics
   e.g.: support strategic decisions relevant for the rail system – support transport policy strategy – support the strategic development of EURNEX – forecast and evaluate economic impacts (LCC analysis)

2. Operation and Systems Performance
   e.g.: interoperability – functional analysis – system architectures – planning and managing operation – optimisation of capacity management and system performance

3. Rolling Stock
   e.g.: bogies and wheel sets – tractions systems – new materials and production methods – crashworthiness
(4) Product Qualification Methods
   e.g.: assessment methods – test procedures and facilities – cross acceptance procedures – scientific support for European harmonisation process (towards ERA and EC)

(5) Intelligent Mobility
   e.g.: intermodal transport, transport telematics – customer information systems – supporting technologies (e.g. Galileo)

(6) Safety and Security
   e.g.: safety and security requirements and management – multi modal risk analysis and measures- technologies to encounter security threats

(7) Environment and Energy Efficiency
   e.g.: noise and vibration – diesel emissions and water pollution – ENC – energy consumption

(8) Infrastructure and Signaling
   e.g.: track including sub-grade and rail – switches, crossings – level crossing – wheel-track interface – signaling and control systems – line side equipment

(9) Human Factors
   e.g.: human-machine interaction – anthrometry – functional division between human and machine

(10) Training and Education
   e.g.: future education and training needs for rail professionals – short training courses according to stakeholder needs – European Rail Virtual University (EURail)

To achieve the ambitious goals EURNEX develops a wide range of corporate services to support the EURNEX members and their research customers.

There selected examples of EURNEX corporate services for its members and the railway community are e.g.:

➢ A new approach for rail knowledge management: The EURNEX Knowledge Management System (KMS):
   The EURNEX KMS aims to become the main Knowledge Exchange platform dedicated to Rail Research Projects.

The Business objectives of the KMS are to

- Collect and assure knowledge
- Provide easy access to knowledge to the members (research excellencies)
- Facilitate communication between the core expert of the poles,
- Provide information about knowledge to the customers as incentive system for further research contracts
- Provide collected rail knowledge to the customers (library function)

The KMS structure has been defined in order to fulfill these objectives, and to implement an efficient communication / management tool for all EURNEX members, an Attractive EURNEX show case towards customers and public and an Unique Rail system knowledge library.
Neutral support for Product Qualification Methods, railway testing and simulation led by CVUT

Using the individual capabilities of the network members added value is created by networking of facilities and knowledge sharing. Neutral expertise on international European level will contribute to cross-countries harmonisation of product qualification methods and modelling of standards.

To be able to bring the added value in introduced areas the following competences are available within the pole:

- Assessment of product design and specification
- New laboratory testing procedures
- Materials and technology – analysis and testing
- Design and management of facilities
- Modelling procedures
- Quality control system
- Communications and software reliability and product qualification.

Main areas of research and capabilities relevant for the scope of the pole:

- Assessment of software reliability
- Reliability of control, electronics, simulations and modelling
- System analysis and system integration
- Interoperability in the rail control systems
- GSM-R applications system assessment, development, simulations (unique laboratory for the rail communication)

CVUT- Coorperation with ERA

The Coorperate Service has been preparing conditions for KMS development in the field of PQM. Also the effort to create methods, tests, and models in the field of both data and information interoperability may be a significant benefit.

The Meaning of EURNEX for a European Research Area

The integration of capabilities results to a better quality, costs and time to contribution. From this follows more and better innovations as contribution to a competitive rail system of the future.

CVUT integrating the CEEG research excellencies and pushes CEEG integration in the EU, in technological and political frame.
The EURNEX virtual rail university EURail

The EURNEX virtual rail university EURail provides high quality training and education activities for the railway community of tomorrow.

The development of a strategy for incorporating “e-learning” into both mainstream and non-traditional programmes will meet public expectations and enhance learning opportunities. The strategic plan will set forth a vision for distance learning market in EURNEX community. A vision for operating model technology, a funding strategy to provide software, hardware, support staff, training support, strategies for supporting programme development and promoting teaching and learning with technology, collaborative services, and a program to ensure on-going assessment, planning, and accountability of educational technology initiatives is currently to be set up.

The EURNEX strategy in “training and education” follows two major tracks:

- Short training courses (STC), an offer for targeted further training of railway professionals (engineers, economists, etc.)
- EURNEX European University of Railway (EURail), a virtual network of universities involved in EURNEX to develop and to perform international courses for students and post-graduates

1. CONCLUSION: STEP BY STEP CONTRIBUTIONS TOWARDS A SAFE, RELIABLE, AFFORDABLE AND ATTRACTIVE RAIL SYSTEM OF THE FUTURE

The process of re-structuring and consolidation of the European railway sector is still ongoing. Strengthening the position of the rail transport mode and further generation of growth in a dynamic and challenging but safe and secure environment demands for technological developments enhancing the quality of service and the economic competitiveness.

EURNEX as the leading force in rail research has to fill its agreed place in the triangle of partnership “operators – supply industry – scientists” (fig. 2) to contribute with the scientific rail research excellence to the future competitive rail system.

ModTrain is an emerging example along the new culture of cooperation to commonly harmonise standards and to develop and implement edge technology.

This is the roadmap for FAV’s and its partners activities in the rail system sector. Together with its partners the FAV focuses on "strengthening the strengths" by defining, developing and implementing future- and market oriented technology projects.
FAV and its partners are very pleased to already contribute with European scientific and technological innovations to the development of the competitive, efficient and safe rail system of the future.

REFERENCES

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[3]: European Rail Research Advisory Council (ERRAC): Rail 21 – Sustainable rail systems for a connected Europe; Feb. 2006; www.errac.org


LIST OF FIGURES

FIGURE 1: EURNEX integrates more than 60 research institutes throughout Europe
FIGURE 2: The new partnership to improve the rail system competitiveness in Europe