

The logo for EURNEX, featuring the word "EURNEX" in a bold, blue, sans-serif font. The letters are slightly shadowed and have a light blue glow around them. The "X" is stylized with horizontal lines.

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EURNEX

EUropean **R**ail research
Network of **EX**cellence

SIXTH FRAMEWORK PROGRAMME

PRIORITY 1.6.2: SUSTAINABLE SURFACE TRANSPORT

Pole Action Plan

Pole 10: Training and Education

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Introduction

Based on the workshop discussions during the 2nd EURNEX Integration Conference each pole of excellence has to prepare an **action plan** to develop and to consolidate the pole within the next critical months. The Action Plan is therefore the “short-term precision” of the mid-term/long-term pole strategy. In order to ensure consistency within EURNEX a template for the action plan had been prepared (see following pages). It is divided into sections with boxes indicating the expected content for the section concerned.

As emphasised on the Integration Conference again, the European Commission expects from EURNEX the more efficient use of the rail research resources. In essence, for our preliminary poles this means:

- Concentration and specialisation
- Integration of research
- Interdependency among pole members

The action plan therefore has to reflect the steps on how to achieve this. Moreover, the contribution of each pole to the durable, long lasting EURNEX business case must be addressed, in particular by the project acquisition planning.

With the aim to cover the relevant items for short-term pole development, the action plan template covers the following sections:

- ❖ Objectives of pole
- ❖ Capabilities involved
- ❖ Collaboration opportunities identified
- ❖ Capability gaps still existing
- ❖ Projects towards Business Case
- ❖ Other actions supporting the establishment of the pole
- ❖ Pole development and milestone planning

It is apparently not necessary do prepare a comprehensive report. The focus should be on understandable and verifiable statements providing the ideas on how to move forward with pole development. Even if not every detail can be described or anticipated today the first issue of the action plan should be prepared as soon as possible, because it's submission is the condition to achieve support from the EURNEX WP's.

Due to its importance to achieve support for pole development, the draft of the action plan should be prepared as soon as possible, but not later than **31 March 2005**.

The action plan shall be a “living document” to periodically updated.

Pole Action Plan

Pole 10 Training and Education

1 Objectives of the pole

- Are there amendments to be made towards the available description of the poles?

The main objectives of pole 10 are:

- To create a pool of short training courses.
- To support the running of short training courses.
- To implement international PhD and Master programs
- To launch a European University of Railway.
- To promote interdisciplinary contacts (collaboration across poles).
- To be a permanent forum for prospective studies.
- To promote exchange of knowledge ((e)-learning material, publications ...).
- To promote dissemination of knowledge out of research project results, publications ...).To use research results in education programs and STC courses.

Pole 10 activities have a strong dependency of WP7 results. Furthermore, the development of Pole 10 – “Training and Education” will be done smoothly and will be embedded into the WP 7 progress.

WP7 plays a role of incubation of Pole 10. Different activities will be launched and handed over in a smooth manner to Pole10 structure.

2 Capabilities involved in the pole

- mainly based on Workshop introduction slides -

- Institutions and persons included
- Main topics of research with relevance to the pole
- Expected contributions to the pole from other poles
- Facilities, laboratories, simulation tools etc. available
- Researchers involved (name of senior & no. of further researchers)
- Selected project references

The members/institutions listed below have long experience on the education field specifically focused on railways.

The institutions listed offer a wide set of railway related courses at different levels (Bachelor, Masters, PhD) and the researchers have been involved in projects related with all areas of the rail sector.

The institutions listed have facilities, laboratories and have been developing tools (software and hardware) relevant to railway courses.

It is foreseen that the members/institutions involved will be extended to the remaining EURNEX partners.

The first list of people and institutions that will participation in pole 10 activities is:

Peter Fabian (UNIZA)
Vlastislav Mojzis (UPCE)
Karel Sotek (UPCE)
Alexander Chlan (UPCE)
Tatiana Molkova (UPCE)
Andrea Quattrini (CIRPS)
Dr. Oum-el-Kheir Aktouf (INPG)
X Wang (INRETS)
Prof. Paolo Pozzobon (NITEL Genoa)
Prof. Hecht (TU Berlin)
Prof. N. Ostermann (VUT)
Prof. T.Ánczos (BUTE Budapest)
H. Vrablova (UNI Zilina)
Prof. Marek Sitarz (SUT)
Prof. C. Esveld (TU Delft)
Prof. F. Monnoyer de Galland (HUVC)
Dr. C. Pyrgidis (CERTH Thessaloniki)
Mikiki Foteini (CERTH Thessaloniki)
Prof. P. Tavares de Castro (IDMEC Porto)
Prof. A. Pita (CENIT)
Prof. Mats Berg (KTH)
Prof. Stefano Ricci (DITS)
Prof. Juan Manuel Mera (UPM)
Marco Giannettoni (NITEL)
Marina Frachia (NITEL)
Prof. Manuel Seabra Pereira (IST)
Rosário Macário (IST)
Virgínia Infante (IST)
Duarte Sousa (IST)
Ernesto Vadillo (UPV)
Jacques Sorin (UPC)
Clara Zamorano (UPM)
Martine Wahl (INRETS)
El-Miloudi El-Koursi (INRETS)
Prof. Ladislav Skyva (CETRA)
Jordi Vinolas (CEIT)
Prof. Jonh Wilson (U. Nottingham)
Prof. Christopher Baker or other (U. Birmingham)

Capabilities involved in the pole (detailed description):

- Education activity domains focused on railways
- Long experience on the specific education field
- Availability of a wide set of railway related courses at different levels (Bachelor, Masters, PhD)
- Large teaching staff
- Coordination of National and EU projects
- Participation/organization of actions within EU research projects
- In some cases, the number of Researchers involved is equivalent to the University resources

- Organization of Training courses for graduated personnel of railway operating companies

Contributions from EURNEX members/institutions to pole 10:

- Access to multidisciplinary skills, experience and facilities of the institutions
- Software tools (operation simulators, full drivers, ...)
- Members of pole 10 will be and will use their own contacts time and material to promote the pole activities
- Teaching material

Main research topics and teaching subjects:

- Sustainable Transports and Mobility
- Transport System Management
- Integrated Logistics
- Railway Systems and Infrastructures Engineering
- Technology and control in transport
- Discrete optimization in transportation systems
- Modelling and simulation methodologies and applications related to transportation and logistic processes
- Reliability and diagnostics of transport means and infrastructure
- Reliability, safety and stability of transport infrastructure and steel bridge construction
- Evaluation of the dynamic rollover stability of heavy vehicles and construction of transport means
- Electric traction, telecommunications and signalling in transport

Organization of the educational activities:

According to the objectives of pole 10, the organization of the educational activities should be done in two separate levels:

- one level named as "Training Board", which will coordinate the educational activities inside EURNEX/Pole 10
- another level that is concerned with the educational activities according to the target trainees and the level of the courses. At this level pole 10 members will be joined according to rail subjects.

3 Collaboration opportunities

- Please indicate collaboration opportunities among pole members already identified (i.e. project database Work Package 1)

Mobility of researchers.

Integration of Master and PhD courses (International courses).

Students exchange.

Joint promotion of learning materials.

54 Projects towards Business Case

Project approaches and ideas, incl.

- Short description of objectives and expected results
- Pole members to be involved
- Expected necessary partners from the rail sector (supply industry & operators)
- Need for cross-pole collaboration?
- Timing and estimated budget
- Preparation steps to implement the project
- Please make use of the Acquisition table template attached also

Objectives of the pole: to create a pool of short training courses; to support the running of short training courses; to implement international PhD and Master programs; to launch a European University of Railway; to promote interdisciplinary contacts (collaboration across poles); to be a permanent forum for prospective studies; to promote exchange and dissemination of knowledge ((e)-learning material, publications,...).

All pole members should be involved in the objectives of the pole. A taskforce should be selected to:

- Define the groups of interest
- Analyse the skills
- Identify personalities
- Identify synergies in Master and PhD courses (Programs identification and existing cooperation)
- Support the launch and running of existing short training courses
 - Existing ones
 - In preparation
 - Capability to launch new courses
- Identify customers
- Define the road map towards the virtual European University of Railway

Budget to support some travelling and involve in a pro-active manner a committed leadership must be foreseen.

65 Other actions supporting the establishment of the pole

- E.g. periodic seminar / conference to support pole's visibility and business
- Scientific service towards the rail sector supporting pole's durable business

Actions:

- On-line discussions and forum on the pole organisation
- Forum for prospective studies
- Web-site creation (under EURNEX supervision)
- Close interaction with the remaining poles

Services:

- Deliver existing short training courses and launch new STC,

- Organize STC on demand from other poles and customers.
- Provide support for joint PhD and MSc initiatives
- Promote exchange and dissemination of knowledge and publish (e)-learning material, books, etc.
- Develop quality assurance procedures to allow a future EURNEX blueprint accreditation concept for all training & education activities.

76 Pole development and Milestone planning

Concluding plan derived from the topics above covering:

- Schedule
- Steps and milestones
- Intermediate results
- Organisation of sustainable contacts to supply industry and operators
- Selection / election of pole leader
- Expected support / resources “on demand” from EURENX WP’s for pole development – to be justified by the targeted activities
- Please focus on the activities supporting the future pole business
- Detailed for the months to come
- More strategic outlook of the time beyond July 2005.

Month 1:

- i) Identify pole members/institutions
- ii) Agreement on strategy and action plan (use the WP7 meetings, to consolidate the pole)
- iii) Define pole leader responsibilities
- iv) select/elect the pole leader

Month 2:

- i) Identify the geographical distribution of skills and competences (input from WP7)
- ii) Identification of potential customers
- iii) Integration of specialists from different institutions according to subjects/branches

Month 3:

- i) Identify synergies in Master and PhD courses
- ii) Selection and contacts of pilot customers
- iii) Development of pilot courses on the basis of pilot customers requirements

Results expected from month 1 to month 3:

- pole strategy and action plan
- pole leader and organizational structure
- Schedule of the launching of short training courses

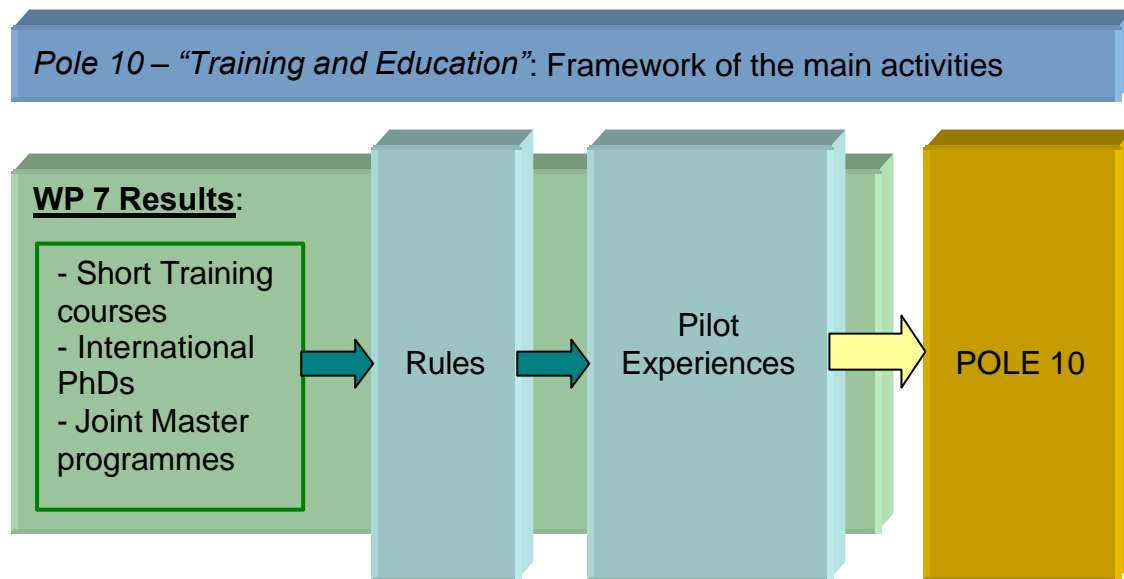
Mid and long-term activities:

About the mid and long-term activities it is important to notice that Pole 10 activities are dependent from the outputs of WP7. Based on this statement, Pole

10 activities will reach its sustainability and cruising speed after the end of the WP7 tasks. In this way, activities of pole 10 will be mainly focused on the following topics:

- Deliver short training courses,
- Joint Master Programmes, and
- Establish International PhDs.

The steps to get the topics have been done according to the JPA of WP7, which works as a platform to feed Pole 10. To achieve the aims of Pole 10, it is mandatory to clearly establish rules related with the topics above and to implement “pilot experiences” within WP7 as represented in the diagram below.



After the “pilot experiences”, Pole 10 will have the tools and skills to assure its sustainability and implement in a soft way the following educational activities:

- Implementation of a wide range promotion plan of STC and e-learning courses
- Deliver short training courses
- Deliver e-learning courses
- Define programs and rules of the EURNEX Master and PhD courses
- Establishment of the EURNEX PhD courses
- Apply for EU educational projects (ERASMUS/Mundus, Minerva, Marie Curie, Leonardo da Vinci,...)
- Transfer of scientific excellence of the EURNEX poles into education (publications, books, on-line information,...)

Embedded in the ideas and aims described above, the following goal of pole 10 will be seen as a conducting line and a structural goal to launch and join all the activities related with education and training inside EURNEX:

- Establishment of the virtual European University of Railway

As a European based Institution, the main objectives of European University of Railway - Eu^{Rail} are focused to provide the framework to meet the needs for more sustained research based educational programs and industry tailored training programs using modern learning technologies.

To this end , Eu^{Rail} aims to:

- Enhance and expand educational access to railway courses
- Upgrade workforce skills in the railway area through continuing education
- Expand professional development in the railway area through continuing education
- Enhance educational quality in the railway area (academic, stakeholders)
- Provide multi-lateral agreements for transfer of learning credits between institutions
- To foster a European dimension in education through cross-European engineering curricula, course content and academic mobility
- Create mechanisms to put forward courses not offered by existing institutions
- Promote the production of e-learning (courses and material; less cost)
- Adopt quality assurance procedures of railway courses and award titles
- Promote Joint PhDs using bilateral and multilateral programs
- Joint international MSc programs in different rail related areas
- Develop and deliver short training courses (STC)
- Develop any other relevant dissemination, training and education activities
- Endorse prospective studies in different railway areas
- Secure international validation and acceptance of the qualification of university educated engineers in railway related programs;
- Promote further collaboration in engineering education, research and development between leading European universities.
- Promote further collaboration in engineering education, research and development with leading railway institutions worldwide.
- Explore different pedagogic processes around formative, informative and constructivist approaches.

The financial support to the establishment of the European University of Railway will come from the annual fees paid by the constitutive members.

The long term financial model to be followed by Pole 10 implies the following principles:

Regular subscription fees from all institutions involved to support the basic running of the pole.

Exploitation of EC channels for specific support actions either within Transport program of FP7(DG Research) or within the Education sector (DG for Education and Culture)

A full financial plan will be prepared and submitted to EURNEX coordination and Council.

7 ANNEX

WP7: Training and education

Status and program of activities

1. Results so far

1.1 Offered educational courses and railway operators needs¹

The activities carried out so far have provided high value inputs in terms of stakeholder demands and have also provided a synthesis on the available skills within EURNEX to face that demand, both in terms of courses already being offered and in terms of potential courses according to EURNEX competences.

The main outcomes of this work are:

- The survey submitted to the actors of the railway sector provides a rich source of information, gathered from a representative cross-section covering all railway areas and companies' sizes.
- A first striking conclusion is that there is an urgent need to harmonise educational and industrial designations. Clear advantages in developing a profile description for each key activity based on the thematic contents of the educational curricula so that the gap between professional competences of educational provision of knowledge can be appropriately bridged.

About Stakeholders needs, it is crucial to point out that:

- The collected data give a clear picture of the current situation of the employment in the railway industry, both in terms of specializations and of qualification levels. The existing training capabilities are also assessed.

¹ Report D16

- A crucial part of the work involved the identification of the required competences, together with the requested qualification levels for the railway sector, which will provide the basis for gap analysis. The data obtained undoubtedly constitute the core of the survey, highlighting the real priorities of the railway industry. In this sense, they can be fruitfully used for the definition and the assessment of strategic orientations of EURNEX with regard to its long term commitment to the railway sector, not only with respect to education but also in what concerns research activities.

The striking points inferred from the survey to the railway sector are the following:

- The most represented qualification levels are Postgraduates and Undergraduates, i.e. high and mid-level degrees.
- The same conclusion holds for the competence needs, which are mostly requested for Postgraduates and Undergraduates. Future education and training programs should therefore concentrate on these levels.
- The most demanded competences depend on the qualification level. However, some of them are appearing recurrently:
 - Railway-specific competences:
 - Train control, positioning and communication
 - Signalling, control command and interlocking
 - Multidisciplinary competences:
 - Computer technology and networking
 - Quality management
- The incidence of the needs reported in multidisciplinary competencies at post-graduate levels is very significant. In addition, a lack of knowledge

of the railway system (holistic perspective) is strongly reported by the different types of stakeholders.

- Since the competences relevant for PhD holders are likely to correspond to areas requesting more scientific insight, they can be interpreted as having a potential for future research. These are:
 - RAMS
 - Security and safety
 - Risk analysis and failure mode analysis
 - Noise and vibrations
- Educational institutions are expected to participate to the development of new training programs. Although most of the areas of competences are concerned, the major potential for external training provided by universities lies in:
 - Rolling stock and traction: Interiors, auxiliaries, car body design and construction;
 - Infrastructures: Tunnels, tracks, switches and crossings;
 - Operations: Interoperability and freight
- Education is the weak spot of the current way in which skilled personnel is acquiring the needed knowledge. Demand for university courses exists for almost all fields of activity, but the deficit revealed by the difference between the existing and the expected university offer is the most significant in the field of operations: freight, intermodality and passengers are concerned.

From the analysis of the questionnaire about courses in railway across Europe it is possible to point out the following:

- BSc and Dipl. Ing. Courses concerned specifically with the main topics of the railway system are not spread across Europe.

- Some specific areas of the rail sector are mainly offered in graduation courses (MSc and PhD).
- Universities present competences in different areas of the rail sector and short duration training in such areas.
- Railway courses are mainly related with the topics; "Rail Vehicle", "Civil Engineering", "Operations" and "RAMS - Reliability, Availability, Maintenance and Safety".
- Institutions enrolled with railway courses, it is clear that almost all are public or governmental institutions.

Joining the competences and needs, there is in some topics a discrepancy between courses and competences that clearly points out the requirement to transfer know-how from competences into the courses according to the needs.

1.2. Short Training Courses²

In the framework of the development and organization of Educational and Training activities within EURNEX WP7, a key activity was targeted on the promotion of short training courses (STC) inscribed in the overall goal of railway experts mobility and knowledge exchange.

Following the WP7 tasks that dealt with the overview of the educational scene in the railway sector as well as the identification of the training needs of the railway practitioners, operators and industry, this task is focusing on the implementation of knowledge dissemination procedures in the form of courses of a short duration tailored to identified audience needs so as to transfer acquired knowledge and research results into the rail business sector.

The organization and promotion of such courses so as to implement training initiatives and ensure high level of dissemination through all relevant means and media, involving actively potential stakeholders, is a core activity for EURNEX sustainability as it aims at producing guidelines for future implementation of such educational activities that

² Report D26

will illustrate the EURNEX “heritage” in the railway knowledge enrichment.

The realization of STCs is in itself a very effective way to approach and interact with industry at large in research, development and innovation activities.

The work was organized in 2 major parts, the first one defining the framework for the formulation of such courses, and the second one addressing issues about the promotion of such activities.

A key pillar of the training strategy is to clearly determine trainee-driven needs, which require concerted action through well-planned, resourced and presented training interventions, involving EURNEX mechanisms throughout the organization and implementation of an hybrid model involving a formal process of assessing training needs (top-down) and supporting STC activities of EURNEX members (bottom-up).

A focal point to develop the training activities is to promote, plan, organize and deliver high quality training events, with multiple different training related roles.

2. WP7 and Pole 10

Educational and Training activities have been organized within EURNEX WP7 as a key activity to promote and implement knowledge dissemination procedures. Higher Education Institutions belonging to EURNEX are particularly suited to participate in this process of knowledge transfer and dissemination and therefore contributing in a decisive manner for the European research and Education areas in Rail. In the framework of the development and organization of Educational and Training activities, steps as the implementation and promotion of short training courses and the implementation of international PhD courses are crucial to reach the “Training and Education” goals related with the rail sector.

According to the activities that have been developed, EURNEX work package “Training and Education” has the following goals:

- Advise on the potential for common education and training provision for the railway sector;

- Review current training provision and standards in member states;
- Identify needs of the railway sector on both the short- and the mid-term;
- Engage with training agencies, educational organisations and universities to design training programmes and courses;
- Identify resources and equipment for training modules and programmes;
- Establish pilot courses and programs for evaluation by the railway sector;
- Implement knowledge dissemination procedures through education and training;
- Contribute for the European Research and Education Areas in Rail.

The future activities inside WP7/Pole 10 for the coming months are:

- to collect a detailed list of topics and training demand from the industry (geographical distribution);
- to agree with industry and advisory board on a number of pilot courses
- to collect the courses information by all the institutions, and to coordinate and disseminate the offered courses and analyse the opportunity for integration;
- to run pilot training courses;
- to define programs and rules of Master and PhD courses with the EURNEX Blueprint;
- to establish the "EURNEX PhD courses";
- to assess the feasibility of blended training and education packages in the different railways activities;
- to assess the market needs and feasibility of long life learning activities, namely interdisciplinary approaches involving wider areas such as, for example, the transport sector and the problem of urban mobility;
- to assess the potential of research material available for general educational purposes and to support the above referred blended packages offer of training and education in railways systems;

- to establish contacts and to collaborate with other networks of excellence and platforms of the transportation sector;
- to establish the virtual European University of Railway.

Pole 10 activities have a strong dependency of WP7 results. Furthermore, the development of Pole 10 – “Training and Education” will be done smoothly and will be embedded into the WP 7 progress.

WP7 plays a role of incubation of Pole 10. Different activities will be launched and handed over in a smooth manner to Pole10 structure.

The graph below summarizes the WP7 activities and establishes its relationships with Pole 10 activities.

	WP7		Pole 10
STC	<ul style="list-style-type: none"> • STC list (topics, regions) • STC' rules • Pilot STC 	⇒	<ul style="list-style-type: none"> • Running STC • STC' promotion • E-material • Relationships with other poles
PhD & MSc	<ul style="list-style-type: none"> • Inventory of PhD and MSc courses/material • “EURNEX PHD” rules and programs • Financial support 	⇒	<ul style="list-style-type: none"> • Establish bilateral and multilateral agreements • Material for PHD and MSc courses • Projects (D23) • Relationships with other poles
Other Networks	<ul style="list-style-type: none"> • Establish contacts with: other transportation sectors; other universities (no railway related courses; other technological systems/networks). 	⇒	<ul style="list-style-type: none"> • Bilateral agreements • Material for PhD, MSc and ST courses • Projects
EUR ^{all}	<ul style="list-style-type: none"> • Principles • Basic model • Aims/Objectives • Installation 	⇒	<ul style="list-style-type: none"> • Running EUR^{all}

