SEVENTH FRAMEWORK PROGRAMME

THEME 7

Transport including Aeronautics

Project NEAR²

NETWORK OF EUROPEAN – ASIAN RAIL RESEARCH CAPACITIES

Coordination Action
Grant Agreement No: 314254

Deliverable D3.4

Concept Document: Product Qualification Methods and Harmonization of Standards

Version: Final

Date: December 2013

Dissemination level: Public

Table of Contents

PROJECT INFORMATION

Title: Network of European – Asian Rail Research Capacities

Acronym: NEAR^2

Grant Agreement no: 314254

Programme: 7th Framework Programme

Funding Scheme: Coordination and Support Action

Start date: 1st December 2012

Duration: 24 months

Web site: http://www.near2-project.eu/

PROJECT PARTNERS

No	Name	Short name	Country
1 (coordinator)	Centre of Research and Technology Hellas / Hellenic Institute of Transport	CERTH/HIT	Greece
2	EURNEX e.V.	EURNEX	Germany
3	TECHNISCHE UNIVERSITAT BERLIN	TUB	Germany
4	CESKE VYSOKE UCENI TECHNICKE V PRAZE	CVUT	Czech Republic
5	VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS	VGTU	Lithuania
6	Moscow State University of Railway Engineering	MIIT	Russian Federation
7	A-TRANS LLC	A-TRANS	Russian Federation
8	Petersburg State Transport University	PSTU	Russian Federation
9	TONGJI UNIVERSITY	IRRT	China (People's Republic of)
10	EIRC Consulting Private Limited	EIRC	India
11	State Higher Educational Establishment Donetsk Railway Transport Institute of Ukrainian State Academy of Railway Transport	DRTI	Ukraine
12	INSTYTUT KOLEJNICTWA	IK	Poland
13	TRAINOSE METAFORES-METAFORIKES YPIRESIES EPIVATON KAI FORTIOU AE	TRAINOSE	Greece

DOCUMENT PROFILE

Document status: Final

Deliverable code: D3.4

Deliverable title: Concept Document 4: Product Qualification Method and Harmonization of Standards

Work Package: 3

Preparation date: June - September 2013

Submission date: January 2014

Dissemination level: Public

Author: Witold Olpniski

Contributors: EIRC, CERTH/HIT

Quality control: Annie Kortsari

Abstract: D3.4 includes the focus area of WG4. The network application field and the brief overview of the WG4 topics of interest related with the intercontinental transport policy, the role of intermodality, implementation of the ICT measures, harmonization, standardization and cross-acceptance are described. The future research needs and research priorities with areas of priority projects are initially outlined. The deliverable concludes to the policy recommendations.

Document History	*Version*	*Comments*	*Date*	*Authorised by*
	1.1	EIRC contribution applied	15.11.2013	CERTH
	1.2	draft final document	20.12.2013	CERTH
	1.3	quality control remarks applied	23.12.2013	CERTH
	1.4	final document	30.12.2013	CERTH
Classification:	Public			

Number of pages:	26
Number of annexes:	-

Executive Summary

The Concept Document related to the project Working Group 4: “Product Qualification Methods and Harmonization of Standards” includes an introductory part which describes the project as a whole and the Working Group 4 focus area, as well as the scope of the following chapters of this document. After the description of the network application field included in Chapter 2, the following chapters are focused on the brief overview of WG4 topics of interest, and consist of the intercontinental transport policy, the role of intermodality, implementation of the ICT measures, harmonization, standardization and cross-acceptance as the basic factors of the interoperability. Two basic gaps such as the gauge differences and missing links in the intercontinental rail network are mentioned. The future research needs and research priorities are initially outlined. The tentative areas of priority project in the scope of business case are preliminarily defined. Finally, conclusions are drawn and policy recommendations are made.

Abbreviations and Terminology

CAT	Computer Aided Transport
CD	Concept Document
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CIT	International Rail Transport Committee
ECMT	European Conference of Ministers of Transport
ECTRI	European Conference of Transport Research Institutes
EIM	European Rail Infrastructure Managers
ERA	European Railway Agency
ERRAC	European Rail Research Advisory Council
ETSI	European Telecommunications Standards Institute
EURNEX	European Rail Research Network of Excellence
GIS	Geographic Information System
ICT	Information and Communication Technology
IRIS	International Railway Industry Standard
NSA	National Safety Authorities
OSZhD	Organization for Cooperation of Railways
RDSO	Research Design and Standards Organization
TAR Network	Trans-Asian Railway Network
TRB	Transport Research Board (USA)
TSI	Technical Specifications for Interoperability
UIC	International Union of Railways
UNECE	United Nations Economic Commission for Europe
UNIFE	Association of European Railway Industries
WG	Working Group
WP	Work Package
Interoperability	The ability of a rail system to allow the safe and uninterrupted movement of trains which accomplish the required levels of performance for these lines. This ability depends on all the regulatory, technical and operational conditions which must be met in order to satisfy the essential requirements;
Intermodality	The characteristic of a freight transport system that allows at least two different modes of transportation such as e.g. rail, ship, and truck to be used in an integrated manner in a door to door transport chain.
Cross-acceptance	The result of the conformity assessment procedures of products enabling the public authorities to ensure that products placed on the market conform to the requirements, in particular with regard to the health and safety of users.

1 Introduction

1.1 The NEAR^2 Project

The rapid development of Asian economies, particularly China, India, Kazakhstan and Russia has dramatically increased the trade volumes between Europe and Asia, with the largest trading partners of Europe actually being located in Asia. Nowadays, the most significant trade loads are being transported between the two continents by sea.

Railway transport, using the existing and new land routes for the Trans-Eurasian land bridge presents a viable alternative to the maritime routes, which is gaining significant momentum. Due to the origins and current nature of this rail land bridge, numerous issues need to be resolved to bring the system to a modern state of infrastructure, services and operations. Furthermore, to build the capacity to fully exploit the systems potential adaptation of new technologies, interoperability solutions and optimized safety operations should be considered. In order to support this objective, NEAR^2 proposes the creation of a Rail Research Network along the Trans-Eurasian land bridge, exploiting the structure and leveraging the achievements of the existing European Rail Research Network of Excellence (EURNEX), engaging this way all the existing research centres in a continuous and fruitful international cooperation.

The overall activities of NEAR^2 project contribute to the general objective of improving the competitiveness of railway sector vis-a-vis other transport modes, especially in Eurasian land-bridge context. Three main foundation-stones which ensure attractiveness and a reliability of each transport mode are these:

1. Transportation speed (short duration) and punctuality (reliability).
2. Safety & security both of passengers and freight.
3. Reasonable cost of service.

One of the core activities of NEAR^2 is the formulation of 10 Concept Documents (CDs) that will map all the technological issues that concern the achievement of interoperability along the EU-Asia railway network. The gaps in the existing knowledge in terms of barriers and potential solutions are also being investigated, thus resulting to the identification of research needs and priorities. Each Concept Document covers a specific thematic area, based on the 10 EURNEX Poles of excellence, and is supported by a project-partner-membered NEAR^2 Working Group (WG). The 10 WGs of the project are the following:

1. Strategy and Economics
2. Operation and System Performance
3. Rolling Stock
4. Product Qualification Methods
5. Intelligent Mobility
6. Safety and Security
7. Environment and Energy Efficiency
8. Infrastructure and Signalling
9. Human Factors and Societal Aspects
10. Training and Education

Each one of the Working Groups identifies and analyses the relevant in each case topics of interest, while a most in depth analysis of the most prominent of them follows. The goal of this analysis is the identification of needs, barriers and research recommendations in relation to the Euro-Asian railway corridors.

In the next stages of the project, three workshops will be organized in which a selected group of research representatives and industry parties will participate, having the goal to finalize and prioritize the initial topics of interest and the identified need, barriers and recommendations. The final topics along with the conclusions drawn from the workshops will be included in the core outcome of the project, D4.5 “Project Publication”.

1.2 The NEAR^2 Working Group 4

The basic subject scope and the focus of Working Group 4: “Harmonization of Standards / Product Qualification Methods” is the influence of the harmonized standards, qualification methods and cross-acceptance of products on railway infrastructure managers and operators involved in Europe – Asia railway transport.

There are two complementary areas / aspects of this influence: operational and technical ones. The research of the railway transport operation should be targeted to achieve seamless intercontinental transport in the future, increase the intermodal transport role in the freight traffic and speed-up the transportation processes. It should be achieved with permanent “greening” of the railway transport i.e. keeping and improving the low environmental impact of this transport mode on the environment.

The research related to the technical issues of Working Group 4 area of interest is focused on support of both sides of the railway industry, i.e. on the suppliers of products used in railway transport and on the end users of these products. The activity will be concentrated on the harmonization of standards applied to products, but also to the process of their putting into service. It should make this process easier, cross-accepted and resulted in the decrease of the LCC (Life Cycle Cost) of the equipment used by railway infrastructure managers and by railway operators.

The general WG4 objectives will be achieved by the identification of the necessary research topics and their possible performers. The first step will be focused on the review of the legal basis of the intercontinental transport in the particular Europe-Asia railway transport corridors. The review and analysis will cover several partially separate issues, but influencing together the basic WG4 scope.

It is necessary to recognize the binding operational rules and constrains of the trans-continental railway transport, particularly related to intermodality. This activity will be done in the next steps of the project and in cooperation with all Working Groups of the project, but particularly with WG2 and with WG1. The review may be performed also by survey for support of the important stakeholders of the transcontinental railway transport. The cooperation with respectively all or some of project WGs is expected also in the other issues considered by the project WG4.

In the area of the product qualification and cross-acceptance it is important to recognize and analyse common rules and differences in the process of putting the railway equipment into services. The cooperation with the other project WGs is expected, eg. with WG3 in issues related to rolling stock, WG8 – to the infrastructure and signalling as well as with WG6 regarding some safety and security issues, with WG7 regarding environmental and energy efficiency issues and with WG9 regarding human factors and societal aspects of the process of railway equipment application. The review of existing standardization on the international, continental (European and Asian) and national (of the railway transport corridor states) level will be performed and existing gaps will be identified. As the important step in the harmonization review it will be crucial to recognize the existing application area of the UIC (International Union of Railways) leaflets and the area of possible introduction of the TSIs (Technical Specifications of Interoperability), as applied on European Union railways. The possibility of the best EU practices application to Europe – Asia railway corridors will be considered with a certain input from the other project WGs. The way to spread areas of cross-acceptance will be considered. These activities in operational and technical areas have to be supported by the appropriate training and education of the existing and future personnel involved in trans-continental railway transportation. This issue will be supported by the project WG10.

All of the activities mentioned above will have the joint basic aim – the recognition of possible and necessary research topics and potential European and Asian entities able to perform this research. The expected schedule of the research and development related to the trans-continental land bridge issues will also be considered.

1.3 Scope of the Document

The Concept Document in this part related to the NEAR2 project Working Group 4: “Product Qualification Methods and Harmonization of Standards”. The following chapters include the description of network application field of the project results, the discussion of the WG4 topics of interest, identified basic gaps and barriers in the intercontinental transport as well as the research needs and priorities including the project prioritization towards business case. The final chapter includes policy recommendations and summary of the WG4 area of interest.

2 Network Application Field

In the framework of Working Group 8 "Infrastructure and Signalling", the Network Application Field has been defined based on:

- Existing alternative railway routes that connect Western/Central Europe to Asia and more specifically to Japan (via the Sea of Japan), China and India.
- Existing case studies of Europe-Asia freight transportation by rail.

The indicative routes that have been selected for further analysis and examination are the following:

A: Connection: Western Europe – Russian Far East – Japan
A1: Via main Trans-Siberian railway network:
Poland – Belarus or Ukraine – Russia (Moscow – Novosibirsk – Irkutsk – Vladivostok or Nakhodka) – Japan (Sea of Japan)
Total length Warsaw – Vladivostok: 11 000 km

B: Connection: Western Europe – China via the Trans-Siberian route and its branches
B1: Via branch of the Trans-Siberian railway network and the Manchurian route:
Poland – Belarus or Ukraine – Russia (Moscow – Novosibirsk – Karymskaya – Zabaykalsk) – China (Harbin – Beijing via Manchuria)
Total length Warsaw – Beijing: 11 670 km
B2: Via branch of the Trans-Siberian railway network and the Trans-Kazakh route:
Poland – Belarus or Ukraine – Russia (Moscow – Yekaterinburg-Kurgan) – Kazakhstan (Petrovavlosk – Astana – Dostyk) – China (Lanzhou – Zhengzhou – Beijing)
Total length Warsaw – Beijing: 11 670 km
B3: Via branch of the Trans-Siberian railway network and the Mongolian route
Poland – Belarus or Ukraine – Russia (Moscow – Novosibirsk – Ulan-Ude – Naushki) – Mongolia (Zamyn Uud) – China (Beijing)
Total length Warsaw – Beijing: 11 560 km

C: Connection: Western Europe – China via the TRACECA corridor (Silk Road)
C1: Via the TRACECA – Turkmenbashi rail route
C1.1: Western Europe – Slovakia (Bratislava) – Hungary (Budapest) – Romania (Bucharest, Constanta) or Bulgaria (Varna) – Black sea – Georgia (Poti – Gardabani) – Azerbaijan (Boyuk Kasik – Baku) – Caspian Sea – Turkmenistan (Turkmenabad) – Uzbekistan (Khodzha-Davlet – Keles) – Kazakhstan (Sary-Agash – Almaty – Dostyk) – China (Lanzhou – Zhengzhou – Beijing)
Total length Bratislava – Beijing: 10 090 km + (water route via Black sea = 1 270 km)
C1.2: Western Europe – Slovakia (Bratislava) – Hungary (Budapest) – Romania (Bucharest) – Bulgaria – Turkey (Edirne – Istanbul – Sive – Kars) – Armenia (Akhurgan – Ayrum) or Georgia – Azerbaijan (Boyuk Kasik – Baku) – Caspian Sea – Turkmenistan (Turkmenabad) – Uzbekistan (Khodzha-Davlet – Keles) – Kazakhstan (Sary-Agash – Almaty – Dostyk) – China (Lanzhou – Zhengzhou – Beijing)
Total length Bratislava – Beijing: 12 170 km + (water route via Caspian sea = 270 km)

C2: Via the TRACECA – Aktau route
C2.1 (land detour of the Black Sea through Ukraine and Russia): Western Europe – Slovakia (Bratislava) – Ukraine (Chop – Fastov – Turkmenistan (Turkmenabad) – Uzbekistan (Khodza

Davlet – Keles) – Kazakhstan (Sary Agash – Almaty – Dostyk) – China (Lanzhou – Zhengzhou – Beijing)
Total length Bratislava – Beijing: 12 885 km
C2.2: In C1.2 the section Caspian Sea – Turkmenistan (Turkmenabad) – Uzbekistan (Khodzha-Davlet – Keles) – Kazakhstan (Sary Agash – Almaty – Dostyk) is replaced by the section Caspian Sea – Kazakhstan (Aktau – Makat – Kandagash – Sary-Agash – Almaty – Dostyk)
Total length Bratislava – Beijing: 12 710 km

D: Connection: Western Europe – China via the Central Corridor in Kazakhstan
Western Europe – Poland – Belarus or Ukraine – Russia (Moscow – Aksaralskaya) – Kazakhstan (Ganushkino – Makat – Kandagash – Almaty – Dostyk) – China (Lanzhou – Zhengzhou – Beijing)
Total length Warsaw – Beijing: 11 645 km

E: Connection: Western Europe – India via the Trans-Asian railway route
Western Europe – Slovakia (Bratislava) – Hungary – Bulgaria – Turkey – Iran – Pakistan – India (New Delhi)
Total length Bratislava – New Delhi: 7 970 km

These routes are presented in Figure 1 that follows:

Figure 1: Indicative existing alternative railway routes for the connection of Western/Central Europe with Asia

3 Overview of the NEAR2 WG4 topics of interest

The list of general topics of interest to the NEAR2 Working Group 4: "Harmonization of Standards / Product Qualification Methods" that are considered in this Concept Document includes the following subjects:

- Europe – Asia transport policy,
- intermodality of the intercontinental freight transport,
- implementation of IT measures, particularly Computer Aided Transport issues,
- standardization, harmonization of products and services,
- interoperability and cross-acceptance issues.

These general topics of interest are analysed in the following chapters of this document.

3.1 Intercontinental transport policy

The development of efficient and seamless Europe – Asia transport system requires coordinated development of transport policy. The policy has to be implemented at European an Asian area on both, national and regional levels. One of the most important issues for achieving the basic target mentioned above is the implementation of the intercontinental intermodal transport system. The intermodality will play the most important role in the intercontinental freight transport. As congestion and environmental impacts are continuing to increase, intermodal transportation will continue to play the most important role facing up the challenges. According to EC's communication, four key strategies will provide the necessary impetus to the development of intermodal transport in the overall context of the Common Transport Policy:

- a European strategy on infrastructure: trans-European transport networks and nodes;
- the single transport market – harmonisation of regulation and competition rules;
- identification and elimination of obstacles to intermodality and the associated friction costs;
- implementing the Information Society in the transport sector.

Therefore, it is necessary to establish a research agenda for an in-depth study of intermodal freight and logistics issues in the Eurasian railway corridor.

3.2 Increasing role of intermodal freight transport

Intermodal freight transport involves the transportation of freight using multiple modes of transportation such as rail, ship, and truck. This method reduces freight handling as it does not directly handle the freight when changing modes, and so improves security, reduces damage and loss, and allows freight to be transported faster. In intermodal transport freight is normally transported in containers, also called as intermodal containers or ISO containers (because the dimensions are defined by ISO).

In order to create a common understanding of the concept of intermodality, the European Commission proposed the following definition of intermodality. Intermodality is a characteristic

of a transport system that allows at least two different modes to be used in an integrated manner in a door to door transport chain.

As congestion and environmental impacts continue to increase, intermodal transportation will continue to increase in importance. Therefore, it is necessary to establish a research agenda for an in-depth study of intermodal freight and logistics issues in the Eurasian railway corridor.
In the Communication from the European Commission to the European parliament and the Council on "Intermodality and Intermodal Freight Transport in the European Union" key issues concerning extensive use of intermodal transport have been pointed out. Lack of a coherent network of modes and interconnections, lack of technical interoperability between and within modes, lack of proper regulation s and standards for transport means, data-interchange and procedures are some of the obstacles highlighted. The communication also states that there are uneven levels of performance and service quality between modes, different levels of liability and a lack of information about intermodal services which leaves the mode-independent door-to-door transport underdeveloped.

Intermodality does not aim or relate to a specific modal split, but addresses the integration of modes at three levels:

1. infrastructure and transport means ("hardware");
2. operations and the use of infrastructure (especially terminals), and
3. services and regulation (from a modal-based to a mode-independent framework).

3.3 Implementation of the ICT measures

Since intermodal transport is more data-intensive than conventional transport, thus it is making the Information Society's role in transport of crucial importance. Computer Aided Transport CAT - the use of information and communication technologies - is Key to efficient and customer oriented transport services. The collection of data related to the transported goods with a geographic information system (GIS) feature has an important role. It enables the application of software transport monitoring systems equipped with visual representations of analyses in more readable manner with greater impact than text or data in tables. A wide usage of satellite communication and navigation systems as well as Internet applications play a crucial role in the transportation processes' management.

The ICT measures are basically in scope of the other NEAR^2 project Working Groups as WG2, WG5 and WG8, however, due to the standardisation and cross-acceptance issues they are also a subject of the WG4 interest.

3.4 Harmonization and Standardisation as Keys to Efficiency

Standardisation is one of the most important aspects in developing an efficient, competitive and safe rail system. Standardisation brings along a host of benefits – smooth and more efficient operation and maintenance, higher rolling stock availability, improved service performance for freight, lower inventories, easy availability and management of spare parts.
Interoperability and standardization plays a crucial role in the railways. Wheels and wheel sets designed to run hundreds of thousands of kilometers across borders in Europe and beyond still differ between countries and regions for minor features.

There are several industry bodies and associations in the European Union that have developed standards and those are adopted by their members and railway industries spread across the World.

The UIC (International Union of Railways) is one such international rail transport industry body created in October 1922, with the aim of standardising industry practices. The UIC's mission is "to promote rail transport at world level and meet the challenges of mobility and sustainable development". One of the key objectives of UIC includes promotion of interoperability and creation of new world standards for railways (including common standards with other transport modes). UIC at present has 200 members across 5 continents. In order to provide a common understanding and reduce potential confusion, the UIC has established standard international railway terminology and a trilingual (English-French-German) thesaurus of terms. The thesaurus was the result of cooperation with the European Conference of Ministers of Transport (ECMT) and was published in 1995. The UIC has also established systems for the classification of locomotives and their axle arrangements, coaches and goods wagons. UIC classification and UIC Country Codes allowed precise determination of rolling stock capabilities and ownership, with wagons assigned unique UIC wagon numbers. The 1990s GSM-R radio telecommunication system is an international interoperability specification covering voice and signalling systems for railway communications whose specification is maintained by the International Union of Railways project ERTMS. The leaflets issued by the UIC plays a role of the international railway standards allowing to a certain extent cross-border traffic by the unification of the most important parameters of the railway equipment. The international recognition and application of the UIC leaflets is not enough for building the expected seamless intercontinental transport.
IRIS (International Railway Industry Standard) is another standards system used by industries across the world, based on the internationally recognised standard ISO 9001 with specific characteristics of the rail industry. IRIS expands on project management, change management and design among other things. IRIS has been developed as an industry-specific standard similar to those already existing in the automotive, aviation and food industries. IRIS is promoted and administered by UNIFE (Association of European Railway Industries). Manufacturers such as Siemens, Alstom, Ansaldo Breda and Bombardier, together with their key suppliers, have had a large input to writing the standard. IRIS is intended to apply to all direct and indirect ancillary industries (manufacturers of system construction parts and individual components), operators as well as manufacturers of rail-mounted vehicles.

The UIC has considerable experience in standardisation through the production of more than 670 "Technical UIC leaflets" and it is upon this basis that UNIFE and UIC have agreed to work together in the field of voluntary rail standardisation and have decided to jointly publish a series of standards called Technical Recommendations (TecRecs).

The main executive body now bringing together stakeholders and setting standards is the European Railway Agency (ERA), an EU arm based in Valenciennes in northern France. The Agency issues the Technical Specifications for Interoperability (TSIs), which were formerly the province of the European Association for Railway Interoperability. Published in the Official Journal of the European Union, TSIs link to enactment dates and cover specified aspects of the Trans-European Transport Network. The EU favours the application of these standards throughout the network. In the interests of sense and cost control, however, TSIs do not necessarily specify one standard. For example, considering the ways things are in member nations, four 'acceptable' platform heights are identified.

The European Committee for Standardization (CEN) is yet another officially created international non-profit association based in Brussels on 30 October 1975. CEN is a major provider of European Standards and technical specifications. It is the only recognized European organization according to Directive 98/34/EC for the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electrotechnology (CENELEC) and telecommunication (ETSI). There are over 50 major railway manufacturers, infrastructure owners, and operators in the railway sector and actively working with CEN and CENELEC. The EU aims to achieve free and unrestricted transfer of goods, services and passengers across national frontiers within Europe. To help achieve this, the EU has adopted two Directives concerning the Interoperability of the High-Speed and of the Conventional rail system. The implementation of these directives is aided by standards developed by CEN, CENELEC and ETSI.

CEN/TC 256 and CENELEC/TC 9X are responsible for the development of European Standards respectively for all mechanical products/services and for electro technical applications related to the Rail Transport Industry of the European Union.

In India, the Research Design and Standards Organisation (RDSO) is an ISO 9001 research and development organisation under the Ministry of Railways of India, which functions as a technical adviser and consultant to the Railway Board, the Zonal Railways, the Railway Production Units, RITES and IRCON International in respect of design and standardisation of railway equipment and problems related to railway construction, operation and maintenance.

Standardisation and cooperation in Eurasia rail network are the important areas of the OSZhD (Organization for Cooperation of Railways) activities.

Discussions between high-level government officials and railway industry representatives from Russia, Europe and South-East Asian countries at a convention 2012 aimed to boost the flow of rail traffic between the east and west across the Eurasian rail-network.

According to an article published in Eversheds LLP, a British International Law Firm, July 11, 2012 edition (Authors: Anne Harris and Mark Brunton), building improved rail links not only within the EU but also improving links with its neighbours is seen as a key element of the EU's transport policy; this is also recognised by the European rail industry itself. At the same convention, UNIFE (the European railway association), signed a memorandum of understanding with the Russian railway association, NP-UIRE to strengthen cooperation between the European and Russian railway sectors and overcome the traditional barriers to a seamless Eurasian rail network. Joint cooperation between the two industry representatives will be developed in a number of areas, including standardisation, cross-acceptance, homologation procedures, and quality management.

The key issues identified in the discussions which will need to be resolved are regulatory and interoperability obstacles, the transportation charges on goods in transit and the coordination of infrastructure projects aimed at removing bottlenecks and facilitating seamless transport.

3.5 Cross-acceptance – a "bridge" to interoperability

Cross-acceptance is mutual recognition and mutual acceptance in respect of national rules and authorization processes, based on the principle of equivalence i.e. recognising that there is more than one way of meeting an essential requirement; For example, recognizing that a French fire

extinguisher can meet the essential requirement of putting out a fire in other countries as well as in France. All rules can be mutually recognized unless they are necessary for Technical Compatibility with a non TSI conforming part of a network and recognition would produce a substantial safety risk.

Cross-acceptance gives profits to both sides of the equipment manufacturing process: to the supplying industry and to its end users. The reduction of development and putting into service cost of the railway equipment, even more general, its Life Cycle Cost, is achievable by an increased market scale and by the reduction of the test and homologation costs, if applicable. Reduced railway equipment cost including the rolling stock as well as railway infrastructure parts, such as e.g. permanent way, power supply and signalling equipment and systems, have a positive influence on the railway operation efficiency. This reduction is possible by increasing a number of available suppliers and stronger competition among them. Thus, the cross-acceptance has also a positive impact on the infrastructure managers allowing them reduction of their costs of building and maintaining their networks, and resulting in lowering the access fee required from the transport operators, thus giving them better conditions of the railway infrastructure usage.

According to the European Railway Agency (ERA), cross-acceptance relies upon:

- mutual recognition of national rules;
- mutual recognition of verification checks against rules;
- mutual recognition of authorisations to place into service.

Cross-acceptance requires confidence and trust – transparent, repeatable national rules and transparent, repeatable national checking process.

According to Mr Richard Lockett, Head of Unit, European Railway Agency, private companies normally work together to deliver interoperability and standardisation for mutual commercial benefit, for e.g. US rail freight and UK before nationalisation (Railway Clearing House). However, public bodies find it more difficult to work together. Another observation made by Mr Lockett is that every (infrastructure) project left to its own devices will develop its own solution for e.g. Modern metros and tramways and 3 different versions of ETCS by different projects in the same country. The Cross-acceptance Unit of ERA supports the principle of mutual recognition of the national rules, the checks against these rules and the associated authorisations to place into service in order to facilitate, improve and develop international rail transport services and the progressive creation of the internal market in equipment and services for the construction, renewal, upgrading and operation of the rail system. The European Commission, with the support of the European Railway Agency, set up this task force to identify problems and propose solutions to facilitate the authorisation of railway vehicles. The Units objective is to eliminate duplication of checks and authorisations by recognising equivalence of rules and associated checks. In spite of all efforts for the harmonization of cross-acceptance procedures, roles and responsibilities in EU, they are still partially harmonized only. Cross-acceptance procedures need simplification. The situation is worse when the Euro – Asian connection is considered. The interfaces within the procedure are complex and different in each Member State and in Asian countries. The procedures, roles and responsibilities differ for a variety of reasons including checking bodies (notified bodies, designated bodies) having limited or multiple roles, and different national legal frameworks for the procedure for authorising the placing in service of vehicles. The comparison with other transport modes shows that even if the legislation, actors and procedures differ, the principle of mutual recognition of approved types, certifications,

checking bodies is widely established for air, road and maritime (within EU and internationally) but is in its infancy for rail at European and Asian levels.

The networks of Europe have, in the past, been built to different specifications. These differences cannot be quickly or cost effectively engineered away. Furthermore most of the Member States have not yet put in place and published the Technical Rules describing the characteristics to which their network must be maintained. This makes it difficult at authorisation to verify compatibility between vehicles and their network.

Hans-Georg Werner, Member of the Board of DB Schenker Rail responsible with the Eastern Region and CEO of DB Schenker Rail Polska in an interview with RailwayPro states that rail link between Europe and Asia is a big challenge. To be successful, one needs to focus on different areas like fees, customs clearance, legal regulations and quality. Fees must be competitive with other modes of transport as well as predictable and stable in the long-term. All customs clearance procedures should be simplified and harmonized with the timetable. Transport regulations must be harmonized and simplified, however, this can only be achieved with political support. The improvement of quality is also an important aspect. Therefore the development of modern terminals which will allow offering a wider range of services is very important. The implementation of these elements will create a favourable transport offer, which meets customers' requirements.

The Political Declaration on establishing a unified Eurasian railway transport law was approved in November 2012 and the long-term goal consists in harmonizing the provisions of this legislation. All the other transport modes enjoy common legislation in international transport.
A common legislation for Eurasian railway transport would mean development and the introduction of an appropriate and efficient international legal transport system. It would facilitate the international trade of goods and services, it would also facilitate the development of new infrastructures on the routes China – Kazakhstan – Mongolia, China – Europe, Iran – Pakistan or the North-South Corridor and it would offer a fair development level for railway freight transport between the two continents.

In anticipation of the new unified legal framework at government level, the Economic Commission for Europe (UNECE) supports the railway and railway organisations involved in bringing about harmonized solutions on a contractual basis. Therefore, at the last meeting of the "Railway" Working Group on 9 November 2012, the proposed Political Declaration prepared by the Group of Experts was unanimously approved. The planned UNECE Declaration was signed on 26 February 2013 by the transport ministers involved and the European Union at the International Transport Committee meeting. The Declaration is designed to express the relevant political will of the transport ministers responsible regarding the harmonisation of Eurasian rail transport law.

Under the approved Political Declaration, the above-mentioned transport ministers invite interested railway freight companies, other stakeholders and international railway organizations to pursue work on the development of optional model rules for Euro-Asian rail transport contracts (GTC EurAsia), show the data of the International Transport Committee. International Rail Transport Committee (CIT) and the Organisation for Cooperation of Railways (OSZhD) are accordingly working as fast as they can on the implementation of a comprehensive contractual

framework to allow these new traffics to be moved simply in administrative terms but with complete legal certainty.

4 Identified Gaps and Barriers

There are two basic barriers for the Europe – Asia seamless railway transport: the differences of track gauges and missing links in intercontinental rail network.

The Trans-Asian Railway (TAR) Network traverses a number of countries with different technical and operational standards. One of the most visible technical incompatibilities in the network although not the most restrictive to movements, is the existence of different track gauges.

A break-of-gauge occurs when the railways of neighbouring countries have different track gauges, such as between China and Mongolia, between Poland and Belorussia, Ukraine, Lithuania or between the Democratic People's Republic of Korea and the Russian Federation.

A break-of-gauge is often seen as an obstacle to the smooth flow of railway traffic. However, a number of solutions exist to reduce its effect on the efficiency of the rail network, including transshipment (manual or mechanical), bogie exchange, the use of variable gauge bogies or the use of composite tracks.

Former countries of the USSR, as well as Mongolia, use a track gauge of 1520 mm (and Finland, with small difference, of 1524 mm) whereas the international standard rail gauge used in most of Europe and China is 1435 mm. As a result, trains cannot run from China or European countries into or out of Russia and surrounding countries without changing bogies. Large facilities to carry out this procedure exist at most border crossing between the "Russian" and "standard" gauge territories (e.g., at Zabaykalsk or Erenhot). However, changing the bogies on a rail car require hours and special, heavy equipment. In many cases (especially, containerized freight), freight is transhipped from one train to another instead of changing the bogies. In the case of liquids, frozen goods and hazardous materials, however, the bogies are usually changed.
Whatever solution is adopted to resolve this issue, an interruption in rail operations still occurs. Nevertheless, this interruption does not have to be a major impediment to the delivery of efficient services. Good equipment and operational planning can ensure that a switch of gauge takes places within a few hours, representing a fraction of the overall transit time over long distances of 3,000 kilometres or more.

There are 8,200 kilometres of "missing links" in the TAR Network which is again a big hindrance for intermodal transport. A 'missing link' is an absence of physical linkages between the railway networks of neighbouring countries or an absence of continuous railway infrastructure within one country, often due to local geography.

It has been suggested that on some lines variable gauge axles would achieve significant time savings in comparison to bogie exchange. Their implementation however would involve a much higher capital cost, requiring either retrofitting or replacement of existing bogies.

5 Future Research Needs and Priorities

The railway industry faces many challenges in launching new products, based on the implementation of European standards. The products designed for rail freight transport have to meet European standards in order to be placed on the market and acquired by railway carriers. Most freight cars currently used by rail freight carriers in Europe are manufactured and equipped based on older standards and, in order to increase competition and freight traffic, it is necessary to increase speed or the weight per axle. This means that, in certain operational conditions, they would have to exceed the maximum quality values. Improving the quality of goods transport is as important for rail freight transport, in order to reduce damages.

Rolling stock manufacturing companies should elaborate and apply new strategies based on product research and development in order to increase business and revenues.

Freight car manufacturers are guided by principles according to which freight cars should be able to operate on European railway networks. Therefore, the standards on freight car manufacture represent the starting point for the manufacture of freight cars and components. In this context, manufacturers should consider several aspects: interoperability, methods to increase the weight per axle for the existing infrastructure, brake systems designed for longer trains in order to reduce damages (if the brakes fail), special requirements for heavy trains, maintenance works etc. The European standards help improve competition in the railway industry, which is facing new business opportunities especially in Central and Eastern Europe, where carriers need new vehicles.

Key actions towards intermodality in European countries, some of which could also be applied to the Euro-Asian Railway corridor, listed in EC's communication to the EU parliament and the Council includes three groups of activities:

- integrated infrastructure and transport means:
  - intensify intermodal design of the trans-European and Eurasian transport networks;
  - enhance design and functions of intermodal transfer points;
  - harmonise standards for transport means;
- interoperable and interconnected operations:
  - integration of freight freeways in an intermodal context;
  - development of common charging and pricing principles;
  - harmonise competition rules and state aid regimes on an intermodal basis;
- mode-independent services and regulations:
  - harmonisation and standardisation of procedures and EDI;
  - intermodal liability;
  - research and demonstration;
  - benchmarking;
  - intermodal statistics.

According to an article published in Railway Pro in January 2011, majority of problems that appear during the cross-acceptance process are not caused as much by rolling stock but by

legislation, more precisely by the fact that the European legislation in the area is not completely transposed into the national legislation.

Problems in the process of cross-acceptance of rolling stock can appear if member states choose to demand an additional authorization of a vehicle already authorized in other member state. The additional authorization is already a process which weighs the well-development of traffic, additional costs and bureaucracy.

In another article on cross acceptance in Railway Pro (Feb 2011), the key issues that can stand in the way of cross-acceptance defined by EIM (European Rail Infrastructure Managers) are the ordinary approval procedures, the technical compatibility of a railway vehicle and infrastructure, the “unwritten laws” (related to railway network knowledge, which is not always provided for new entrants on the market) and the economic impact. The work on cross acceptance to date has concentrated on achieving commonality of rules between member states. EIM believes that commonality of the approval process across the EU demonstrates equal or potentially more value. In almost all EU countries the IM has an advisory role in vehicle approvals and cross acceptance. EIM believes that the economic impact should not become part of the cross-acceptance procedure. However, it is important to make sure that it doesn’t become an obstacle in the way of cross-acceptance.

6 Priority Projects towards Business Case

Priority projects shall cover all possible activities leading to possible quick organizing the efficient transport corridors system connecting Europe and Asia. It should guarantee economic profits to all particular states and all stakeholders involved in the transportation business area. Each legal entity including product manufacturers, sellers, domestic and international freight forwarders, transport infrastructure owners and managers, transport carriers and the accompanying service providers, suppliers of transport means as well as entities supporting transport processes as equipment testing and certification units, transport safety authorities and market regulation bodies are considered as such transport processes stakeholders.

It is necessary to identify all possible existing gaps and market needs for the transport research. It should allow selection of all these issues, which are related to the necessary legal constraints including the need for product qualification activities.

The transport research tasks should include:

- the definition of particular lines and a whole network constituting the transcontinental transportation connections' system;
- the analysis of all legal conditions which have to be fulfilled for the creation of transport corridors and the suggestions of necessary harmonization of binding law;
- the cost estimation of putting into operation the transport corridors' system and their particular parts;
- the consideration of all additional conditions and activities required for initiation of the transportation in Europe-Asia corridors;
- the business models' development including the analysis of their pros and cons using standard SWOT methods for the whole life cycle.

It is necessary to consider the detailed tasks and activities which are parts of more general, superior research areas such as mentioned above. For example, the following research topics may be proposed:

- the necessary rehabilitation and modernization of existing parts of the network and corridors as well as building of some missing connections;
- all conditions influencing easier passing through borders of transport corridor states;
- the development and establishing as well as the execution of unified and transparent tariff of access to the transport infrastructure,
- the harmonization of the transport supporting telecommunication and data processing services covering the whole "door to door" transport process;
- the cross-acceptance of the equipment, services and solutions including unified, homogenous certification rules;
- the promotion system of innovative transport solutions, best practice sharing and all activities focused on transport cost reduction, improvements, greening and reduction of energy consumption.

The launching of any research project should be preceded by a comprehensive analysis of its expected results, profits and efficiency including costs and the consideration of possible negative results or lack of their implementation. During the realization of all research projects it is necessary to keep a close cooperation with all end-users of the developments, particularly with all transport process stakeholders efficiently following the current market needs.

7 Policy Recommendations and Summary

One of the first and basic research activities should provide the guidelines for the national transport strategy and policy of all European and Asian states where the considered transcontinental network and corridors exist. It is necessary to define the level and legal type of the particular guideline documents. The bilateral and multilateral international agreements and memorandums as well as agreements between involved entities should be suggested. The harmonization of some binding law and rules in particular states on both continents will allow achieving the basis for seamless and efficient transcontinental transport.

The unification of the National Safety Authorities (NSA) of particular European and Asian states including the approach to the certification, rules of access to the national transport infrastructure, the existence and content of the infrastructure registers have to be developed. The national market regulator boards should also operate on the basis of unified guidelines. The harmonized system of entities acting in the similar way as European "Notified Bodies" should be established in Asian states. The unification should include the definition of necessary application documents, their interpreting rules and operation procedures. The best practices should be also shared between European and Asian Notified Bodies.

Future activities in the framework of NEAR^2 Project and beyond should include the review of existing research cooperation organizations active on transport research area, particularly in railway and intermodal transport research existing in Asia. The counterparts of European technological platforms as ERRAC, research networks of excellence and associations as EURNEX or ECTRI as well as existing bilateral and multilateral cooperation agreements of Asian research entities should be identified. In case of the lack of such organizations in Asia, the process of their development should be encouraged and then a close cooperation of the relevant European organizations with them should be established. The good example of the best practice of such a close cooperation is the European transport research organizations' common activities with the TRB – Transport Research Board of the United States.

This task of the NEAR^2 project shall bring the comprehensive information related to European and Asian research cooperation organizations possibly including member lists, their activity areas, research potential, infrastructure and expertise. This information should be finalized by the launching and carrying out joint research projects with the different visible, real profits including the transport efficiency increase, cost reduction and environmental footprint. Such joint projects should be financed from the budgetary resources addressed to science and innovations of particular European and Asian states as well as from a certain part of operational costs and profits of all kinds of the commercial transport entities.

Bibliography

1. 93/465/EEC: Council Decision of 22 July 1993 concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives, OJ L 220, 30.8.1993, p. 23–39 (EN);
2. Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community, OJ L 191, 18.7.2008, p. 1-45 (EN);
3. Euro-Asian Transport Linkage. Expert Group Report, UNECE 2012