Deliverable Work Package B7

Conclusions and recommendations
Towards new Rail freight quality and concepts in the European Network in respect to market Demand

Deliverable Work Package B7 – Conclusions and recommendations
Implementation of Change in the European rail freight area

Instrument: Co-ordination Action
Thematic Priority: Sustainable Surface Transport

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1 Introduction

1.1 Initial situation

Recently international freight transport has shown an above average growth rate and is of ever increasing importance in Europe, especially with the further expansion of the European Union (EU) in 2004. However the market share of rail in international freight transport has decreased due to insufficient competitiveness, while road freight haulage has increased. One fundamental cause for this was and still is visible in the insufficient interoperability within the railway system. The key factors that make the European rail system interoperable are:

- Ongoing differences in general conditions, both legal/administrative and technological, for the construction, financing and use of the respective — still — national rail infrastructures.
- Insufficient or inadequate cross-border co-ordinations between Railway Undertakings (rail freight operators).
- Differences in performance of respective national infrastructure, bottlenecks in important international rail corridors in relation to technical capacity, unfavourable or at least inflexible regulations of priority between freight and passenger services in each country, aggravated by a lack of harmonisation of priority regulations on international services amongst national countries/railways.
- Co-existence of traditional regulation (e.g. freight income sharing or customs formalities) and new market-mechanisms such as contracts covering the procurement and supply of goods and services between railway businesses of all kinds.

There has been and is a growing liberalisation of the European rail network. A variety of initiatives at many levels is taking place in order to improve the situation of international rail freight services:

- As a result of the EC-Directive 91/440 international groupings of Railway Undertakings (RU) are allowed to operate cross border freight trains.
- On the level of infrastructure management Rail Net Europe (RNE) has been established as a common platform for Infrastructure Managers (IM).
- Corridor-related activities have been established — primarily led by Railway Undertakings — partly including new market actors, e.g. on the North-South Corridors through Switzerland (IQ-C-Project) and on the Brenner-Axis (Brenner Action Plan and BRAVO-Project).
- Under the patronage of CER, and built on the experiences of the Brenner-study, three further European freight corridors were closely analysed in 2003. In doing so, deficiencies in co-operation and bottlenecks in infrastructure were identified and solutions for improvement were compiled into corridor-specific action plans.
- Multifaceted international forms of relation between Infrastructure Managers, Railway Undertakings and customers are co-existing with a focus on RU-RU co-operation. These co-operations vary from simple case to case contracts to corridor co-operations, alliances and even joint ventures with different shapes and objectives. Some are focused on the improvement of (internal) quality and productivity (e.g. Brenner Rail Cargo Alliance) while others are marketing and sales co-operations (e.g. Swiss Rail Cargo Köln – SRCK1, European Bulls).
- Some initiatives have already been completed after delivering first promising results, notably, the creation of Railway Undertakings by single shippers (e.g. IKEA rail) running their dedicated own trains instead of exploiting the service offer of experienced Intermodal Operators or Railway Undertakings.

It is obvious that the European rail sector now finds itself in an initial phase of structural change. This results in a differentiated picture of transport relationships as well as freight corridors. Many initiatives are still at the beginning stage whereas others are already fairly advanced. The latter can be evaluated against the pertinent sustainability criteria. Generally there is a significant difference in the progress achieved towards the internationalisation of rail services between the member and accession states.

On the one hand, an important foundation stone for this structural change process has been laid by the new European regulatory framework for the rail sector. On the other hand, expected growth in demand

1 SRCK was used by SBB for entering the German market and has now become SBB Deutschland.
points to the foreseeable dynamic development of the European freight transport market. It is now necessary to accelerate the development of predominantly nationally aligned systems into a single, integrated Pan-European system approach which will result into a more competitive rail freight service offer compared to road transport.

1.2 Objectives

Against this background, the TREND Co-ordination Action sees its responsibilities in providing two major results as an input to the EC rail transport policy, thus responding to the Call 2A requirements:

First of all, TREND gathers all necessary information to assess the general progress in the establishment of a European Railway Area. As a core product Part A will provide an “evaluation scheme for integration” (scoreboard) only after one year. Secondly, TREND seeks to recommend a coherent conception of individual actions as a “break down” of the White Paper’s general framework. If these actions are implemented in a co-ordinated way and according to a reasonable scheduling, the concept should enable to achieve a quantum leap for Trans-European rail services in quality, efficiency, and in volume, in particular. The main result of Part B is thus a “Specification” for the envisaged Integrated Project (IP) “New Concepts for Trans-European Rail Freight Services”.

1.3 Project organisation

To ensure that these objectives were met the TREND consortium assembled a heterogeneous group of stakeholders who represent not only all components and sides of rail freight services (various kinds of rail customers, Railway Undertakings, Infrastructure Managers, Intermodal Operators, consultants, university) but who are partly operating as competitors as well. This and the working tools of the project generate and provoke innovative instead of traditional “narrow-gauge” solutions.

The TREND-Consortium is made of a core of ten contractors (Figure 1–1):

- Six consulting companies and one university, which are experienced in project execution and management in the field of transport policy, market analysis, infrastructure development, railway operation and intermodal transport. These Contractors are responsible for carrying out the analytical and organisational work, ensuring the information management inside and outside the Consortium and providing reports and financial statements to the European Commission services.
- Three further contractors are customers and Railway Associations (UIRR, CER and UIC) which will, on the one hand, provide their experience in rail

![Figure 1–1: TREND-Consortium and network of experts](image)

2 Call 2A was launched in summer 2003, closed in December 2003, evaluated and negotiated in 2004 so that the Contract was awarded retroactive in April 2005.
3 The European Commission launched a Call 4A in summer 2005 which was closed in December 2005 and which is designed to award two Integrated Projects (IPs) on the subject by end of 2006.
freight business and access to their members from all over Europe and, on the other hand, assist in disseminating the project results to their members and beyond.

Nevertheless, the gathering of data, description of impediments and the access to best practices and business cases will be secured by the business experts from various backgrounds all over Europe.

1.4 Overall approach

The primary scientific objective of this project is therefore to gather all necessary information to assess general progress in the establishment of a European Railway Area (Part A) and analyse the prerequisites for innovative and new concepts for Trans-European rail freight services (Part B). The result of this work lays the foundations for a dedicated European rail freight network (Part C) and paves the way for an Integrated Project (IP) “New Concepts for Trans-European Rail Freight Services” to demonstrate the impact of the proposed measures (see Figure 1–2).

As a core product Part A provides an “evaluation scheme for integration”, ready to be exploited by European Rail Agency (ERA) and Part B a detailed specification for the envisaged call for proposal for the future Integrated Project with a view to experiment innovative international railway services.

Another core product for the networking, dissemination and overall information is the comprehensive web-based geo-referenced information system (GIS). The GIS includes all relevant project findings with respect to the railway network, both infrastructure and service.

The TREND project addresses Parts A and B since they are closely related with an emphasis on rail freight service networks, while Part C is more focusing on infrastructure networks. According to the Call, Part C shall build on Part A and B. Therefore the TREND-Consortium agreed a close co-operation with the NEW OPERA Consortium in the field of data and information exchange, and also with the REORIENT-Project which was awarded in parallel.

The NEW OPERA-Conferences on 01.07.2005 and 20.01.2006 in Bruxelles were attended by representatives of TREND, as the joint conference on 09.03.2006 in Bruxelles and the TREND expert meeting on 04.07.2006 in Paris was attended by a delegation of NEW OPERA.

1.5 TREND content overview

Parts A and B, which are the components of the TREND-project, are broken down into the following scientific and technological sub-objectives, each executed in a separate work package (see Figure 1-3).

Part A is made up of the following work packages:

- **A1**: Development of the design of the knowledge base and the concept for information gathering in 13 selected European countries; followed by country based surveys and investigations including expert interviews on the current situation in the railway sector with particular emphasis on conditions and prospects for the implementability of fully interoperable freight corridors;

- **A2**: Horizontal analysis of the different country-specific institutional arrangements and organisational set-ups, and assessment by means of an evaluation scheme, including the deduction and evaluation of possible links between the various organisational developments and the reasons for the differences in progress towards interoperability in the rail freight sector; establishment of the knowledge base for decision support with respect to legislative and management issues; development of an intra-industry support scheme and of an incentive scheme supported jointly by the railway industry and the European Union;

- **A3**: Summarising the results with the aim to obtain a comprehensive picture of the current status in the European railway area, with regard to barriers and opportunities which are important for the establishment of pan-European freight corridors; recommendations for policy support at national...
and EU level and intra-industry support for know-how transfer and best practice applications.

Part B is made up of the following work packages:

- **B1**: Analysis of existing / envisaged shapes and contents of co-operations set up to alleviate or eliminate existing barriers for seamless international freight services based on available results of five freight corridors: The Netherlands – Italy via Germany and Switzerland (Gotthard and Simplon/Lötschberg), The Netherlands – Italy via Belgium, Luxembourg, France, and Switzerland, Germany – Italy via Austria (Brenner), Germany – Iberian Peninsula via France, Ukraine – Iberian Peninsula via Hungary, Slovenia, Italy and France.

- **B2**: Choice and analysis of up to 5 supplementary important freight corridors (to be defined by market potential analysis and background know-how of the Partners) based on the proven methods developed within the framework of the previous corridor studies and on current UIC work as well as on the EUFRANET study. This will be further improved by experience gathered in Part A. The recommendation of these corridors is most suitable to configure a successful IP.

- **B3**: Elaboration of appropriate concepts (business cases) to meet market requirements for innovative Trans-European rail freight services. This will include an analysis of innovative operational and technical solutions to improve international freight services and recommendations for implementation (as done for Barcelona – Montpellier, Woippy – Mannheim, Lyon – Torino, etc.).

- **B4**: Deduction and development of appropriate Key Performance Indicators (KPI) and quality standards, taking into account existing activities in this field (e.g. FTA Short Sea Shipping indicators, UIC work on RU-RU quality agreements, UIC CTG work on RU-IM quality agreements, UIRR-UIC work on RU – Intermodal Operator relation, etc.) by involvement of all market participants (demand and supply).

- **B5**: Elaboration of an infrastructure development scheme on up to ten corridors in line with the newly developed concepts (e.g. application of quality measurement) and taking into account the expected increase of rail freight volumes, the operational measures and concepts for new services of the RU and the advanced forms of co-operation between IMs.

- **B6**: Elaboration of an appropriate business model (e.g. an open platform), defining rules/provisions concerning operational processes and equipment as a basis for future international co-operation between RUs. This will consider the area of conflict between co-operation and competition and take into account existing initiatives like the Technical Specification on Interoperability (TSIs).

Analysis and evaluation of different practices on existing relations between RUs, IMs and RU/IM – identification of best practices in the range between the co-operation and/or competition model in the overcoming of administrative, legal, cultural and technological barriers in the rail sector.
1 Introduction

1.6 Structure and methodical approach of this report

This report summarises the results of the work achieved during the 18-Month Project (01.02.2005 – 31.07.2006), and draws conclusions and recommendations for the implementation of change in the European rail freight area.

The components are resulting from the analysis of the legal and administrative framework (Part A) and the investigation of corridors, markets, infrastructures and business models, service quality in particular.

The components and their integration into a coherent project to be developed and implemented as an IP are the final recommendation achieved by the TREND Coordination Action, jointly with the stakeholders.

2 Results and conclusions

2.1 Assessment of general progress in the establishment of a European railway area (Part A)

After the establishment of a concept for the knowledge base of the current situation and prospects for the forthcoming changes in the railway business in selected countries (see Figure 2–1), information were gathered by desk research and direct interviews with relevant stakeholders. The results of this work (WP A1) are presented in the fact sheet document containing the summaries of the countries (Deliverable DA 1) and the knowledge bases for each country separately (Deliverable DA 2).

In work package A2, a cross-national evaluation scheme was developed and the current situation in each investigated country was evaluated by the WP A team. Stakeholders and independent experts then verified the evaluation and assessed discriminatory practices and competitive distortions as well as evaluated the management of change by the governmental and industry organisations concerned. Deliverable A3 presents the methodology, the results and recommendations of the evaluation process in WP A2. The results and recommendations are summarised in the following.
2 Results and conclusions

2.1 Assessment of general progress in the establishment of a European railway area (Part A)

2.1.1 Results

2.1.1.1 Best practices

The best practice survey does not cover every topic of the evaluation, since best practices have not been detected for some aspects. The aim is to provide an overview of the significant best practices encountered within the analysis, as well as some highlights on particularly critical situations.

Although licensing no longer seems to be an issue causing potential barriers to integration, the large number of licenses issued in Germany should nevertheless be considered as a best practice, and the major benefit for RUs seems to come from the presence of a practiced licensing body (EBA).

Contrary to licensing, safety certification procedures, as well as the performance and efficiency of the safety authority vary greatly from country to country. Romania appears to show a best practice, since the guidelines for safety certification and authorisation are reported to be very clear, thus allowing rapid application (less than one month).

The right of access is the legislative principle on which market access for different types of transport is based. Italy also allows cabotage, in the form of passenger and freight rail transport between two stations in the network, to RUs from a Member State, though only after granting a “Titolo Autorizzatorio”. This certificate is issued to RUs based in Member States that have already opened their market to competition.

The Track charging system appears to be clear and fair to users in most of the countries. The calculation of charges in Slovenia may be more complicated due to the difficulties in obtaining the Network Statement (in any case in the local language only) from the IM.

The ways in which framework agreements are used in order to allocate rail capacity differ greatly in the countries analysed. However, almost all countries have implemented the European regulation on the matter. Confidentiality prevents us from knowing the details of framework agreements issued and in some cases even the existence of such agreements between the main RU and the IM. In Italy at least one framework agreement exists between a newcomer RU and the IM, for a standard duration longer than one year. In any case the Italian Network Statement makes signing framework agreements with non-RU “authorised applicants” more difficult: applicants have to specify in advance the identity of the RU which is to carry out – on its behalf – the transport service related to the jointly acquired capacity.

The procedures for capacity allocation, both for train paths and terminal capacity, are reported in general terms to be fair and clear. However, the management by the incumbent RU of the “last mile” for terminal access is sometimes reported as a potential factor for discrimination in some countries. In these countries, some applicants may feel discriminated against when access to public terminals and marshalling yards is refused on the grounds of lack of capacity. Best practices in this area are reported where delays in allocation are minimised, and justifications for refusals are very clear: this happens in Romania (no refusals), Austria and Switzerland.

The access to electricity, and in particular the liberalisation of energy supply to RUs, appears to be one of the most important topics for successful liberalisation of rail service markets in the forthcoming years. In Germany it is possible to induct electricity from a provider other than the one owned by the railway holding company. However, no RU is making use of this possibility since the price for the transmission of electricity into traction current is said to be too high. At first sight Slovenia appears to enjoy another best practice, since RUs can purchase electricity directly from energy suppliers. However, the situation is peculiar: only the incumbent RU operates in the country and is still fully integrated in the railway holding company. The latter also maintains the infrastructure, delegated by the State Railway Agency (formally the Infrastructure Manager). It therefore appears obvious that the RU SŽ contracts directly with energy suppliers.

No best practices have been reported for overall aspects in the topic of approval and safety authorisation of rolling stock. In almost all countries the procedures and time span for approval have proved to be unsatisfactory for RUs. In Hungary the absence of justification for refusal has been reported. Concerning single evaluation criteria (in which the aspect has been broken down), 7 countries show a responsible body fully independent from the IM (Austria, Bulgaria, France, Germany, Poland, Romania, Switzerland) and in these countries – except Germany – procedures for safety authorisation are reported to be very clear.
In terms of the availability of drivers for international operations, Poland appears to have the best practice since PKP Cargo, as well as some private RUs, are training their locomotive drivers for international operations, in particular in the East-West traffic with Germany. Some private RUs even see business opportunities due to the high differential in personnel cost between Germany and Poland.

As concerns user rights, whilst noting that quality issues are more widely developed in work package B4, it is worth mentioning the existence in Italy of a performance quality incentive plan called “Performance Regime”: RFI’s Network Statement describes the regime, which as from 2005 governs contracts between RUs and the IM. It is based on punctuality as the only performance indicator, and provides for penalties in case of underperformance caused by the IM.

The evaluation of the country reports and the interviews have shown that progress in rail-specific legislation and the institutional set-up has been satisfactory since the publication of the White Paper. Policies are now largely in place for improving the performance of the railways by introducing competition for freight traffic within the sector and by improving network access. However, far from moving towards the modal split target of the White Paper, rail has not gained freight market shares. Nevertheless some achievement can be seen in the slowing down of the decline in the railway share in the EU-15 countries and we are witnessing a stabilisation of the modal split. In the new Member States, the transformation process will continue to shift the balance towards road freight transport.

All in all, the progress of reform within the rail sector has started slowly but gains speed. Investment in new capacity, in particular for freight traffic, is equally slow to take off. The market share of new entrants leaves much to be desired in some countries. There are, however, clear signs of progress according to the evaluation of the scoreboards. Effective competition has emerged on some key international corridors touching the countries under consideration, most notably on the Alpine transit.

The activities of the RailNetEurope consortium of Infrastructure Managers are improving the marketing of international paths. The formation of a non-incumbent railway grouping such as European Bulls promises to spread competition in international rail products. Thus it appears likely that rail freight will be spurred to improve its efficiency and service quality over the coming years under the pressure of stronger competition and indeed it is possible that the scene has been set for major changes in the next three years.

The major challenges – where achievements have not been sufficient – are to be seen in:

- more competition (in many countries)
- better quality, respecting contractual obligations
- further easing of access to operating on the network (path allocation, safety, international traffic)
- removing administrative and technical barriers to cross-border traffic
- providing sufficient “good quality” infrastructure capacity for rail freight services

2.1.1.2 Conclusions

Revitalising the railways

Major achievements:

- It seems likely that the adoption of the second railway package (starting with Directive 2001/12/EC published in the official Journal of the European Communities on 30 April 2004), will be completed in 2006 or at the latest in 2007, indicating an increase in speed.
- New administrative bodies have been created, mostly at government level, to introduce and control the new “rules of the game” in a liberalised European rail market, which has been dominated by incumbent national state railways. The most recent such body is the European Rail Agency which started functioning on January 1st 2006 in order to enhance interoperability and safety – notably by the introduction of the new common signalling and management system (ERTMS).
Major challenges to revitalising the railways:
The railway market in the countries under study still represent some challenges for the EU:

- As regards the shift from other modes to rail, no country has succeeded in significantly improving the rail market share. Recent years have, however, shown some "stabilisation" in certain countries after years of decrease.
- The share of new entrants in the rail freight market is still marginal or very low in some countries. Most noteworthy exceptions are Germany, where it was around 10% in 2004, and Romania where the share is estimated to be more than 20%.
- In some countries there are still some difficulties:
  - in introducing fully operational regulatory bodies and safety authorities for the rail sector (as required by EU law)
  - in reducing the administration needed for licensing, safety certification and safety authorisation

Network access was another prominent milestone of the first railway package. The evaluation did detect progress in ensuring access to the rail network:

- **Licensing**: There is no longer any significant problem for incumbent railways and new entrants. Procedures and criteria are clear, although a few delays still exist in issuing licenses (example: B-Cargo license for the French network).
- **Safety certification**: At least the procedures and criteria are clear.
- **Access of rolling stock to the network (safety authorisation)**: All market players now generally know procedures and criteria. However, there is still much scope for accelerating procedures in various countries and accepting authorisations issued in other EU Member States.
- **Network information**: Network statements have progressively become multilingual and available on-line; information on traffic performance and temporary infrastructure modifications because of maintenance and construction works are still missing in most countries.
- **Allocation procedures of train paths**: Time periods are reported to be satisfactory. Few delays.
- **Liability insurance**: Insurance requirements are clear at national level. However, obtaining insurance coverage for international service is more difficult.
- **Access to diesel supply**: No problems have been reported.

These achievements should not, however, divert attention from the continued existence of serious problems in ensuring low-cost access to the network. In chapter 2.1.2, appropriate recommendations will be made on how to overcome such obstacles.

**Unblocking the major routes**
The elimination of bottlenecks, the second policy goal of the White Paper, led to the establishment and a recent update of a Trans-European Network (TEN-T). The main corridors have been identified and established. The TREND work package B2 is following up this issue.

The TENs require very substantial funding. It is understood that the priority projects together require funding of the order of 220 bn EUR and the entire TEN-T network some 600 bn EUR. So far, such funding has not been secured.

Within this general theme the introduction of one-stop-shops can be considered as a first step towards unlocking major routes in order to facilitate international rail traffic. Unfortunately current management of OSS by the IMs has received relatively low marks from all evaluators.
Harmonisation of infrastructure charges

In the White Paper, the European Commission stated that one of the main causes of imbalance in the transport sector is the failure for transport prices to reflect the full social costs of the activities. In this line of thinking, existing Community legislation, in particular Directive 2001/14/EC, allows for the external costs of rail traffic to be internalised if other competing modes are doing so, too. The Member States have used differing approaches to infrastructure charging, thus creating different levels of charges for what seems to be the same service level for a Railway Undertaking.

The assessment focused on the description of the present system of track charges implemented in each country. Inter-country comparisons of charging levels were not part of our assessment.

2.1.1.3 Main findings

The evaluation of the country reports and the interviews have shown that progress in rail-specific legislation and the institutional set-up has been satisfactory since the publication of the White Paper. Policies are now largely in place for improving the performance of the railways by introducing competition for freight traffic within the sector and by improving network access. However, far from moving towards the modal split target of the White Paper, rail has not gained freight market shares. Nevertheless some achievement can be seen in the slowing down of the decline in the railway share in the EU-15 countries and we are witnessing a stabilisation of the modal split. In the new Member States, the transformation process will continue to shift the balance towards road freight transport.

All in all, the progress of reform within the rail sector has started slowly but gains speed. Investment in new capacity, in particular for freight traffic, is equally slow to take off. The market share of new entrants leaves much to be desired in some countries. There are, however, clear signs of progress according to the evaluation of the scoreboards. Effective competition has emerged on some key international corridors touching the countries under consideration, most notably on the Alpine transit.

The activities of the RailNetEurope consortium of Infrastructure Managers are improving the marketing of international paths. The formation of a non-incumbent railway grouping such as European Bulls promises to spread competition in international rail products. Thus it appears likely that rail freight will be spurred to improve its efficiency and service quality over the coming years under the pressure of stronger competition and indeed it is possible that the scene has been set for major changes in the next three years.

The major challenges – where achievements have not been sufficient – are to be seen in:

- more competition (in some countries)
- better quality, respecting contractual obligations
- further easing of access to operating on the network (path allocation, safety, international traffic)
- removing administrative and technical barriers to cross-border traffic
- providing sufficient “good quality” infrastructure capacity for rail freight services

Competition

The White Paper states in general terms that competition is to be encouraged and monopolies are to be carefully regulated. The regulatory bodies as guardians against discrimination and unfair competition are playing a key role in this. In some countries however they are not yet fully functional. Further achievements are necessary in these countries.

Quality of service (user rights)

The evaluation has shown that the user rights of Railway Undertakings in relation to Infrastructure Managers vary significantly between Member States but are, on the whole, not satisfactory. The users are exposed to Infrastructure Managers acting as monopolies and often also on behalf of government authorities; they do not always show the required customer orientation. Exceptions are those countries which compete with alternative routings such as Alpine corridors and TEN Corridors IV and X. The commercial relationship between RUs and the shippers, however, has improved significantly but has not yet reached the quality level of road transport.

Access to operating on the network (path allocation, safety, international traffic)

As mentioned above, right of access, in particular for new entrants, has improved. More progress is needed in the following fields:

- Reflection of network costs and the capacity situation in the charging systems
- Technical competence of the notified bodies
• Speed of the decisions for safety authorisations and safety certification
• Access to electricity supply
• Availability of locomotive drivers for international operations

**Barriers in cross-border traffic**

- Within the European Union, technical barriers remain significant for cross-border traffic.
- On the borders between the EU and the non-members of Eastern Europe, all Railway Undertakings have found barriers to cross-border traffic. Most border crossing agreements between EU Member States and non-EU Member States do not allow for open access by new entrants.
- Whether inside the EU or between the EU and non-member states, the efficiency and user friendliness of path reservation does not score high marks. There are however some good examples for seamless border crossings but much more needs to be achieved in this area.

**Providing sufficient capacity and good quality infrastructure for freight**

Infrastructure autonomy and access plays a preeminent role in the EU liberalisation process. For rail freight to provide good service and gain market share, the provision of sufficient capacity and good quality infrastructure is a key factor. It is well known that the freight railway traffic usually has a lower priority, compared to passenger traffics (long and short distance). Thus all the capacity problems, in certain locations or at certain moments tend to concentrate on freight, especially when capacity investments are scarce, and maintenance budgets dwindling.

One other issue is the non-discriminatory allocation of train paths between operators. Although very few cases of actual discrimination are reported, this issue remains controversial in Europe. Indeed, in Europe, some argue that the best way to favour competition among Railway Undertakings is to split operation and infrastructure management. Outside of Europe (e.g. in the United States…), the high degree of synergy existing between infrastructure management and train operations has been accepted as a sufficient reason for not dismantling the existing railway organisations. It has so far not been demonstrated that the advantages of the splitting prevail on its disadvantages. Some parties argue nevertheless about the necessity of a complete separation of infrastructure from existing railways.

**2.1.2 Recommendations**

Based on the findings of the evaluation process and the identification of best practices, recommendations were drawn up which are grouped as follows:

- Take into account the specificity of the freight railway market
- Transferring the know-how acquired in the most advanced countries
- Need for additional legislative and institutional measures
- Need for incentives

**Concentrate on market segments where the railway mode is relevant**

Work packages A1 and A2 have focused on the state of liberalisation of the rail freight market in Europe, with the main ambition of describing what should be done from now in order to make headway towards a truly open EU rail freight market.

Nobody questions the necessity and the practical feasibility of such an evolution, but at the same time, one has to realise that the rail freight industry carries a heavy burden of its past which is in need of radical modernisation. The obsolescence of certain technologies and production models, and the shrinking market shares of goods traditionally linked to rail highlight this need. In the current intermodal competitive environment (with very different cost/pricing structures between modes) the single wagon load traffic is a good example of the difficulty for the rail industry to stay competitive, independently of its state of liberalisation. In a context of unchanged framework conditions between modes, rail freight will have no other choice than to concentrate on market segments and production forms/systems where it has competitive advantages.

**Achieve better interoperability**

Although Part A did not focus on the interoperability issue which would be dealt mainly with in Part B, many stakeholders put interoperability at the top of their list of policy issues. It is inconceivable that rail freight transport can compete head on with road transport.
transport unless the barriers to seamless interoperability are definitively eliminated. Liberalisation efforts cannot be effective in a market hindered by lacking interoperability.

The very high cost of achieving that interoperability, especially in the migration phase to ERTMS, has led to the call for the industry to obtain external funding for that purpose. The transport market does not seem to be prepared to pay the higher costs for rail freight services. On long term it expects a significant decrease of costs through better efficiency. This means that more pragmatism will be needed:

- It is inconceivable that full technical interoperability will ever be reached. The added value will not allow compensate for the very expensive investments required, whilst the traditional technical culture prevailing in the railway industry favours huge projects and unitary solutions. More initiatives towards interoperability of at least national transport systems are required.

- Very important is the harmonisation for freight train operations by the removal of profile, weight and module limitations in the European network requiring substantial investments on some lines.

- Infrastructure to facilitate terminal access and investments in terminal equipment are also needed to ensure the future growth of intermodal services.

- Quick and significant improvements could be obtained without major expense, particularly in the field of safety standards, provided the national authorities are prepared to make the necessary compromises about keeping or abolishing domestic rules, in the face of generally strong resistance to change at local level.

The reform of the railway sector implies that governments will be responsible for the development of the infrastructure. Member States should therefore concentrate their efforts also on cross-border international traffic problems rather than only on domestic transport issues. The role of ERA, the European Railway Agency, is therefore of the utmost importance in this area, where progress has been slow and sometimes not made in the most effective way.

Rely on compound indexes blending market shares and best liberalisation practices when giving examples to follow

Among the results of WP A1 and A2, the synthesised scoreboard for each country gives useful indications as to whether the country has implemented good practice or lags behind for whatever reason. There are different possible ways to take the analysis further and achieve better results also in the countries lagging behind:

- Selecting ideal practices for each individual aspect and trying to translate them as goals for all other countries.

- Clustering aspects in broader topics (e.g. institutional set up and access to the market) and adhering to a segmentation of countries in 3 or 4 categories.

- To add to the preceding an “index of liberalisation” related to intramodal competition.

It would be of interest to relate the development of modal shares to the stage of liberalisation achieved within the rail sector. In principle, provided that other aspect of transport policy are fulfilled (like fair cost/pricing structures for all modes), if liberalisation is effective, the market share of rail vs. other modes should rise.

2.1.2.2 Transferring the know-how acquired in the most advanced countries

Which party has to play the main role?

Not all the players will share the same enthusiasm in sharing expertise and best practices, because their short term interests may be affected by the change: it is the public authorities’ (national and international) duty to disseminate broadly best practices. New entrants with little expertise are the natural beneficiaries of this kind of information.

The European Commission, as described in the conclusions, has already achieved a great deal, but the pace of progress has not been the same everywhere. Among many others, there is the challenge of bringing the different countries and all the players in the rail freight industry progressively to a sufficient level to authorise further common progress, in particular, in the TEN.
The Commission will have to make sure that the less advanced countries take the necessary steps. The present study, among others, can become a useful tool for that purpose, if an appropriate follow up is carried out:

- Completion of the knowledge base for other Member States (only 13 countries have been studied by TREND and four more will be covered in REORIENT)
- Updating of the knowledge base on a regular basis
- Permanent monitoring of the correct application of competition laws and directives and of the stage of market liberalisation

National governments still play the key role in managing change. The possible double role of transport ministries as policy agents and at the same time owners of railway organisations, can be a barrier for the management of change. It is conceivable to separate these roles by assigning the business supervision of the owners of railway organisations as private law companies to other governmental institutions.

Infrastructure Managers also have a direct interest in improvements leading to an integrated European network.

Finally International railway organisations are also likely to play a role in promoting change, thus standing up for the common interest of the industry and strengthening their own positions at the same time.

Setting up guidelines

Organising the legal and regulatory background for new developments like, for example, access to electricity and diesel or availability of locomotive drivers for international operations is one thing. But setting up a practical way to obtain fuel at a “filling station” or to hire multilingual locomotive drivers requires more than written rules. It is proposed that for each criterion selected in work packages A1 and A2, best practice guidelines should be prepared, in order to make rules practical. The guidelines should include the mutual acceptance of practices that favour international operations unless they represent safety risks.

The writing of such a set of guidelines could be a task for the European Railway Agency.

The example of successful Business Models

Another overall approach is to consider not only the elementary best practices, but also a global way for overcoming border-crossing problems. In topic 5 of the Country Reports (cross border traffic) the remaining barriers to interoperability, the functioning of “one stop shops”, the adaptation of agreements to the new market situation and various models of international co-operation have been described.

On that note, the most promising co-operative but not anti-competitive models could usefully be described in some specific monographs that would be proposed to the parties concerned. These monographs would of course not unveil the commercial and business particulars of the original models.

It would be very useful for entrepreneurs to be provided with the general architecture of successful ventures (what kind of activities do they share, how is production dealt with, who is in charge of the marketing and so on), but at the same time this kind of structure has to struggle in a very competitive market and will normally not be prepared to share strategies and commercial policies.

2.1.2.3 Is there a need for additional legislative and institutional measures?

There is a broad consensus on the fact that enough European legislation is available and that the two railway packages, if properly enforced, are adequate for an open rail freight market in Europe. Nevertheless a majority of stakeholders feels at the same time that even the first package should be implemented not just to the letter but in a way that renders the goals achievable. For example, the situation is sometimes unsatisfactory in aspects like the implementation of performance schemes, the access to and the pricing of essential facilities or the use of priority criteria.

Outside the framework to insure good intramodal competition, the question of level playing field between modes needs to be addressed urgently. The current imbalance between road and the other modes regarding their cost/price structure renders it practically impossible for the environmentally friendly modes to compete with road whatever internal efforts are developed.

Once more, the improvement of infrastructure and of technical interoperability is also a key factor of progress and the European Railway Agency has of course an important role to play in this field. A special mention has to be made of the practical use of the TSI (Technical Specifications of Interoperability). These specifications, being very detailed, have needed a long time to be first written and then enforced. From now
on, it should be checked carefully if national specifications are still in line with the TSI, because very often the remaining disparities between national specifications lead to an unfortunate lack of interoperability.

Infrastructure presents specific challenges:

- Considerable heterogeneity of access charges on different networks, sometimes at excessive levels compared with market conditions.
- High maintenance costs and correlative lack of quality of the infrastructure, with the final consequence of capacity bottlenecks for freight at crucial nodes or on important corridors.
- Infrastructure management companies should be more customer-oriented and be aware of their requirements. Infrastructure managers and network access managers, such as in Austria and in Hungary, have a crucial role to play in allowing the rail freight operators to deliver a good quality of service at an acceptable cost.

In conclusion, additional legislation is not needed at this point regarding liberalisation, pending the full implementation of the first two railway packages. What is needed, however, is to enforce the existing rules in daily practice and the industry will benefit in the long run from a truly liberalised market. TSI’s should be implemented in a practical way and more pressure should be put on Infrastructure Managers to improve their quality-price ratio. Finally the question of intramodal competition and investment in the infrastructure will need to be seriously and urgently addressed.

2.1.2.4 Is there a need for incentives?

What kind of incentives could be set up to increase the pace and the depth of change?

- One possible way is to penalise those not in line with the new rules; the problem is that the main responsibilities at this level lie with public authorities, which makes it quite a sensitive political matter; besides, punishing is hardly the best way to develop business.
- Another solution is to reward and encourage the best behaviour. Normally, no European direct funding can be provided to the companies involved, because of the risk of market distortion. Things are different, however, at the level of infrastructure, especially on corridors and for promoting improvements in the field of interoperability. The most promising projects and business models could be boosted by the development of high quality routes, assuring sufficient capacity and reliability. Freight corridors deserve and need to be further supported by the EU. However, they alone will not help boost rail traffic if the opening of the entire network lags behind. Despite all good intentions for revitalising rail traffic, the road will remain the benchmark in all aspects of transport.

2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

2.2.1 Corridor analysis (B1+B2)

Within this work package the following six European freight corridors were deeply analysed (see Figure 2–2):
2 Results and conclusions

2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

On the basis of the analysis of the corridors a coherent conception of individual measures (“action plans”) was developed for each corridor aiming at improving the competitiveness of rail freight services. The methodology of work bases on TREND work package B1 and was further refined in the starting phase of TREND B2. The main working steps were:

1. Agreement upon geographical extent and routing of the corridors
2. Analysis of the corridors, especially as concerns current freight volume (incl. modal split), analysis of the rail infrastructure capacity and border crossing procedures
3. Diagnosis of impediments and problems that are jeopardising the development of rail freight services on the corridors
4. Analysis of alleviation projects already under way
5. Deduction of action plans, sub-divided into priorities

All results presented here are based on the input of the TREND B2 experts (both Infrastructure Managers and representatives of Railway Undertakings), who contributed their specific knowledge to the analysis, and who adopted the action plans in which their companies are committed to implement the measures.

(1) Geographic extent and routing of the TREND corridors

The extent and routing of the TREND corridors were discussed, fine-tuned and agreed upon in the 1st Corridor Workshop in Hannover, Germany, in April 2005.

The final corridor selection makes reference to the most important freight flows (in terms of current volume and growth potential) across Europe. The selection took account of previous projects and stakeholders interest.

(2) Analysis of the corridors

The length of the analysed TREND corridors varies between 1,100 km (Corridor E) and 2,900 km (Corridor C), the number of involved countries is between 3 and 9. Figure 2–3 provides an overview over general specifications of the TREND corridors.

As far as adequate data has been provided the total freight flows (rail, road, waterway) amongst these countries vary from 26 Mio t on Corridor A to 277 Mio t on Corridor B-West. The following conclusions could be drawn for all TREND corridors:

- The corridor destinations contribute unevenly to the total amount: As a general rule it can be stated that the two strongest relations represent more than half of the all transport modes’ volume.
- Most relations are directionally unbalanced.
- Rail freight traffic currently represents a poor modal split of 8% to 17%.
- Higher shares of rail on parts of the corridors are resulting from impediments limiting road transports, or specific conditions favouring other modes of transport (e.g. alpine transit by rail, inland waterways on Corridor B-West).
- The experts expected a significant increase of freight volume on all TREND corridors.

### Table: Comparison of TREND corridors’ main characteristics

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Corridor A</th>
<th>Corridor B-West</th>
<th>Corridor B-East</th>
<th>Corridor C</th>
<th>Corridor D</th>
<th>Corridor E</th>
<th>Corridor F</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Corridor length</td>
<td>2,300 km</td>
<td>1,200 km</td>
<td>1,600 km</td>
<td>2,600 – 2,900 km</td>
<td>2,500 km</td>
<td>1,100 – 1,250 km</td>
<td>2,200 – 2,500 km</td>
</tr>
<tr>
<td>II. Involved countries</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>9</td>
<td>6</td>
<td>2 – 3</td>
<td>3</td>
</tr>
<tr>
<td>thereof transited</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>6 – 7</td>
<td>6</td>
<td>2 – 3</td>
<td>3</td>
</tr>
<tr>
<td>III. Locations on the corridor route with • terminals for intermodal service road/rail • marshalling yards</td>
<td>21</td>
<td>16 – 17</td>
<td>13</td>
<td>17 – 22</td>
<td>10</td>
<td>8 – 11</td>
<td>10 – 23</td>
</tr>
<tr>
<td>29</td>
<td>5 – 6</td>
<td>5</td>
<td>10 – 20</td>
<td>8</td>
<td>6 – 7</td>
<td>9 – 16</td>
<td></td>
</tr>
<tr>
<td>IV. Rail freight interface concentration (= ∑ III.*100/I.)</td>
<td>2,2</td>
<td>1,8 – 1,9</td>
<td>1,1</td>
<td>0,9 – 1,6</td>
<td>0,7</td>
<td>1,1 – 1,6</td>
<td>0,8 – 1,8</td>
</tr>
<tr>
<td>V. Freight transport amongst corridor countries 2003 (rail, road, waterway)</td>
<td>26.0 Mio t</td>
<td>276.3 Mio t</td>
<td>n.a.</td>
<td>n.a.</td>
<td>254.4 Mio t</td>
<td>49.3 Mio t</td>
<td>116.9 Mio t</td>
</tr>
<tr>
<td>VI. Modal split rail/road/waterway 2003</td>
<td>17/53/30</td>
<td>13/45/42</td>
<td>n.a.</td>
<td>n.a.</td>
<td>24/76/n.a.</td>
<td>n.a.</td>
<td>8/75/17</td>
</tr>
</tbody>
</table>

Different values refer to alternative routings on the respective corridor
7 Including Danish/German border, but without Scandinavia
8 Main route only
9 Including Channel Tunnel, but without UK
10 Without waterway volume

Figure 2–3: Comparison of TREND corridors’ main characteristics

Deliverable Work Package B7 – Conclusions and recommendations
(3) Diagnosis of rail freight impediments

The diagnosis of impediments that are jeopardising the development of rail freight transport was structured as follows:

a) Border crossing bottlenecks
b) Other infrastructural impediments
c) Lack of interoperability
d) Resource problems
e) Operational problems

(a) Border crossing bottlenecks

The main border crossing related problems can be assigned to the following groups of impediments (see also Figure 2–4):

- multiple loco changes due to different technical / infrastructural railway equipment (current systems, signalling systems)
- lack of mutual transport and technical train trust
- missing operational co-ordination (e.g. lack of communication, double work)
- administrative burdens (e.g. double authority / customs procedures)
- insufficient transport data management, which often requires multiple data pickup / correction / modification and manual document transfers
- lack of co-operative rolling stock and personal dispatching
- insufficient infrastructure causing complex shunting movements
- transshipment of loading units / wagon loads or axle change of wagons due to different track gauges
- specific problems due to special geographic situations (like the Channel Tunnel)

<table>
<thead>
<tr>
<th>Corridor A</th>
<th>Corridor B-West</th>
<th>Corridor B-East&lt;sup&gt;12&lt;/sup&gt;</th>
<th>Corridor C</th>
<th>Corridor D&lt;sup&gt;14&lt;/sup&gt; (only NL – PL)</th>
<th>Corridor E&lt;sup&gt;14&lt;/sup&gt;</th>
<th>Corridor F</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Min./max total time need for cross border activities per direction</td>
<td>1 h</td>
<td>2/4 h</td>
<td>1/1.5 h</td>
<td>14/28 h</td>
<td>2/7 h</td>
<td>1/2 h</td>
</tr>
<tr>
<td>II. Min. required amount of loco driver changes per direction</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5 – 6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>III. Number of loco changes per direction due to different...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• energy systems</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1 – 3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>• signalling systems</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>&gt;= 3</td>
<td>&gt;= 2</td>
<td>1</td>
</tr>
<tr>
<td>• pantograph widths</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>&gt;= 1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>IV. Quality deficiencies because of time loss due to...</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• lack of mutual train trust</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• missing operational co-ordination</td>
<td>o</td>
<td>o</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• administrative problems</td>
<td>o</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• insufficient transport data and document management</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• lack of co-operative dispatching</td>
<td>o</td>
<td>o</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• customs clearance procedures amongst corridor countries</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• insufficient infrastructure causing complex shunting movements</td>
<td>o</td>
<td>+</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>• transshipment of loading units / wagon loads or axle change of wagons</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>• specific problems</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

11 Different values refer to alternative routings on the respective corridor
+ criteria does not influence negatively in level of rail freight quality
o criteria influences slightly negative in level of rail freight quality
– criteria influences significantly negative in level of rail freight quality
12 Including Danish / German border, but without Scandinavia
13 Assumption: No multi-system loco used
14 Including Channel Tunnel, but without UK
Deliverable Work Package B7 – Conclusions and recommendations

2 Results and conclusions

2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

<table>
<thead>
<tr>
<th></th>
<th>Corridor A</th>
<th>Corridor B-West</th>
<th>Corridor B-East</th>
<th>Corridor C</th>
<th>Corridor D</th>
<th>Corridor E</th>
<th>Corridor F</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Different track gauges</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>II. Max/min speed for freight trains [km/h]</td>
<td>120</td>
<td>120</td>
<td>120/120</td>
<td>120/65</td>
<td>120/&lt;=80</td>
<td>120/80</td>
<td>120/90</td>
</tr>
<tr>
<td>III. Different wagon coupling modes</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IV. Max/min line category</td>
<td>C 2/D 3</td>
<td>D 4/D 4</td>
<td>D 4/C 3</td>
<td>D 4/C 2</td>
<td>D 4/&lt;=C 3</td>
<td>D 4</td>
<td>D 4</td>
</tr>
<tr>
<td>V. Max/Min train length [m]</td>
<td>750/450</td>
<td>750/555</td>
<td>750/515</td>
<td>750/500</td>
<td>750/540</td>
<td>750/550</td>
<td>750/500</td>
</tr>
<tr>
<td>VII. Max/min permitted train mass [t]</td>
<td>2,000/1,300</td>
<td>2,735/1,300</td>
<td>2,800/1,100</td>
<td>3,000/1,100</td>
<td>5,100/&lt;=1,600</td>
<td>3,640/1,100</td>
<td>2,800/820</td>
</tr>
<tr>
<td>VIII. Different signalling systems</td>
<td>3–5</td>
<td>5</td>
<td>2</td>
<td>&gt;=3–5</td>
<td>&gt;=4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IX. Different current systems</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2–3</td>
<td>&gt;4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>X. Complete electrification</td>
<td>___</td>
<td>✓</td>
<td>✓</td>
<td>___</td>
<td>___</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>XI. Different widths of pantograph</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>&gt;=2</td>
<td>1</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Figure 2–5:
Overview of infrastructural and technical interoperability on TREND corridors

(b) Other infrastructural impediments
mainly concern the lack of capacities and operational quality within the stations/nodes or along the lines. These problems lead to expensive operational procedures – especially within the nodes – increasing the total costs and deteriorating the market position of rail freight traffic. The following different types of impediments due to the infrastructure are to be distinguished:

- high traffic volume leading to capacity restrictions for additional rail freight
- limitations of the intermodal gauge, caused e.g. by tunnel sections
- speed restrictions due to disadvantageous line layout
- single track line sections
- insufficient length of tracks in stations, limiting the maximum train length
- congested intermodal terminals

(c) A variety of operating and technical parameters leads to a lack of interoperability on each corridor (see Figure 2–5), triggered by

- different energy systems
- varying widths of the pantograph
- incomplete electrification
- changes of permitted train parameters (length, load, line category, intermodal gauge)
- different signalling systems. The new European ETCS levels 1 and 2 have only been implemented in dedicated corridor parts
- changes of track gauge (e.g. Corridor D/Baltic States, Corridor F/Spain)
- dissentient wagon coupling modes (Corridor D/Baltic States)
- only sporadic employment of interoperable loco drivers

(d) Resource problems
Another main impediment concerns the rolling stock, especially the multi-system locos. In many cases interoperable engines for different signalling systems are regarded too expensive by the Railway Undertakings. Other reasons for the lack of locomotives are insufficient dispatching systems (especially on Corridor E/Spain) or breakdowns due to their obsolete technical status. Furthermore the poor quality of the wagons (especially within the Baltic States) causes delays in the border crossing procedures.

15 Max/–min values may refer to different routings on the respective corridor
16 Including Danish/German border, but without Scandinavia
17 Including Channel Tunnel, but without UK
(e) Operational impediments mainly concern the following aspects:

- Operational priority of passenger trains over freight trains in infrastructure bottlenecks, such as metropolitan nodes, and in conflict situations.
- Bilateral control centres in some cases already do the controlling of cross border train operations; however, mostly controlling issues are still separated on national dispatching systems.
- Time loss due to operations in marshalling yards (single wagon traffic).
- Heterogeneous EDP-standards; from complete absence of EDP-solutions to totally EDP-supported procedures.
- Time loss due to other operations (e.g. low permitted speed for freight trains).

(4) Alleviation projects already under way

Several cross-border alleviation projects have already been started in order to overcome the above mentioned problems. Some of them represent a bunch of single measures, such as the implementation of One-Stop Shops (OSS) or the “ZEUS project”. The following projects have been mentioned as of particular importance:

- CIFFA: Cross border operation centre for interchange between SNCF and Railion, including common dispatching of interoperable locos and train paths (Corridor F).
- Several activities of RENFE and SNCF Fret in order to improve border crossing operations, bundled in projects like MUM, GOTI or SISIFO.
- Increase of amount of trust trains (especially for intermodal trains), leading to a considerable reduction of the required border processing time.
- Upgrading signalling and control systems to the status of ETCS and GSM-R.
- The establishment of the new European loco driver license for cross border rail traffic.
- Common quality agreements and common priority rules for train path planning/operation.

Alleviation projects within the TREND corridors’ countries mainly concentrate on upgrading infrastructure (line doubling, leveling steep gradients, and station reconstruction).

(5) Action plans

The alleviation measures and projects for the TREND corridors have been elaborated and agreed upon by the TREND experts, representing the respective Railway Undertaking/Infrastructure Manager. A classification into three types of actions (= packages of measures) according to their priority and realisation timeframe (short-term, medium-term, long-term) shall facilitate a better overview. The action plans are completed by a fourth group of measures (“other measures”).

Short-term actions – package of measures I:

- Improve and intensify the co-operation that has already started amongst Railway Undertakings
- Improve and intensify the co-operation that has already begun between Railway Undertakings and Infrastructure Managers
- Elaborate an implementation plan for quality management tools
- Define priority projects for improving infrastructure bottlenecks

Medium-term actions – package of measures II:

- Analyse management of international freight traffic through congested areas, focusing on priority rules between freight and passenger trains
- Intensify the co-operation amongst IMs and between IMs and RUs at “service planning” level and at “operational” level
- Improve communication and data exchange to optimise the interfaces between RUs, to optimise resource control and customer information
- Extend the existing corridor-related interoperable traction concepts
- Prioritise freight trains

Long-term actions – package of measures III:

- Establishing rules and tools to manage trains along the corridor (RU operating centres)
- Improving co-ordination of national traffic control centres (between IMs)
- Monitor the planned upgrading and extension of the railway infrastructure (lines, nodes, marshalling yards, terminals)
- Elaborating of new solutions for the existing HERMES system
- Development of ERTMS on the corridor
Other actions – package of measures IV:

- Developing the corridor concept by alleviating capacity differences and bottlenecks
- Developing the corridor concept by alleviating problems in interfacing with terminals / ports
- Other corridor specific measures

2.2.2 Innovative rail freight services (B3)

TREND work package B3 is aiming at the elaboration of business cases for future oriented rail freight services on the corridors recommended in TREND work package B2.

The work package is broken down in a couple of tasks which have basically been executed in the period May 2005 – December 2005, and fine tuned until mid April 2006.

The market demand for rail freight service (e.g. volumes, flows, service quality, competition, etc.) has been determined by two studies, one performed by Progtrans for the corridor related rail freight volume and one performed by Kessel & Partner (subcontractor to HaCon) for the corridor related road freight volume. Both delivered an internal report with a projection of forecasted volumes on the corridors that allows a rating of the corridors according to existing and potential traffic volume.

Road Freight Transport

The analysis is showing a pragmatic survey of international road freight transport flows in Europe, despite lacking of comprehensive statistical data entries for particular peripheral regions.

The network assignment is following the shortest path itinerary and calibration at significant border crossing or measuring points, but is neglecting other influences on the route choice.

In the classical triangle Paris – Hamburg – Vienna the largest quantities of goods are transported, and its leading position is maintained until 2008.

Significant growth rates are nevertheless forecasted to be realised on East-West Corridors e.g. Poland – Germany, Austria – Hungary/Slovenia, and several relations to Turkey.

Due to the concentration on only two mayor arteries the road transit through France is the largest international long distance road flow in Europe, while e.g. hinterland connections of the Northwest European ports are more spread to several routes and relations, in particular in relation to and through Germany.

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<td>Slovenia – Hungary</td>
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<td>Germany – Switzerland</td>
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<td>B-East</td>
<td>Scandinavia – Germany</td>
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<td>German/Austria – Italy</td>
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<td>C</td>
<td>Germany – Austria / Bulgaria – Greece/Turkey</td>
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<td>/ Germany – Poland / Estonia</td>
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<td>D</td>
<td>Netherlands – Germany</td>
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<td>Germany – Poland</td>
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<td>France – Germany</td>
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Road flows to and from Eastern European countries are much more fragmented than visualised in the maps because the model road network does not allow a deeper analysis.

With respect to the anticipated modal shift the most promising road flows are passing the TREND corridors in particular the classical north-south, but also the emerging east-west corridors.

It is recommended to consider the corridor flows, both their total volume and the anticipated growth rates, when evaluating the relevance of a corridor for further analysis to demonstrate the impact of certain measures on the modal shift potential.

**International Rail Freight Transport**

The TREND Corridors are generally in line with major European rail transport arteries.

The main corridors identified by the stakeholders according to current volume are prevailing also in 2008.

There is a more dynamic growth on Eastern European corridor sections than on Western European ones.

In the surroundings of Western European seaports a more dynamic growth than in other Western European regions can be noted.

A couple of rail transport flows are characterised by imbalances, thus creating a difference of the volume in both transport directions.

The findings of the current co-ordination work, which was validated by the stakeholders concerned can be used to evaluate the recent and most probable future rail transport volume in a European perspective.

It is a fundamental basis for further thorough analysis for specific purposes such as the identification of infrastructural bottlenecks or development of focused rail freight services.

The projection year 2008 was chosen with respect to the anticipated start of the Integrated Project “New concepts for trans-European rail freight services” and the involvement of the stakeholders involved in rail freight services notably customers and Railway Undertakings for which this was the maximum achievable planning year. On the basis of expert interviews involving the market parties to obtain logistic requirements on recent and future rail freight services (= demand) exemplary cases e.g. forwarder market, chemical goods, intermodal freight were derived. It appeared that the customers were either confirming the general opinion with respect to rail, namely it should become faster, more reliable, more flexible and cheaper, or have very precise demands on specific transports that are hardly to be responded to in the framework of a Co-ordination Action due to the involved business interest of the market parties.

Thus the Railway Undertakings were in the position to deduce necessary improvements in rail freight service (= supply) by comparison of existing service to market requirements only by themselves, and it was proposed to organise a workshop with stakeholders (Infrastructure Managers, Railway Undertakings and customers) aiming to present examples of customer related services by recent projects and innovations they are planning to or have already implemented. The workshop has been organised by KombiConsult in Frankfurt am Main on November 22, 2005. It included the development of forward-looking and innovative rail freight services for selected corridors (e.g. advanced intermodal technologies, hub-and-spoke production forms, innovative tracking & tracing solutions, ...). The presentations have been documented and stored to the TREND website (www.trend-project.com), where further investigation are added from those stakeholders that could not attend the workshop itself.

Examples of the innovative concepts proposed were:

- CD-Telematika reports on the implementation of new technologies for the rail freight transport in the Czech Railways, in particular new operational centres that are effectively linked by Telematics (consignment data, mobile information to/from shunting gangs, web-based tracking and tracing), and the implementation of ERTMS in Czech Republic composing of a pilot application of GSM-R and ETCS level 2 for both infrastructure and locomotives.

- Europlatforms, the European association of freight villages, presented the recent status of freight villages in Europe since the creation of the first one, Interporto Bologna, in 1972. Europlatforms destroy the misunderstanding that freight villages are only real estate business by highlighting the positive effects on the reorganisation of the freight activities, the environment and finally the traffic shift to intermodal and thus rail transport. Respective national regulations, e.g. in Italy and Germany have created the legal framework for developing freight villages by means of private-public-part.
nership (ppp) model. They can thus be seen as a tool to attract private investment for rail-supporting measures.

By means of maps that are showing the BMW Group workshops, vendors locations and distribution routes the enormous transport need of the car industry across Europe was demonstrated, but also in regional perspective between different places in Bavaria for example. Currently the new entrant Railway Undertaking TX Logistics is providing traction services on selected routes. BMW is requesting to receive service offers also for relation Leipzig and Berlin.

Railion Deutschland selected the successful implementation of multi-system locomotives (MSL) on their joint transport with SNCF as an example for achieving interoperability in cross border rail freight services, and proposed to further develop multilingual management offices (cross border operation centres) in particular for long corridors with more than two active languages spoken.

The Rail Cargo Austria presentation that reports on five current “best practice” rail freight products, namely the Corridor-X-train towards the Orient, the “butterfly” of ICA and Alpe Adria from Salzburg and Vienna via Villach to Triest, the waste transport by means of ACTS, automotive logistics for Magna (Weiz – Devinska Nova Nes), and delivery of gasoline to gasoline stations by intermodal rail freight transport, was unfortunately not received electronically.

SZ (Slovenian railways) presented their achievements on border crossing using multi-system locomotives and dedicated border crossing stations, and their recently established intermodal gateway Ljubljana which serves as a gateway north-south (Germany/Austria – Balkan states), and east-west (Italy – Hungary/Ukraine).

Turkish railways, TCDD, presented a multifaceted approach to increase the rail freight transport and improve the trade with central and western Europe: modernising infrastructure and wagon fleet, and introducing satellite-based solutions for tracking and tracing of consignments (wagon).

MAV Cargo introduced their modern combined transport terminal BILK that facilitates as a gateway for intermodal services.

Trenitalia presented examples of rail based supply/distribution concepts that are involving intermodal terminals, logistic platforms and their recently restructured marshalling hubs.

SZSK Cargo proposed a concept that has been elaborated to link the newly constructed KIA motors factory with ports.

“Systemcargo” is a system of the forwarder Hellmann to link the companies logistic centres by rail. The particular challenge is the narrow night jump window open to compete with lorries and the achieved overall punctuality of more than 97%.

New Entrants

Supporting measures to facilitate access of third party railway operators/newcomers (e.g. access to infrastructure information such as Network Statements, personal, authorisation procedures, …) have been elaborated by means of a desk research, phone interviews with new entrants, elaboration of a draft report, validation of the findings in a one day workshop in Frankfurt am Main on July 8, 2005, further interviews with new entrants that could not participate, and by laying down the results in an internal report on the subject which was agreed upon with the involved railways. Within the discussion of the position of private railways in cross-border rail freight transport in Europe the following aspects have been looked at:

### I. Legal Aspects
1. Network access
2. Authorisation as a railway company
3. Vehicle homologation
4. Legal demands on engine drivers and other personnel
5. Customs clearance and taxation matters
6. Contract design

### II. Technical Aspects
1. Electric current systems
2. Signalling systems and train radio
3. Clearance gauge, axle load, track gauge

### III. Economic Aspects
1. Access to capital
2. Access to rolling stock
3. Access to qualified personnel
4. Infrastructure pricing and energy costs
5. Duration of transport contracts and traffic modes
6. Intermodal competitive situation

### IV. Operational Aspects
1. Train paths construction and allocation
2. Operational disturbances

### V. Other Aspects
1. Cultural distinctions
2. The time factor
Despite the above described problems private railway companies are active and successful in the international rail freight business in Europe. However their market share still is significantly below 10% of all international rail freight services in Europe. The success of the private railway companies is a result of their greater flexibility and customer orientation compared to the former state railways, but especially a result of their focus on the profitable block train sector. The little market share of private railways is a consequence of the listed issues and problems, especially the fact that they still have no or different access to a large part of the European railway network.

Especially a simplification and harmonisation of the technical and operational regulations within the EU can make a significant contribution to improve the competitive capability of rail freight service in general and the position of private railway companies in this market in particular. Although the EU has enacted several directives and regulation on this matter, their implementation in the member states of the EU and especially the enforcement of the European legislation in practice leaves a lot to desired. Therefore the European Commission must act much stronger on the member states to ensure the effective enforcement of the European regulations.

Whereas a significant part of the European legislation on the railway sector leads in the right direction, actual improvements are still in the future, indeed some other European regulations contribute to the problems of the railway sector. Directives on the interoperability of rail traffic do not match the requirements of market. Here for future legislation a more effective participation of the railway companies, also the private railway companies, is required.

The private railway companies can improve their competitive position themselves by a better co-operation among each other. Whereas in some European countries as for example Germany there already is an intensive co-operation amongst private railway companies and according to that their market share rose significantly, in other European countries as for example Poland there is no co-operation between private railway companies at all. A better co-operation among the private railway companies can especially ease the problems of and deriving from access to qualified personnel and rolling stock. The scheduling of these can be improved and costs resulting from operational problems such as broken trains can be reduced.

No improvement can be expected to numerous technical obstacles for international rail services, as respective measures require a tremendous amount of financial funds and in most cases do not provide noteworthy improvements until the corresponding components are implemented at least on all main railway lines of the continent. This applies especially to ERTMS/ETCS, which has been assessed as an additional operation system that has to be dealt with at least during a transition phase (20–30 years) after it has fully replaced the existing systems and can demonstrate its benefits.

### Studies on specific aspects

Jointly with UIRR, KombiConsult administers a budget for selecting and commissioning feasibility studies. These include cost-benefit and migration aspects on innovative solutions for the improvement of international rail freight services. In the framework of this task the following studies were initiated and accompanied by UIRR and Kombi-Consult:

- upgrading an Y-corridor Belgium / Germany – Spain through France for P400-loading profile, awarded by KombiConsult and completed by subcontractor Kessel & Partner, Freiburg
- report on legal aspects of “alliances” in European rail freight services, awarded by KombiConsult and completed by subcontractor RA (lawyer) Kurt Fuchs, Köln (which was used as an input to B6)
- totally different form of mass transport operation e.g. pipeline for pallets, awarded by UIRR to subcontractor Technical University of Delft
- energy supply in freight trains to allow transport of temperature controlled cargoes in unaccompanied intermodal transport, awarded by UIRR to Logistic Network Consultants

The task elaboration and discussion of a suitable and feasible corridor leadership – “Corridor Co-ordinator” was executed by CER. Their point of view is the following:

In the course of the TREND project the participants expressed the need for a co-ordination of timely upgrading and extension of railway infrastructure with regard to the whole corridor (including lines, nodes, yards, terminals). It is our opinion that such co-ordination would take place through a co-ordinator, a person capable, with enough political influence as well as technical knowledge, to increase and co-ordinate...
investment in the rail infrastructure, in turn, rising the effect this investments have on the economy.

It is focused on infrastructure investment and thus it does not concern operational or rail freight service oriented measures which are subject of the business partners.

The mission of this high-profile personality would be:

• To raise the awareness of policy makers in the states along the corridor on infrastructure investments in neighbouring states – priority between freight and passenger, harmonisation of administrative procedures …

• To raise the awareness of the European Union institutions on the infrastructure priorities in different Member States and encourage harmonisation of priorities between Member States

• To promote political support from the Members States concerned

• To suggest the actions and decisions of the Members States, and the European Commission

• To mobilise proper financing from the public authorities concerned

• To mobilise other stakeholders (notably the railway operators and the Infrastructure Managers)

• To mobilise private finances

On the basis of the 884 / 2004 TEN-T Guidelines decision the European Commission has appointed six European co-ordinators for selected European Corridors and the implementation of ERTMS.

A point of consideration is whether the European co-ordinators can take on the described tasks.

The European co-ordinators appointed until now are not responsible for all the identified TREND corridors as TREND corridors are not entirely identical, but do in part correlate, to the railway axes identified in the Decision 884/2004.

The TREND corridors have been identified and agreed upon at the beginning of the project in consideration of the main European transport flows, the development of the TEN-T, commitment of the stakeholders and works already done in previous corridor studies. Analysis in the framework of TREND is not only covering infrastructural conditions but also interoperability issues, technical operational questions and the market potential at large.

Three options are at hand:

1. The European co-ordinators participate only partially in the work of the corridor co-ordination that is envisaged by the TREND project

2. Their tasks are extended to fit the corridors identified under the TREND project

3. New co-ordinator(s) are appointed to cover the whole of the TREND corridor(s)

In each case, the task of co-ordinating timely upgrading and extension of railway infrastructure with regard to the whole corridor should be entrusted to a high-profile personality with sufficient political influence.

The selection of ‘TREND Corridor co-ordinator’ would precede a nomination of possible candidates by the interested parties of the states the corridor runs through (Governments, Infrastructure Managers, Railway Undertakings, …), similarly as done in the process of nomination of the existing European co-ordinators.

We consider that the financing of their task and the possible setting up of a secretariat should be done through the instruments of the European Community and propose that the tasks of corridor co-ordination on TREND corridors is considered as extended scope of tasks of existing European Co-ordinators, where financing issues have already been defined.

2.2.3 Key performance indicators / quality standards (B4)

Work package B4 is reporting the co-ordination work on developing quality standards for the different commercial and operational relations in rail freight services: Customer (CU) – Railway Undertaking (RU), Railway Undertaking – Railway Undertaking and Railway Undertaking – Infrastructure Manager (IM).

The importance of the topic is directly related to the decreasing market share of rail freight traffic in Europe, which means that the expectations of the traditional rail customers are less and less satisfied and that many of them have left and gone to other transport modes. Thus the concept of quality is not to be considered as an absolute one, but in comparison with the level of service given by the competitive modes of transport.

The work package B4 took advantage of the participation of project partners representing Railway Undertakings (UIC and CER) and combined transport operators (UIRR).
The first added value of that presence is the opportunity of cataloguing the most relevant documents concerning the wider topic of "quality agreements", i.e. multilateral agreements to achieve a better quality in rail freight transport, guidelines for quality contracts between RUs and customers, guidelines for agreements and sub-contracting between RUs in international combined transport\textsuperscript{18}, and studies concerning quality aspects.

Within the task of cataloguing existing agreements and good practices a field survey has been made among some relevant Railway Undertakings and rail freight service customers across Europe. The survey on the existence of quality agreements, intended as contracts for rail freight transport services including clauses or commitments that rule "quality" aspects, had to deal with the confidentiality clauses applied to (and agreed with) different customers in rail freight contracts. Although this might be an impediment for a co-ordination action on quality it can also be seen as a signal for intramodal competition, quality being one of the differentiation criteria.

The survey focused on quality agreements between RUs and customers, being that category of contracts the one bringing the most effective response to market requirements in terms of possible "quality indicators" which rail operators and customers could agree upon.

Nevertheless information about the existence of agreements between RUs for international services and between RUs and Infrastructure Managers (IMs) were dealt with as well.

Experts from RUs (7) and customers (8) explained the approach experienced by their company concerning the most relevant quality criteria defined in "CER-UIC-CIT Freight Quality Charter" which was signed by these organisations in 2003, i.e.:

a) Planning
b) Punctuality/reliability
c) Information
d) Rolling stock
e) After-sale service

The specific aim was to assess the level of implementation of the quality criteria of the Quality Charter into commercial transport contracts, as well as to identify a preliminary market segmentation related to quality. The segmentation includes factors such as the existence of corridors/international relations covered by specific quality agreements, the existence of specific quality clauses in contracts issued for specific products (e.g. intermodal transport services, conventional block trains and single wagons).

Deliverable B4 reports detailed results of the survey. In this summary paragraph the implementation into quality contracts of the 5 mentioned quality topics is reported as outcome of interviews made to RUs and Combined Transport (CT) operators, as well as the collection of customers (mainly CT-operators) requirements towards quality.

As concerns the transport volume coverage of quality agreements, a clear percentage of trains reported "under quality agreements" in a corridor can hardly be assessed. The survey allows the drawing of a range of general trends towards the application of quality agreements:

- Quality clauses are mainly applied to transport contracts for intermodal services
- The application of quality agreements is more complex for conventional block trains and single wagon traffic
- Quality clauses are less distributed in corridors to and from Central/Eastern Europe

Quality managers for cross border transport are not always provided, but every RU puts in place some quality initiative to improve the overall situation. That is to say product quality groups, service contracts, border crossing monitoring, quality measuring systems. They are not always well co-ordinated and documented although that would be desirable, and make the application and transferability more efficient.

The next paragraphs report on the implementation of the Freight Quality Charter criteria:

As concerns "planning", procedures for requesting regular train paths follow RailNetEurope (RNE)/Freight Train Europe (FTE) rules. RUs report an average real time of 12 months for reengineering timetables after a request of a new regular service (some customers however report a 2-year delay). Much lower, from 2 to 12 weeks, is the reaction time for obtaining additional paths on existing services. Customers however report worse market conditions and punctuality rates on those additional services, because they do exploit only spare capacity left in the annually agreed schedule. In some corridors e.g. the Brenner corridor the Infrastructure Managers have designed catalogue train

\textsuperscript{18} The terms "combined transport" and "intermodal transport" are here used as synonyms.
paths right from the beginning which have almost the same quality (travel time) than regular train paths, and can be ordered on request.

According to RUs and customers, “punctuality” as a quality criterion is almost always defined in contracts. The “delay relevant for compensation”, is mainly reported to be 60 minutes after arrival time. Different types of compensation exist, mainly used in intermodal transport contracts.

If “reliability” relates to the existence of punctuality thresholds to be reached by RUs after which a compensation scheme applies, the concept is widely applied in quality agreements, and leads to the existence of “train based compensation schemes”. On the contrary, reliability as “capability to maintain a level of performance for a stated period of time” is not reported to be a criterion inserted in quality contracts, yet.

The major part of RUs declare to apply compensations in case of cancellations, whilst CIM rules are applied for compensations in case of loss/damage of cargo. The same CIM standards are applied for other kinds of compensation when a quality agreement is not signed, although they are reported to be not suitable for intermodal transport. However, CT operators report a still higher flexibility in cancellations from RU side than for customers.

“Information” aspects are more and more dealt with in quality contracts, because it is a logic consequence of defining responsibilities. The topic covers various services, the more offered the higher is the product value, from EDI data exchange on delays (and causes) and cancellations, to tracing and status of order. However CT operators still report some lack of quality in data provided by RUs on causes of delays, in particular, and due to the use of different information systems among different RUs.

Some RUs give the possibility of technical specification of “rolling stock” in the contract. In general, compensations in case of no-show of appropriate rolling stock are not included in the contracts; however, in few cases they might be part of the service agreement, according to RIV regulations.

On nearly all important corridors, “after-sale services” are treated by the creation of corridor-specific quality groups, mainly for intermodal transport. Quality groups are always present supporting the companies in managing and solving problems connected with bad quality. In particular, these groups are busy with quality monitoring (fulfillment of quality objectives), analysing causes of delays, complaint management and defining corrective measures to improve quality. The feeling of some customers is that the role of such quality groups has to be re-designed, in order to achieve more effective results.

As concerns relationships between RUs, the survey confirms that still the “co-operative traction” model is the most used, with an increasing use of One-Stop-Shop (OSS) model (a “leading-RU” subcontracts one or more other RU on the corridor) for intermodal transport, which follows the guidelines of UIC for signing such RU-RU agreements. Intermodal corridors will see more and more the presence of competitive models among railways on the same corridors.

Opinions of interviewed customers on the actual status of quality agreements can be seen as an indicator of actual market requirements. As satisfactory factors, CT operators report the existence of quality agreements on the major corridors, and the existence of compensation schemes when lacks of punctuality occur. Causes of dissatisfaction are the lack of diffusion of quality agreements on some corridors (e.g. East-West), the too low penalty level, thresholds not allowing to enable a correct feedback loop to the subject causing the delay, too many exemption clauses, and a still poor feedback of quality agreements application on the overall punctuality of trains.

19 Usually considered to be the MAD (mise à disposition), i.e. the time after which the cargo or loading units are available to the customer at the terminal.
As concerns causes of delays and deficiencies, the topic has been developed during work package B4 activities, by a three-step process, described in details in the Deliverable B4 report:

- Presentation of UIRR study on causes of delays and deficiencies
- Feedback by RUs represented by UIC and CER
- Discussion (in an expert workshop) and conclusions

Thanks to the close collaboration between CT operators and rail companies, and the effort of UIRR Office in elaborating harmonised statistics, a regular quality control of complete CT trains is carried out. The table below summarises the evolution of causes of delay between 1999 and 2004.

These statistics have to deal difficulties in comparison related to the changes occurred between 1999 and 2005, i.e. profound changes in the production schemes on nearly all main transalpine corridors (Moldane, Gotthard and Brenner), the introduction of new corridors, and the arrival of new entrants on the market (Brenner).

From 2005 no data is available on some major corridors (Brenner) due mainly to confidential clauses in the quality contracts. If this trend continues, it will be thus difficult to consolidate and elaborate the harmonised statistics on European level.

The UIRR survey conclude that the overall punctuality has not reached at all a satisfying level, which could really develop Combined Transport in Europe. It is to fear that the CT market will know again profound changes in the production schemes.

The reciprocal effort of RUs and customers in defining the main causes of quality lacks and the main measures to overcome them and then to increase quality led to the following main conclusions and recommendations:

- The actual poor quality of rail freight transport is a result of missing locomotives and drivers, missing or delayed infrastructure investment, the increase of scheduled passenger traffic (mostly short and medium distance) year by year and the increase of rail freight services on specific corridor sections.
- The improvement of quality has to be in line with existing changes of customers’ needs which are also determined by the quality of service offered by competing modes of transport (mostly direct truck transport but also regular short sea and barge services).
- Economic and commercial consequences of “non quality” represent an important deal to work on, because they affect the entire transport chain, both for CT operators (more wagon rotations, staff, loss of turnover), for shippers and transport companies, and also for the production system of RUs: Longer turnaround time for wagons, suboptimal use of locos, organisational disruptions in transshipment.
- RUs are taking several measures to improve the overall situation: investment in traction resources, employment and training of staff, quality monitoring programs, agreements for interoperability etc.
- The importance of multilateral monitoring bodies and common management for border crossing operations, in particular, have to be enlightened as keys to improve quality.

### Causes

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<td>Force Majeure</td>
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<td>5%</td>
<td>4%</td>
<td>5%</td>
<td>7%</td>
<td>3%</td>
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<td>Terminal Related</td>
<td>3%</td>
<td>5%</td>
<td>5%</td>
<td>12%</td>
<td>9%</td>
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**Railway causes**

- Missing traction/driver: 23% 41% 41% 29% 25% 29%
- Strikes: 9% 3% 6% 5% 7% 5%
- Anterior delays: 11% 12% 9% 6% 10% 6%
- Infrastructure damages: 2% 6% 7% 10% 9% 8%
- Sorting fault: 4% 2% 1% 2% 1% 5%
- Works: 4% 4% 4% 5% 8% 5%
- Divers: 12% 12% 15% 16% 15% 23%

**Divers**

21% 10% 8% 10% 9% 10%

*: excluding Brenner and UK – Italy corridors
• Actual acceptable quality levels on "best practice" corridors are not coming from liberalisation by itself but intramodal competition is an important fact for pushing RUs towards better quality, and towards the adoption of quality agreements and quality monitoring systems to meet customers’ requirements. Liberalisation should be enforced wherever barriers still exist, in order to achieve a more relevant intramodal competition. On the Brenner corridor it could be demonstrated how the overall quality of service was raised after newcomer traction providers have occurred on the scene, and set the benchmark for block train services. However, combined transport operators report that the negotiation between RUs and customers for a satisfactory agreement on quality clauses is reported to be more difficult in corridors where no choice among traction providers exists.

• Integrated international traction can represent a key factor for quality in international rail freight transport, since it leads to a more co-ordinated use of – not necessarily multi-system locomotives and drivers in cross border operations.

• Co-operation among actors involved in rail freight business should be encouraged: all parties, customers and Railway Undertakings, support initiatives towards a dialogue and a closer co-operation between all market players; i.e: customers, IMs and RUs.

• Since the majority of current quality agreements are between RUs and Intermodal Operators, but quality deficits are also caused by the IMs it is recommended to expand quality agreements to the relation RU-IM and to implement effective performance regimes to rule relationships between IMs and RUs. A performance regime defines the level of service and the price and included sanctions and incentives. The implementation of performance regimes has been required in Directive 14/2001 and the Commission shall carefully monitor the implementation into national law and application by Infrastructure Managers.

• It appears that the co-ordination work done by the associations on a European level, working groups of the railways (e.g. the UIC Working Group on quality), and general agreements between the associations with respect to combined transport have reached a level which no longer requires further international intervention at the level of regulatory bodies. Nevertheless, it is the opinion of CT operators that assistance from national or supranational authorities might be required in specific instances and for a transitional period.

• It is up to the market parties to verify the standard phrasing of different quality agreements and apply them for real transport contracts rather than agreeing upon another “standard”. The mutual understanding of the stakeholders is that “quality” becomes a part of the transport contracts and is negotiated and agreed upon between the contracting parties as any other part of the contract. The level of service quality (e.g. transit time, punctuality) and the price might be too different for different market segments of rail freight transport to issue a unique “standard” agreement.

• The rejection of the Directive proposal on quality in rail freight services leaves the market without any official regulation on quality. The market environment however shows that quality contracts are more and more signed between commercial entities without any need of public monitoring or intervention for the time being. This demonstrates that market parties are able to decide bilaterally on quality issues in rail freight market, and this entails with the implementation concept proposed in the framework of this Co-ordination Action. It can however become relevant to monitor the implication of these quality contracts on the quality level, via the establishment of quality monitoring systems, which can be supported even by Public Authorities.

2.2.4 Infrastructure development scheme (B5)

Work package B5 focuses on a methodology for the evaluation and development of European railway infrastructure, the Infrastructure Development Scheme (IDS). A technical instrument was required to perform the necessary evaluations of the infrastructure network and to test new forms of information provision for a particular group of railway market players. The GIS-based information tool was therefore included in this work package. Both aspects of this work package are summarised in this chapter and the most important results are presented.
2.2.4.1 Infrastructure development scheme

Seamless travel of trains across borders face a huge number of organisational and technical obstacles, preventing this environmentally mode from prospering comparably to overall transport growth rates. The creation of a harmonised European Railway Area (ERA) is hence one of the European transport policy topics. The Community policy of the last fifteen years has initiated change in many organisational structures. Nevertheless, railway infrastructure, being a very slow-changing asset, still hampers cross-border services as signalling, electrification, gauges, and many more parameters vary significantly from country to country and sometimes even within countries.

The TREND project therefore proposed already in 2003 a new approach to rail infrastructure development, focusing on selected, most heavily used rail transport corridors. The technical infrastructure and the organisational structures were intended to be developed along these corridors to provide maximum benefit to international railway services at least investment cost. The results of this approach are described hereinafter.

In 2005, the railway industry and policy makers, namely the European Commission, have agreed on a similar strategy to bundle efforts and promote rail as a more efficient transport system. Almost in parallel, UIC, supported by the European railways and their representatives, namely CER and EIM, developed the European Rail Infrastructure Master Plan (ERIM). As UIC was involved in both TREND and ERIM, cross references are no coincidence.

2.2.4.1.1 Approach

Given the overthrow of the railway markets in the last decade, the report first closely examines the framework for rail infrastructure development in the European Union. The analysis addresses the legal framework, the relevant stakeholders, as well as current activities at European level in this respect. The last part focuses on the joint activities of the European Commission and the railway associations as from 2004 (‘Memorandum of understanding’). The European approach to rail interoperability is presented.

The methodologies for rail infrastructure evaluation are addressed in a further section of the report, focusing on the technical evaluation of railway infrastructure. This is to identify an appropriate approach for the evaluation of railway infrastructure at European level. As it was out of scope of the TREND project to elaborate an economical evaluation of railway infrastructure, the analysis was restricted to planning approaches.

The railway infrastructure to be analysed needed to be mirrored against a quality target. The benchmarks where hence set by defining the requirements of Railway Undertakings (users), wishing to operate cost efficient services to be successful on the market. As the efficiency of services is not only restricted by stops at border crossings due to changing infrastructure parameters, the requirements also include parameters influencing for example the maximum allowable length and weight of trains. Six model trains are defined, varying especially the maximum length and weight of consists.

Already in TREND work package B2 the corridors were defined to be respected in the overall TREND analysis. The definition is based on expert opinions from national Infrastructure Managers and to a smaller extent on the opinions of rail freight operators. The approach for the definition was a qualified estimation on which parts of the network international rail freight services will be mainly operated in 2010. The preconditions for the selection of the corridors were that they should cover the most frequented railway links including important deviations and important installations such as shunting yards and intermodal terminals.

The network analysis, applying the TREND GIS-tool, demonstrates in a first step the practicability of the tool and visualises the overall TREND network. The quality of railway infrastructure in place is demonstrated and quality slumps become easily evident. The second step applies the user requirements to the TREND network and elaborates to which extent the current infrastructure responds to the requirements.

2.2.4.1.2 Results network analysis

The TREND network analysis consists of three parts:

- The corridor reports elaborated in work package B2. This detailed analysis is based on a corridor-by-corridor approach and includes an analysis of constraints and other deficits. The action plans developed in work package B2 are again part of this report.
- A visualisation of the TREND network differs between the various parameters respected in the TREND evaluation and provides a concise mirror
image of the current status of the infrastructure by parameter. For each parameter investigated a map is presented in the report and an analysis of the shares of quality levels is provided.

- The compliance of the TREND network with market requirements was investigated by applying a set of parameters to the corridor network, corresponding to the parameters of intermodal trains performing competitive rail services.

The results from the corridor reports are not presented at this point again as they were discussed in the WP B2 report already. Readers are therefore requested to check the WP B2 report for further reference.

The most important results of the analysis applying the GIS tool (visualisation) shall be summarised in the following. For the maps and figures please refer to the full presentation in the report.

- The weakest link, meaning the section of a train route with the most restricting parameter value, may be decisive for the successful operation of a train. It may prevent a train from operating at all or with maximum efficiency. Knowing the specific train parameter for a particular service, any train operator may easily analyse a route chosen for the service. The coloured presentation provides a concise overview. A detailed presentation is possible, down to a single link of the network.

- Technical parameters such as type of electrification, control-command and signalling technology, and rail gauge are usually known to the Railway Undertakings. They are nevertheless displayed for completeness and consistency. The largest variety in network characteristics is found in the sector control command and signalling systems.

- Market related parameters include allowable train length, allowable speed and weight of freight trains, UIC line categories, the intermodal loading gauge and the UIC loading gauge. These parameters are much more important for the design and marketing of a new or expanded rail service. The route information is complemented by the location of shunting yards, intermodal terminals, and border stations.

- The TREND tool also provides information about line capacity and line occupation. A comparison allows a rough capacity analysis that is also provided. Railway undertakings should be aware, that the information provided may only be regarded as an indication. Due to the complexity of timetabling and train path construction no guarantee may be given regarding the availability of capacity unless a train path request is confirmed by the Infrastructure Managers involved.

The number of tracks provided on a particular route is probably of lesser importance to Railway Undertakings.

The analysis of the TREND network with regard to compliance of the TREND network with market requirements may be described as being rather disillu- sioning. The analysis is based on a virtual operation of a set of model trains through the TREND network. The infrastructure quality is substantiated by the following figures:

- Only Germany provides railway infrastructure to host all model trains defined by the TREND project. Apart from Germany, only France, the Czech Republic, and Spain provide railway infrastructure at all to operate some of the trains defined.

- Between 16% and 37% of the TREND network comply with the requirements of the trains defined.

- Very significant restrictions are imposed by the allowable train speed. A maximum speed of 120 km/h is only admitted on 66% of the network, restrictions being significantly higher for trains 140 km/h fast. In Eastern Europe maximum line speeds of only 80 km/h can often be reached.

- The lack of 700 m sidings causes significant limitations to the operation of efficient train services as well. 700 m long trains are only admitted in the centre of the TREND network to roughly only half of the network.

- Heavy trains of up to 1,800 t are largely denied on some outer branches of the network.

- The intermodal loading gauge P/C 400 is not available on one third of the TREND network, especially causing problems in France and Switzerland that are transit countries.

2.2.4.1.3 Results of the application of the TREND methodology

The following results shall be pointed out as a result of this work package:
The corridor approach pursued in the TREND project and agreed by the Commission and the railway associations (MoU) is a suitable approach for analysing and further developing the interoperable European railway network. Starting from a core network of significant railway corridors, the overall network can be gradually converted into an interoperable rail network where economically justified and required by the users.

In the European Union, there are a significant number of stakeholders and a multitude of instruments and procedures to discuss and further develop railway infrastructure at the European level. Among them is the European Rail Infrastructure Master Plan that is currently established for the first time. They stand vis-à-vis the national stakeholders and planning instruments easily losing the European perspective, focusing only on truly national projects.

The methodology applied in the TREND project is similar to the one applied for the current elaboration of the European Rail Infrastructure Master Plan. A synthesis of both project methodologies and results may serve as a basis for the implementation of a sustainable and continuous planning process.

European rail infrastructure planning therefore requires a more formal framework and the full support of the major players, especially the Infrastructure Managers playing a double role both at national and European level.

In medium-term, a more sophisticated methodology is to be implemented to raise planning efficiency and to improve the quality of planning results. This calls for the provision of a European infrastructure database and the application of state-of-the-art planning tools (see below for decision support system/tool) also allowing for cross-border infrastructure evaluation.

Due to international (cross-border) processes, a practical application of the IDS furthermore requires:

- early involvement of all relevant stakeholders
- clear commitment of the Infrastructure Managers
- clearly defined competences
- development of stringent, accepted processes

The following two problems arising with data collection should be mentioned in this context: Firstly, infrastructure data available with the Infrastructure Managers have proven to vary widely in quality, a problem reported earlier in this report. Secondly, a non-ambiguous identification of stations and other operational nodes such as junctions is difficult in a multilingual and international environment. Often several names, usually referring to the name of a town, exist for one location. This problem will have certainly been addressed in the context of timetable information systems. It is therefore recommended to come to a common international structure/standard including the definition of aliases.

2.2.4.2 GIS tool

The second focus of WP B5 was the implementation of a GIS-based internet information tool. Input is based on infrastructure data collected by partner HaCon (WP B2) and provided by the external experts. The selection of the underlying GIS basic software and the database was made basing on a TREND-internal evaluation process.

The tool demonstrates the following applications:

- Also large infrastructure networks may be displayed with help of internet technology. A high level of detail is possible where required. The number of infrastructure parameters to be displayed is not restricted.
- The display of network characteristics is possible by selecting particular infrastructure parameters. The identification of bottlenecks or restraints to certain services is only a mouse click away and can contribute valuable support to infrastructure planning processes.
- The tool allows Railway Undertakings to identify and evaluate opportunities and restraints for the operation of new and modified services easily.
- The performance of the tool is not fully exploited yet. Further functions for display and analysis may be added if reliable data is provided.

The tool was widely tested by TREND developers and users as well as by external experts. The particular experts checked the infrastructure corridor data online via the Internet tool. Furthermore, the GIS tool as explained above, also supported the network analysis.

22 Access via www.trend-project.com
2.2.4.3 Recommendations

Despite the vision of a European Railway Area (ERA), the European railway system is still a very heterogeneous one. This is not only true in technical terms but also as regards the support by national governments, related institutions and the Infrastructure Managers: national perspectives of infrastructure development still prevail the business. Financial support to railway infrastructure from the TEN-T budget has not generated a coherent infrastructure so far although progress becomes visible in some parts. Too many “construction sites” still need to be completed.

With the attempt of developing a European deployment plan for ERTMS there is also a chance of creating a framework for developing railway infrastructure and businesses beyond the implementation of ERTMS. Methodologies developed and applied in the TREND project as well as work undertaken in the ERIM project do not only provide a knowledge base for the evaluation of measures and strategies. They also brought together European actors jointly debating and contributing to the development of European railway infrastructure.

Research and discussion have revealed that a further integration of stakeholders might be required to make best use of expert knowledge. Too many circles and platforms exist today still not joining forces to achieve the vision of a European Railway Area, which clearly stretches far beyond the EU-25 borders.

In the following the recommendations therefore clearly target a better European integration in the railway sector and improved tools to proceed. Recommendations have to be cautious as regards existing communication structures inside the railway sector: such structures may exist already but have not been revealed by TREND investigations.

2.2.4.3.1 A European railway core network

The attempt of defining a European railway core network is driven by the plan of implementing an interoperable railway network, characterised by a uniform control command and signalling system, ERTMS. The corridor approach is certainly correct, providing benefits to the Railway Undertakings as from the completion of the first ERTMS cross-border route, preventing the implementation of an ERTMS patchwork. The ERTMS core network is then to be extended gradually.

In parallel to the ERTMS network, further “core” networks have been defined (see section 3.5.2 on standards for international rail freight), addressing commercial factors of rail freight such as loading gauge, axle load, etc. These factors, also being addressed by the TREND and ERIM evaluations, play a paramount role for handling increasing trade volumes with the future European partners and the Far East.

It is therefore recommended

- to gradually integrate railways beyond the EU-25 borders into developing European railway infrastructure
- to make use of the preparatory work that has already been performed by other platforms such as those under the umbrella of UNECE (section 3.5.2)

2.2.4.3.2 Infrastructure development

Infrastructure development being an original national monopoly requires to adopt international traits in the case of railway infrastructure. This is due to the tight interdependencies between vehicles, thus train operations, and railway infrastructure management. Both sectors are marked by the historical national developments which need to be overcome when generating the European Railway Area.

The development initiated by European legislation, set in motion by the Memorandum of Understanding of April 2005 (section 4.2.1) and supported by actions and projects such as the TREND project, provide the opportunity to achieve a breakthrough in developing the European railways.

To ensure a sustainable development in developing the ERA, several conditions need to be fulfilled from the TREND point of view:

- Infrastructure planning: The definition of the various levels of the European railway network and the co-ordination of the implementation of measures need to be lead over into a continuous process. It would not be acceptable if the development of a European Rail Infrastructure Master Plan remained a singular action without follow-up activities including a regular update of the master plan.
- A high transparency of processes and results may improve the perception of European railway problems and task by national stakeholders and politicians. A clear demonstration of the benefits
of a European railway, broken down to particular projects, will also improve the acceptance of railway investment.

- Based on the experiences gained in current activities and the availability of improved statistics and evaluation tools, a refinement of the methodology has to be arranged for. The improved methodology shall also further integrate existing stakeholders and the appraisal of best practices for example at national level or in other industries.

- Better integration of research at European and national level into the processes will contribute to a higher efficiency of research funds and will lead to results better meeting the requirements of the industry.

There are tendencies in some European Member States to integrate more international (European) aspects into transport planning. For example, the new German Logistics Master Plan requests the discussion of international issues. It may be doubted, for the time being, that the Member States will soon agree on the integration of their national transport plans. Nevertheless, there is scope for improving the collaboration of national governments in terms of transport planning. A European transport infrastructure plan shall remain the vision.

2.2.4.3.3 Decision and management support

Both the TREND and the ERIM project, but also many other projects being mainly publicly funded, provide a profound knowledge base supporting the planning and evaluation of railway and other transport infrastructure. No attempt is known so far integrating and structuring the results, data and methodologies of projects performed till date and providing a single platform supporting decision and management in the railway sector.

The results of railway research funded by the European framework research programs are, for example, widely spread over the internet. The Transport Research Knowledge Centre (TRKC) on the DG TREN website of the European Commission provides a good initial approach providing access to research results. However, results from Commission service contracts may not be included. Transport statistics are only available separately if at all, for example for intermodal transport.

TREND therefore recommends the implementation of a decision support system covering railway infrastructure aspects, for example regarding the implementation of TSIs, and railway markets and operations to a certain extent. The system shall support the continuous monitoring of railway infrastructure as well as market development, especially of the rail freight market. It shall allow to identify market requirements, opportunities and restrictions. The tool shall support European as well as national policymaking especially in the field of transport infrastructure development. A further prime objective of the proposed system will be the increase in transparency of processes and results.

The decision support system shall correspond to the following main characteristics or to a relevant subset, as the system may be gradually enhanced:

- GIS-based information system supporting display and analysis of data.
  - Database and database management for (at least) the following data
  - railway infrastructure (lines/routes) including parameters to be defined
  - significant installations such as marshalling yards and terminals
  - transport demand (trans-shipments, o/d-based, etc.)

 Several moments in time shall be presentable.

- Integration of the knowledge base, for example country specific. Data may be linked to the GIS system or be accessible via a catalogue. Mind maps may support orientation.

- Access rights manager for assigning public and internal access to data and use of functions.

- Display of infrastructure and related data (example: TREND GIS tool). Enhanced selection functions such as by country, by region, core-complete network etc. Local and internet-based applications for display and analysis.

- Comparison of various variants (infrastructure scenario, moments in time) and further analysis tools such as route search functions or bottleneck identification for model trains: technical train data as input, allowable route or infrastructure restraints as output.

- Export functions for results (Excel® sheets, CSV tables etc.).
The system may be operated by or on behalf of the European Railway Agency. Tasks will encompass at least the following points:

- Guaranteeing technical availability and functionality
- Timely update of data
- Management of user rights
- Co-ordination of enhancement of methodology and tool
- Execution of tool updates and testing
- Public display of content and results. The European Commission together with the relevant stakeholders shall agree non-public content and functions.

The last point of the list shall promote a public and European-wide internet-based railway infrastructure database for Railway Undertakings seeking support for their business development. This aspect is further discussed in the next section.

2.2.4.3.4 Data collection and data handling

Traditionally, the (former) national railways and today the Infrastructure Managers descending from those organisations are in charge of planning and developing railway infrastructure. Depending on the (political) perspective, they more or less fulfill parastatal tasks with a significant impact on public welfare and budgets. In this context, IMs are also responsible for the collection, updating, and quality assurance of infrastructure data.

Practical applications have proven that data collection and storage of European railway infrastructure at microscopic level are easy to handle. Many central European railways (Austria, Germany and Denmark just to name a few) already provide a sophisticated infrastructure database to support planning of infrastructure, running time calculation, timetabling, and other relevant processes. In the UK for example, a microscopic infrastructure database is under preparation. However, most eastern European Infrastructure Managers do not yet have a reliable infrastructure database at their disposal that is due to a significant lack of information about infrastructure in place.

Data structures and formats in existing data storage and planning applications are varying. This should not result in significant problems as long as data are of a truly microscopic character. A conversion of data into a format to be used by a third-party system will be possible in most cases. A data structure may be defined being microscopic, if it allows the user to produce a reliable running time calculation and timetable construction.

It is therefore notably recommended:

- European railway Infrastructure Managers should build up a reliable (European) railway infrastructure database at microscopic level to facilitate national as well as European infrastructure planning, timetabling and other applications.
- Although railway infrastructure data will always be similarly structured at microscopic level, a specification for rail data storage should be developed, supported by the relevant associations and system providers. This process will also require a close co-operation of IMs.
- The decision support system has to be regularly provided with up-to-date electronic data by the Infrastructure Managers. The level of detail of data remains to be defined, however, data at microscopic level are certainly not required. Directive 2001/16/EC, calling for a register of infrastructure in Article 24, may serve as the legal base for the provision these data, although the Directive does not request the electronic format.

Data may also be retrieved from the constantly improving network statements. A co-operation with RailNetEurope, striving to standardise network statements among RNE members, should be considered although the application of the RNE standard is not mandatory.

Demand data may result from public sources or from projects carried out on behalf of the European Commission or national public bodies, for example as a result of national transport master plans. For the time being, a request for a frequent update of demand data only for the purpose of the decision support system would go too far. It is therefore recommended to rather improve the methodology of European statistics or to revert to national statistics.
2.2.4.3.5 Linguistic barriers

As the procedures and interaction among partners play a paramount role at international level, the problem of linguistic barriers shall also be mentioned in this context. This is especially the case when it comes to technical definitions. English is the first “common” language that is usually spoken at most international events. Besides English, representatives from the eastern European countries quite frequently speak German. But as in all languages, technical terms are often related to the country specific technical development as it is especially the case with signalling.

Only few multilingual sources are available providing support in technically driven discussions, often also encompassing other transport sectors or economics. Among these source is the UIC RailLexic encompassing mostly technical railway terms and which is available for sale in electronic format. At least an older version of the RailLexic was fed into the online dictionary Eurodicautom, which is currently not updated as a new tool is due for publication. Furthermore, the RailLexic is considered being sometimes misleading as regards the English translations. Meanwhile, new expressions are being generated, a development which is much driven by the development of the European Railway Area.

The definition of TSIs and their widespread application require exact translation into a wide range of languages. This is also true for legal documents treating technical subject. As a translation of these documents is most likely accompanied or edited by technical experts to ensure compliance of the translations with the original, the experience gained in these procedures should be made available to the expert community. It is therefore recommended to provide a substantial linguistic support to the railway community, which is not only supportive at management and planning level, but also for training of internationally operating railway staff.

2.2.5 Business Models for international co-operation (B6)

TREND work package B6 reflects on the elaboration of Business Models for international co-operation.

To fulfil this task, substantial studies were carried out by the TREND B6 team under the project leadership of HaCon, which can be structured into the following main issues:

- Definition of basics terms and objectives (e.g. different forms of co-operation and Business Models)
- Detailed description of existing agreements and operating models; as a core result of this working step a list of components as possible instruments for Business Models was derived
- Analysis of the terms of usage (incidence, specific conditions) of these components in order to deduce their suitable applications and furthermore to generate the framework for the creation of Business Models on TREND corridors
- Development of a Business Model on an example corridor Benelux – Turkey/Greece
- Verification of this Business Model against European competition law and other legal conditions as well as against the influence of TSI

Within a detailed description of existing agreements and operating models 30 existing co-operations were analysed. They cover the whole range from mere agreements to daily practiced transport services, from passenger traffic to freight transport, from rail freight services to road, air and other modes’ transports (see Figure 2–10).

Based on this analysis, 51 co-operation components have been derived. These components can be interpreted as the basic instruments for Business Models.

Figure 2–11 provides an overview of these components, assigned to the main “departments”

- Headquarter/Management
- Administration
- Business
- Resources

analogue to the theoretical case of a “co-operation company”.

2 Results and conclusions
## Deliverable Work Package B7 – Conclusions and recommendations

### 2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

<table>
<thead>
<tr>
<th>Co-operation Cluster</th>
<th>Co-operation name</th>
<th>Type of involved partners</th>
<th>Geographical coverage</th>
<th>Main market segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. General agreements (rail freight)</td>
<td>3 COTIF</td>
<td>States</td>
<td>42 countries, mainly European, but also in North Africa and in the Middle East</td>
<td>Passengers and freight</td>
</tr>
<tr>
<td></td>
<td>4 Rail Net Europe</td>
<td>Infrastructure Managers</td>
<td>almost all of Europe</td>
<td>Pre constructed and tailor made paths</td>
</tr>
<tr>
<td>III. Freight co-operations (rail)</td>
<td>5 BoxXpress</td>
<td>Railway Undertakings (new entrants), terminal operator</td>
<td>dedicated destinations: German north seaports – Southern German economic centres</td>
<td>Block trains of overseas containers</td>
</tr>
<tr>
<td></td>
<td>6 Brenner Rail Cargo Alliance</td>
<td>Railway Undertakings (incumbents)</td>
<td>Corridor München – Verona</td>
<td>Joint production of all services: Block trains, combined transport, “Rollende Landstraße”, wagon-load traffic, by maintaining the individual commercial/sales responsibility All kind of consignments: mainly swap bodies and containers but also semitrailers</td>
</tr>
<tr>
<td></td>
<td>7 CORTAX</td>
<td>Intermodal Operators</td>
<td>Belgian terminals through the Ronet hub to South of France, Italy and Spain</td>
<td>Containers, Cereals, chemicals in tank cars, coal, petroleum coke, Cement etc.</td>
</tr>
<tr>
<td></td>
<td>8 European Bulls Alliance</td>
<td>Railway Undertakings (new entrants)</td>
<td>All of Europe, but mainly in the countries of the founding companies (Benelux, Germany, Italy, Austria, Czech republic and Slovakia)</td>
<td>Intermodal block trains for maritime containers</td>
</tr>
<tr>
<td></td>
<td>9 European Rail Shuttle</td>
<td>Railway Undertakings (new entrant), alliances with incumbent and new entrants</td>
<td>Mainly from and towards Rotterdam, but also from and towards Hamburg and Bremerhaven Destinations are almost every country on the North-South route: Belgium, Germany, Switzerland, Italy, Czech Republic, Slovakia, and also Poland, Hungary, Slovenia</td>
<td>Intermodal block trains for maritime containers</td>
</tr>
<tr>
<td></td>
<td>10 Kombiverkehr ICA</td>
<td>Intermodal Operators</td>
<td>Germany (based on the national network Kombi-Netz 2000+) – Austria – The Netherlands – Italy – Eastern countries</td>
<td>Mainly swap bodies and containers but also semitrailers</td>
</tr>
<tr>
<td></td>
<td>11 Netzwerk Privatbahnen</td>
<td>Railway Undertakings (new entrants)</td>
<td>Germany and neighbour countries</td>
<td>All types of goods/commodities</td>
</tr>
<tr>
<td></td>
<td>12 Rail Euro Concept</td>
<td>Railway Undertakings (incumbents)</td>
<td>Originally, Woippy-Mannheim with only one border crossing (Forbach). In a further stage, enlargement to the hinterlands (Ruhr Region in Germany, Area of Lyon in France). One possible long term option is for the REC to handle part of the German-Spanish traffic</td>
<td>All kinds of goods, but only in full trains (single wagon load is not concerned)</td>
</tr>
<tr>
<td></td>
<td>13 Rail Traction Company/ Lokomotion</td>
<td>Railway Undertakings (new entrants)</td>
<td>Originally the Brenner route, but actually all the German – Italian traffic via Austria</td>
<td>Block trains for combined transport, steel, automotive</td>
</tr>
<tr>
<td></td>
<td>14 Railion North-South-route</td>
<td>Railway Undertakings (incumbents, new entrants)</td>
<td>All countries from Finland, Norway, Sweden and Denmark to Italy and the South east of Europe</td>
<td>Combined and conventional transport, mainly block trains</td>
</tr>
<tr>
<td></td>
<td>15 SIBELIT</td>
<td>Railway Undertakings (incumbents)</td>
<td>SIBELIT is in charge of operations between Muizen and Bale. But improvement of the Antwerp – Milano, and more generally Benelux – Italy route is the final goal</td>
<td>All traffics</td>
</tr>
<tr>
<td></td>
<td>16 Systemcargo</td>
<td>Forwarder, Railway Undertaking</td>
<td>National traffic on dedicated German destinations: Hamburg/Bremen/Ösnabrück/Hannover – Frankfurter/Karlsruhe/ Nürnberg/Regensburg/Landshut</td>
<td>Primarily time critical system traffic</td>
</tr>
<tr>
<td>Co-operation Cluster</td>
<td>Co-operation name</td>
<td>Type of involved partners</td>
<td>Geographical coverage</td>
<td>Main market segments</td>
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<tr>
<td>17 UIRR model</td>
<td>Intermodal Operators, Railway Undertakings (mostly incumbents), road transport companies, freight forwarders, logistic companies</td>
<td>Most continental countries of Europe</td>
<td>Mainly the continental market of loading units coming from the road side.</td>
<td></td>
</tr>
<tr>
<td>IV. Freight co-operations (non rail)</td>
<td>18 Air Cargo Interlining</td>
<td>National, continental and intercontinental airlines</td>
<td>Worldwide</td>
<td>Air cargo, all commodities</td>
</tr>
<tr>
<td></td>
<td>19 Antwerp Intermodal Network</td>
<td>Port development company, transport companies, terminal operators</td>
<td>Services start and end in the port of Antwerp. Services operate in Belgium, the Netherlands and Germany (Rhine only).</td>
<td>Transport of intermodal transport units, mainly container services (intermodal)</td>
</tr>
<tr>
<td></td>
<td>20 Bonamare-Bonatrans</td>
<td>Five owner masters, leasing ships belonging to five limited partnerships where the owner masters hold shares themselves</td>
<td>Europe, all navigable waterways as from class Va</td>
<td>Inland waterway transport Commodities: bulk goods, building materials, containers/swap bodies, hazardous materials, heavy loads, disposal transport</td>
</tr>
<tr>
<td></td>
<td>21 Cargo-Line/ABX</td>
<td>Mid-size freight forwarders co-operation, transport/logistic service provider</td>
<td>Germany</td>
<td>Road transport: National consolidated cargo</td>
</tr>
<tr>
<td></td>
<td>22 China Cargo Alliance</td>
<td>Medium-sized freight forwarding companies</td>
<td>China: all major ports and cities closed to the coast. Less than five branches in the Chinese hinterland. Worldwide: south Asian coast range (Indian Ocean), Europe, USA, Australia (South East), South America (west coast)</td>
<td>Mostly maritime transport, all market segments</td>
</tr>
<tr>
<td></td>
<td>23 City Logistics (Example: Bremen)</td>
<td>Freight village development company, freight forwarding companies</td>
<td>City and region of Bremen</td>
<td>Road transport; mainly groupage freight</td>
</tr>
<tr>
<td></td>
<td>24 CoLog</td>
<td>Medium-sized freight forwarding companies</td>
<td>Focus on Franken (Franconia) in Central Germany, activities and partner companies all across Europe</td>
<td>Road transport: automotive, glass and beverage logistics, relocation/removal and furniture transport, export/import air, shipping and rail transport services, general goods for national and international shipping</td>
</tr>
<tr>
<td></td>
<td>25 Deep-freeze food logistics</td>
<td>Manufacturers of deep-freeze food, logistics provider specialised in handling and transporting refrigerated food</td>
<td>Germany, Benelux: three times per week per region, Great Britain, South of Europe, East of Europe: one to two times per week</td>
<td>Road transport: Deep-freeze food products</td>
</tr>
<tr>
<td></td>
<td>26 eWit</td>
<td>Transport companies with strong focus on inland waterway transport, companies for consulting/technical support</td>
<td>The river Danube serves as an example in the application and stands for any inland waterway in Europe.</td>
<td>All market segments except for express services. All modes, focus on inland waterway transport.</td>
</tr>
<tr>
<td></td>
<td>27 On road network</td>
<td>Road transport companies, freight forwarding company</td>
<td>The network serves 19 hubs spread across Sweden</td>
<td>Road transport, focus on general cargo</td>
</tr>
<tr>
<td></td>
<td>28 Star Alliance</td>
<td>Passenger airlines (carriers) of various sizes</td>
<td>842 destinations in 152 countries</td>
<td>Air traffic, focus on passenger traffic</td>
</tr>
<tr>
<td></td>
<td>29 System Alliance</td>
<td>Medium-sized freight forwarding companies</td>
<td>Germany, Europe via the System-Plus co-operation</td>
<td>Consolidated goods (packaged and palletised).</td>
</tr>
<tr>
<td></td>
<td>30 The New World Alliance</td>
<td>Shipping companies with main focus on container shipping</td>
<td>Major East-West container trade lines: Trans-Pacific, Trans-Atlantic, and Asia-Europe</td>
<td>Maritime transport; Worldwide container shipping</td>
</tr>
</tbody>
</table>

Figure 2–10: Cluster of analysed co-operations
2 Results and conclusions

2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

With respect of the development of Business Models it is important to understand, that the usage of the described components is suitable only under dedicated conditions (no “ideal” Business Model). In summary, these conditions cover a (corridor) specific framework with the criteria

- Business cases
- Infrastructure
- Actors/players
- Other prerequisites

By assigning the analysed 30 co-operations to this framework and overlaying their actually used components, clusters for suitable component applications for new corridor Business Model can be gathered.

Generally this procedure can be adopted on all (TREND) corridors. With respect to the envisaged Integrated Project (IP) the proposed CREAM corridor has been chosen as an example for developing corridor specific Business Models.

The CREAM corridor complies for the most part with TREND corridor C. The main difference lies in the extension to Benelux, to Greece and to Italy, including the option to continue to Asia via Turkey (see Figure 2–13).
## 2 Results and conclusions

### 2.2 Analysis of prerequisites for innovative and new concepts for Trans-European rail freight services (Part B)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Business Cases</strong></td>
<td>Service affected</td>
<td>new</td>
<td>extended</td>
<td></td>
<td>links between existing ones</td>
</tr>
<tr>
<td></td>
<td>Markets affected</td>
<td>specific market segments</td>
<td></td>
<td>several market segments involved</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Competition</td>
<td>intermodal</td>
<td>intramodal</td>
<td></td>
<td>intermodal/ intramodal</td>
</tr>
<tr>
<td></td>
<td>Competition in charging schemes</td>
<td>same level</td>
<td>higher than competitors</td>
<td></td>
<td>lower than competitors</td>
</tr>
<tr>
<td></td>
<td>Geographical Coverage</td>
<td>worldwide</td>
<td>Europe corridor</td>
<td>limited number of countries (1 ... 5)</td>
<td>region</td>
</tr>
<tr>
<td><strong>2. Infrastructure</strong></td>
<td>Ownership/Access</td>
<td>public/free unlimited access</td>
<td>public/regulated access (regulation)</td>
<td>private/external owner</td>
<td>private/owned by one partner</td>
</tr>
<tr>
<td></td>
<td>Charging system</td>
<td>free of charge</td>
<td>fixed charges</td>
<td></td>
<td>to be negotiated</td>
</tr>
<tr>
<td></td>
<td>Infrastructure Charging</td>
<td>free of charge</td>
<td>Marginal costs</td>
<td>Full infrastructure costs</td>
<td>Full cost (internal and external)</td>
</tr>
<tr>
<td><strong>3. Actors/Players</strong></td>
<td>Number of parties affected</td>
<td>bilateral</td>
<td>multilateral</td>
<td>Alliances</td>
<td>open network</td>
</tr>
<tr>
<td></td>
<td>Leadership</td>
<td>Same level</td>
<td></td>
<td>strong leader</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nature (level of creation of value)</td>
<td>identical – similar (horizontal)</td>
<td></td>
<td>complementary (vertical)</td>
<td></td>
</tr>
<tr>
<td><strong>4. Other Prerequisites</strong></td>
<td>Geographical Coverage (political borders)</td>
<td>national</td>
<td>international within EU (common framework)</td>
<td></td>
<td>international</td>
</tr>
<tr>
<td></td>
<td>Legal/Contractual Framework</td>
<td>individual</td>
<td>general framework (sector-specific)</td>
<td></td>
<td>legal framework (e.g. international law)</td>
</tr>
<tr>
<td></td>
<td>Intensity of Co-operation</td>
<td>merging businesses</td>
<td>merging parts of the business/partner largely independent</td>
<td></td>
<td>Restriction to specific geographical area (full independence beyond this region)</td>
</tr>
<tr>
<td></td>
<td>Financial Commitment</td>
<td>equal shares</td>
<td>unequal shares</td>
<td>own costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Risk sharing</td>
<td>equal shares</td>
<td>unequal shares</td>
<td>own risk</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 2–12:* Specific framework for Business Models

*Figure 2–13:* Example corridor for a new Business Model
According to the described procedure suitable components for the example corridor have been chosen and specified. In summary the Business Model for this corridor can be described as follows:

- **Potential involved Partners:** Regarding the project consortium of CREAM as the "core" co-operation, it consists of 25 partners from 14 European countries, thereof
  - 14 Railway Undertakings (RU)
  - 1 Infrastructure Manager (IM)
  - 4 Intermodal Operators (IO)
  - 1 Technology Provider (TP)
  - 4 Consultant and Research companies (CR)
  - 1 Association (AC)

- **Main objectives/Strategic background**
  The CREAM Project has been designed to respond to the increasing demand for rail-based logistic systems, and the implementation of change in the European railway area, which has been initiated by the European legislation. Against the benchmarking business models of logistic service providers CREAM will design and validate advanced customer-driven business models (ABM) for Railway Undertakings and Intermodal Operators. CREAM will analyse the operational and logistic prerequisites for developing, setting up and demonstrating seamless rail freight and intermodal rail/road and rail/short sea/road services on the Trans-European mega-corridor between the Benelux countries and Turkey, including field validation.

- **Legal/contractual basis**
  In order to minimise administrative efforts – especially in the start-up phase – it is not intended to establish a formal company for the demonstration of the ABM.

  The partners’ role within the CREAM business model will be defined in the deliverables of the respective work package and by additional contracts amongst the partners of the co-operation. Also additional partners, which are not in the CREAM consortium, can become part of the business model (e.g. customers) by additional contracts. One important part of these contracts will be the allocation of train capacity shares. Every partner will be responsible for the risk of capacity utilisation of his share.

- **Market segments**
  Following the general objective to offer joint services with defined contractual obligations for each partner, the "String-of-pearls" concept has been chosen to be the example transport service on CREAM corridor.

  This means that long haul trains covering the complete corridor route with or without intermediate stops are supplemented by other trains to travel on dedicated corridor sections.

  Within this concept the trains will consist of container wagons and conventional wagons, without general restrictions regarding commodities, as long as no special and not available facilities are required.

- **Coverage**
  The activities within the project lifetime will cover the following areas:
  - Research/concept developing
  - Technological development
  - Prototyping/demonstration
  - Training within the fields of (output of other TREND work packages)
    - Innovative rail-based supply chains including intelligent rail and multimodal operation models
    - Quality Management System
    - Efficient corridor capacity management
    - Interoperability and border crossing
    - Integrated telematic solutions for train control, tracking & tracing of shipments and customer information
    - Rail logistics for temperature-controlled cargoes
    - New technology for the transport of unaccompanied semitrailers in intermodal transport

  To ensure the feasibility, the elaborated Business model was checked against the legal framework, mainly consisting of the two aspects

  - compatibility with European competition law and
  - verification against common legal issues.

  The respective analyses have been carried out with the collaboration of juristic experts and lead to the core result, which is that no severe juristic obstacles against the CREAM Business Model are to be expected.
3 Concept for the implementation of change in the European rail freight area

The implementation of change in the European rail freight area is made of three components with respect to the TREND Co-ordination Action.

1. Investigation of the progress made in selected countries with respect to implementing European directives into national law, and anticipation of the legal and administrative framework by the stakeholders by application of an evaluation scheme for integration (Part A).

2. Corridor analysis and conclusion of corridor action plans jointly with the stakeholders, mostly Infrastructure Managers and Railway Undertakings.

3. Assessing innovative approaches (best practices) with respect to their application to other corridors, and recommending a corridor and a business model for further development and demonstration.

Country specific scoreboards have shown that the progress in establishing a single European Railway Area with respect to rail freight transport is different in the countries analysed. The recommendations show that it is not the task to agree upon new legislative initiatives but assure that the existing directives are implemented and applied not only by letter but in practice. The roles of the parties have been identified:

- Completion of the knowledge base for other Member States (only 13 countries have been studied by TREND and four more will be covered in REORIENT)
- Updating of the knowledge base on a regular basis
- Permanent monitoring of the correct application of competition laws and directives and of the stage of market liberalisation

National governments still play the key role in managing change. The possible double role of transport ministries as policy agents and at the same time owners of railway organisations, can be a decelerating factor for the management of change, but in a few cases also a pushing factor. It is conceivable to separate these roles by assigning the business supervision of the owners of railway organisations as private law companies to other governmental institutions.

International railway organisations are also likely to play a role in promoting change, thus standing up for the common interest of the industry and strengthening their own positions at the same time.

Finally the newly created European Railway Agency, shall play a more important role in monitoring the implementation of directives and providing guidelines on good practices proposed for mutual acceptance.

The contributions of the stakeholders, mostly Infrastructure Managers which have also a direct interest in improvements leading to an integrated European network, and Railway Undertakings have been reported in corridor action plans (TREND Deliverable B2) that do not need to be repeated here.

As it has been shown in the previous chapters the freight corridors analysed within TREND are characterised by the heterogeneous situation of those factors that determine the performance of rail freight service. Above all this refers to the level of co-operation and harmonisation of the border crossing procedures. Due to the length of the corridors and the amount of countries involved (especially in Corridors C and D) even within the corridors different progress levels have to be distinguished. So before performing the detailed evaluation of the TREND Corridors, a rough clustering concerning those characteristics of the TREND corridors shall facilitate an overview of the above mentioned progress levels, which is complementary to the detailed assessment with respect to the potential for an Integrated Project.

The TREND Corridors have been analysed according to their main characteristics as concerns …

- cross-border operation and level of co-ordination
- successful business cases demonstrating innovation and level of customer orientation
- potential for improvements and innovations
- current modal shift and prognosticated market growth

… and results in a categorisation of the status of development for rail freight.
Three different categories from “Standard” via “Advanced” to “Top” and the respective criteria have been defined (Figure 3–1).

The category “Standard” is defined by the traditional processes at the borders and the affected parties, which generally speaking count with a low level of performance resulting in a large need for improvements and innovations. Provided that the mentioned improvements have been done, the modal shift of rail is supposed to be increased significantly. The overall development status of rail freight has been assessed as “low”.

The second category is denominated “Advanced”, as border crossing operations have already been improved, but still remain insufficient for achieving a competitive performance of rail freight services along the corridor. Business cases and the offered services do not fit totally the requirements of the market and are therefore often not competitive to road transport. This type of corridor has reasonable potential for improvement and innovations in several aspects. A significant potential for increasing the volume of rail freight has been identified, either based on the growing transport market in general or by a modal shift from road to rail.

The objective – and thus benchmark for the other two categories – could be the category “Top”, where good practices for the cross border operations have been introduced. Suitable solutions, which are competitive to road transport, have been developed and the impact of additional improvements is thus limited. A further increase of the market share of rail is often limited by the infrastructure capacity. These corridors can be characterised as ‘ripe’ with a ‘high’ status of development of rail freight services.

As most of the corridors are heterogeneous and, in addition, the development is different from category to category, it was difficult to assign one single type to each country section. However, a rough overview of the investigated corridors is given in Figure 3–2. The figure comprises the level of development regarding interoperability, cross-border operations and the potential for improvements and modal shift. Two significant findings are on the one hand that some corridors are already well developed, and that on the other hand the actual stage of development can be significantly different along the corridors as well as between them.

Based on these experiences one task of the TREND Co-ordination Action was to coordinate good practices and innovative ideas for further development and implementation in the framework of an Integrated Project. The vision behind this concepts is to contribute to the change in the European railway system by a market approach involving Infrastructure Managers, Railway Undertaking (both private and incumbent), and rail freight customers such as Intermodal Operators and forwarders. The results of these works are reported in the following chapter.
4 Recommendations for an Integrated Project

4.1 Specification of terms of reference

In the work programme 2002–2006 of the 6th Framework Programme a Thematic Priority 1.6. Sustainable Development, Global Change and Ecosystems consists of a particular section 1.6.2: Sustainable Surface Transport in which the European Commission has identified Objective 3 ‘Re-balancing and integrating different transport modes’, and 4 ‘Increasing road, rail and waterborne safety and avoiding traffic congestion’. For the call 4A (July – December 2005) the topic ‘3.2 New Concepts for Trans-European Rail Freight Services’ was selected. The following specification was proposed:

Objective: European rail freight has declined for many years and especially international rail freight suffers from serious quality problems. There is some progress and growth, however, with great variations from country to country. Serious actions are urgently needed. These matters are highlighted in the Transport White Paper as well as in the Commission Communication 23.1.2002 COM (2002) 18 “Towards an integrated European railway area”.

With an objective and unbiased approach this research activity should therefore develop the necessary, operational and logistic prerequisites for a setting up and demonstration of seamless rail freight services in two or three Trans-European “corridors” based on the results and recommendations from research activity 3.1. Research activity 3.1 is building on the new European regulatory framework in evaluating and overcoming foreseen and non-foreseen technical and non-technical barriers, and effects of liberalised markets for a successful demonstration of the objectives in 3.2.

Scope: This activity should establish and demonstrate:

- A business solution pertaining to management and operational models that involve external business relationships, such as collaboration with other mode operators, infrastructure providers, management of contractual arrangements with customers, strategic relationships with financial institutions, and market communication for launching seamless freight movement services in (at least two) corridors.
- Create the conditions for an efficient supply of (intermodal) freight services and for their field evaluation.

Some examples of potential corridors (to be analysed in more detail by research activity 3.1, see chapter 4.2) are:

- Baltic states – Adriatic states
- Benelux – Balkan states
- British Isles – Eastern Europe (incl. CIS)
- Iberian peninsula – Benelux
- Iberian peninsula – Germany
- Nordic Countries – Southern Europe

This activity should deal with the whole variety of events in the supply-chain of international freight services, incorporating the customers’ needs and requirements for quality of service. Identification of the infrastructure, operational and logistics requirements are required to implement the service concept defined above. Variations in axle loads, train lengths, loading gauge, rules & regulations, business concepts etc., will need special attention as well as data exchange items. Improvements as e.g. introduction of the European Rail Traffic Management System (ERTMS) or opening of new railway lines, which will be effective when the project will be completed, should be taken into account.

Requirements concerning dangerous goods must also be incorporated in the proposed management and business models. Devising solutions designed to overcome the above “gaps” may include the establishment of e.g. One-Stop-Shop for supply and/or operations management or other concepts, involving the corridor-wide capacity management, tracking and tracing of freight movement, resource management, staff training, both from a system and regulatory point of view. Incompatible driver rules concerning for instance their training and deployment are important barriers to a truly interoperable European rail system. Connected to the driver issues are differing safety regimes and to some extent attitudes. These factors must be taken into account. Other measure improving efficiency of international operations such as training of traffic control and capacity allocation staff may also need to be included into proposed/demonstrated management models.
The research activity 3.2 should continuously liaise with projects under research activity 3.1. It should also liaise with relevant EC activities such as ERTMS, the Rail Market Monitoring System (RMMS), and the European Railway Agency (ERA). It should furthermore liaise with the Strategic RTD plan of the European Rail Research Advisory Council (ERRAC) and national regulatory bodies. Finally it should take into account the effects of existing or non-existing cabotage in rail freight in general.

It is strongly advisable to engage expertise not only from the incumbent Railway Undertakings and railway Infrastructure Managers but also from other rail freight operators, and other transport and logistics services sectors. New entrants and their organisations in particular from the new member states are much needed in this activity.

Expected outcome: A field-validated concept for dedicated rail freight operation in European wide corridors. This will include spin-off contributions to ongoing legislative work on interoperability, infrastructure and safety. This would include, e.g., a validation of telematics and traffic management concepts and solutions, new templates for operational activities, including driver rules and regulations, innovative corridor-wide integrated safety management approaches, demonstration of new technologies for reducing the environmental impact. Finally, a higher market share for rail freight, environmental improvements, less road congestion, improved safety along these corridors and evening out the differences between high and low performing countries, as well as a dissemination of good practice on realistic testing and demonstration shall be dealt with in the project.

Preferred Instrument: Integrated project

4.2 Evaluation and recommendation of corridors

4.2.1 Evaluation criteria

The evaluation of the corridors takes place against criteria which are either on-hand (such as the transport volume and interest by the business partners) or presented in the European Commission’s work programme for the 4th Call. As a basis for evaluation five groups of in total eleven criteria have been worked out and harmonised within the TREND work package B3 (see Figure 4–1). In detail the criteria are the following:

- Corridor freight volume separate for rail (1) and road (2) in million tons by 2002/3. The precise figures which have been elaborated in two market studies in the framework of TREND work package B3, and which have been agreed upon with the stakeholders, have been transferred into evaluation points by means of a transparent scale.

- Estimated growth rates for the increase of corridor volume separated for rail (3) and road (4) in % for the time horizon 2002/3 to 2008. The year 2008 has been selected because the envisaged IP shall start its demonstration by then. The rates have been agreed upon with the stakeholders.

The before mentioned criteria are essential as a measuring stick for the impact of proposed and implemented measures in freight services.

- Stakeholder evaluation of corridor results with respect to
  - (5) Existing (infrastructure) capacity problems identified in the scope of the corridor analysis and
  - (7) Experienced commitment of stakeholders to collaborate in a joint project.

- Compliance with existing European Commission initiatives to implement the Tran-European (Rail) Transport Network (8) and the European Rail Transport Management System (ERTMS) (9).

- Congruence with specific aims of the 4th call namely to involve active New Entrant Railway Undertakings (10) and New Member States and Candidate Countries (11).
A final assessment of factors, e.g. the existence of ongoing European projects which are already dealing with the improvement of the corridor or its section, and which would therefore limit the value added of additional RTD funding; in order to reflect this limitation 1 point has been subtracted to derive the final scoring.

Each of these criteria has been rated within a scale with the following expressions:

5: excellent, criterion completely fulfilled
4: very good/very high, criterion preponderantly fulfilled
3: good/high, criterion partly fulfilled
2: fair/moderate, criterion preponderantly not fulfilled
1: poor/low, criterion (almost) completely not fulfilled
0: not at all or very limited, criterion not fulfilled

Different criteria can thus be linked by adding the points set into a final scoring. A sensitivity analysis has shown that reasonable but different weights for the criteria will not significantly change the picture so that it was agreed to use the unweighed criteria. The result of the evaluation is shown and explained in chapter 4.2.2.
## 4.2 Evaluation and recommendations

### 4.2.2 Evaluation results

#### Figure 4-1: TREND corridors’ evaluation with respect to the envisaged IP

#### Table: Impact on attractiveness for IP

<table>
<thead>
<tr>
<th>Impact on attractiveness for IP</th>
<th>Classification</th>
<th>Rail Mio. tons</th>
<th>Road Mio. tons</th>
<th>Rail Growth in %</th>
<th>Road Growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>large</td>
<td>very good/very high</td>
<td>15 and more</td>
<td>50 and more</td>
<td>45 and more</td>
<td>45 and more</td>
</tr>
<tr>
<td></td>
<td>good/high</td>
<td>50 to 119</td>
<td>10 to 19.9</td>
<td>0 to 2.9</td>
<td>0 to 4.9</td>
</tr>
<tr>
<td></td>
<td>low/small</td>
<td>3 to 5.9</td>
<td>10 to 19.9</td>
<td>0 to 2.9</td>
<td>0 to 4.9</td>
</tr>
<tr>
<td></td>
<td>small</td>
<td>0 to 2.9</td>
<td>0 to 2.9</td>
<td>0 to 4.9</td>
<td>0 to 4.9</td>
</tr>
</tbody>
</table>

1. Traditional north-south axis with competition in place; high level of research knowledge already available; limited impact of IP
2. Lack of stakeholder commitment
Under the headline "corridor freight volume" the transport volume in terms of million tons per year has been transferred into evaluation points by means of a transparent scale. The analysis shows the differences of the present volumes between road and rail, and between the corridors. The corridor sections with the largest quantities of goods transported (both ways) on rail are Switzerland – Italy, The Netherlands – Germany, and Germany – Poland, while the largest aggregated road flow are between Spain – France, The Netherlands – Germany, Germany – Poland followed by France – Italy and France – Germany.

Based on the previous market studies and the "estimated growth rates" which have been agreed upon with the stakeholders the future potential of the corridors can be assessed. Generally, transport volume increase is expected within all corridors, with peak values on Corridors C and D. The criterion market volume for additional rail freight services indicates which rate of the expected market increase can be exploited by new rail freight services and techniques. Indicators are e.g.

- high existing and forecasted freight volume
- low current modal split value for rail freight or
- actual lack of high quality rail transport services

In this respect Corridor C shows the best perspectives: Its new EU members and candidate countries show above-average economical growth rates, which are expected to continue for the foreseeable future. This expected volume increase is not yet covered by adequate rail freight services, which implicates a big chance for innovative services and techniques.

Considerable additional rail freight potential can also be expected for Corridor B-East (mainly by developing the Scandinavian market), Corridor D (in case of high quality rail transport offers on Poland destination) and F (mainly Spain relation by solving the track gauge problem).

On Corridors B-West and E high level rail freight services have already been established for several years, further volume increase is mainly expected due to new infrastructure or within the scope of common transport market growth rates.

Based on the corridor results on the existing – and remaining – rail infrastructure "capacity problems" the corridor sections can be assessed. The largest quantifiable bottlenecks have been identified at the French-Spanish border, in line section in Germany, Switzerland and (north) Italy.

Looking at the respective corridors it can be stated that most of the capacity problems on the lines are subject to current improvement activities, particularly on Corridor B-West (Betuwe-Line, upgrading Offenburg-Freiburg, freight bypass for node Basel, Gotthard/Simplon-tunnel) and also on Corridors B-East and F. On Corridors C and D there are several "white spots" with unknown activities, especially in South Eastern Europe and the Baltic States; on Corridor E as the only exception from the rule no nameable "line" capacity improvement activity has been stated.

Despite all these measures underway most of the bottleneck situations within the nodes and the terminals remain valid in the next year.

Next to these infrastructural activities several projects have been launched to improve daily operation, e.g. co-ordination centre in Brenner station, DIFFA at the German – French border, or MUM and GOTI at the French – Spanish border. A serious unsolved organisational problem remains in the form of the Eurotunnel (Corridor E).

The aspect "Potential for short-term improvements" fits to those corridor related problems which can be alleviated by measures with short- (and probably mid-) term effects, mainly caused by administrative measures, optimised data exchange and technical improvement.

In this respect two groups of corridors have to be distinguished: The first group comprises the corridors with long established rail transport structures (B-West, B-East, and F). Within this category transport organisation has been optimised in the course of time and in daily operation. This manifests itself for example in relatively small time loss at the borders, compared to Corridor C or D, or in well-rehearsed operational procedures. Due to this the scope for improvements by further short-term administrational or operational measures is rather small. Suitable components could be

- mutual acceptance of loco drivers
- filling remaining gaps of electronic data interchange
The second group implicates the Corridors A, C and D. Within these corridors short-term measures could be a big step forward, for example

- on Corridor A (trust based handover of trains already in place at the cross-border centre Italy/Slovenia),
- on Corridor C (train operating on the basis of transport, technical and RID confidence, co-ordination of border activities),
- by transport management on Corridor D (e.g. using common transport documents also in the Baltic States) or
- by electronic data exchange, keeping in mind that the hardware and knowledge conditions have to be completed first (especially in South Eastern Europe, Corridor C).

On Corridor D and F a further large potential for technical improvement lies in new techniques for track gauge change (borderlines Poland/Lithuania, France/Spain).

(7) The “Interest of stakeholders in corridor wide transport services” refers to the stakeholders’ intention to establish a new rail freight service not only on dedicated destinations, but covering the whole corridor length. This interest is a necessary condition for stable and economically sustainable transport services.

In this regard a great interest has been stated on almost all corridors, with Corridor D as the only exception due to less interest in rail freight services to/from the Baltic States.

(8) The European Commission has launched two initiatives with respect to infrastructure improvement, alleviation of bottlenecks and rail traffic management and commissioned high level representatives to co-ordinate the activities with respect to the implementation of the “Trans European Transport Network” and the “ERTMS”. Since it is vital for the IP to comply with those initiatives, the congruence of the corridor sections with the target sections of these corridor co-ordinators has been evaluated. Only the Corridor B-West is entirely covered while the other corridors are partly dealt with by the European co-ordinators.

4.2 Evaluation and recommendation of corridors

4.2.3 Recommendations of corridors

Within this framework the most urgent needs with respect to the implementation of an Integrated Project (IP) on “New Concepts for Trans-European Rail Freight Services” have to be seen on:

- Parts of Corridors D (namely The Netherlands – Germany) where a new dedicated freight railway line will come into operation and requires the proper integration into the networks and operation concepts including interoperability.
- The entire Corridor C with its high potential in south-east Europe. This corridor might be connected to sections dealt with in Corridor A (interoperability aspects for the transit through Slovenia based on the Italy-Slovenia common practice).
- The Spanish – French border and the transit through France (Corridor F).

In contrast the operating risks and additional research needs on Corridors B and E are comparatively manageable and should therefore be mainly taken over by the involved Railway Undertakings and (potential) customers.
4.3 Recommendations of services and innovative components

In the framework of interviews with the experts involving market parties to obtain logistic requirements on recent and future freight services (= demand) it appeared that the uttered requirements were either very general or too detailed to be taken account of seriously in the framework of a public Co-ordination Action. Nevertheless, in particular the following quality requirements on rail freight services have been collected:

- Road-competitive rate of punctuality of services
- Regularly high performance of services (reliability, consistency)
- High performance of international planning process
- Customer-oriented information, in particular in case of irregularities
- High availability of rail wagons/clear rules for on en-route detachment of wagons
- Damage-“free” transport of cargoes and load units
- Clearly determined responsibilities (defined processes)
- Reliable transport of documents

=> Quality Agreements as part of the transport contract

Since discussions were already made directly after the respective presentations it could be concluded that involving the customers (shippers, logistic service providers, Intermodal Operators) in the development of rail freight services along trans-European transport corridor is essential. The meeting shows that collaboration between the stakeholders involved in international rail freight transport with respect to the different infrastructural, operational and finally commercial aspects is important. Those key items of mutual interest for further developments are – among others – efficient production systems for bundling of cargoes (e.g. freight villages, gateway), application of corridor management systems involving solutions to overcome border crossing (e.g. joint control centres with local responsibility, deployment of multi-system locomotives), implementation of Quality Management Systems (e.g. quality handbooks), tracking & tracing of consignments by exploitation of available data from the Infrastructure Managers control centres (today and after application of ERTMS/ETCS higher levels) or by satellite (Galileo). When applying the set of measures the different stage of development of the legal and institutional framework and the structural infrastructure conditions in the different countries should be considered. Nevertheless, the generic drivers are the customers’ interest in cost effective, efficient and reliable services where promising examples could be demonstrated during the actions reported above and are recommended to be transferred into the Integrated Project on “New rail freight services”.

Based on the corridor analysis and corridor action plan adopted in the framework of work package B2 (see chapter 2.2.1) and ideas co-ordinated in the framework of work package B3 (see also chapter 2.2.2) the Integrated Project shall be made of components targeting all relevant items which are influencing performance and success of rail freight services:

- Market requirements with respect to different commodities and market segments (port hinterland transport, logistics trains of steel and automotive industry, intermodal trains)
- The mechanism of cross border collaboration according to the co-operation or competition model
- Operating procedures and agreements between Infrastructure Managers and Railway Undertakings, in particular with respect to border crossing
- The quality of service defined as total transit time, punctuality and reliability
- The availability of appropriate (quantity and quality) resources
- The lack of integration with other modes

Following the good experience gained from e.g. the BRAVO-Project (Contract N° TREN-04-FP6TR-S07.31614-506391) on the Brenner route, intermodal transport might be used as a benchmark and trailblazer for conventional rail freight services which will be able to take up the result in terms of operational key elements such as border crossing time and quality.
The market demand on the corridor requires different (intermodal) freight service offers with respect to time and cost and thus alternative routings on the corridor. Besides different rail routings involving new infrastructures dedicated to rail (e.g. the 150 km long Betuwe Line) one option is also to offer a road-rail-sea connection via Adriatic ports and thus by-passing the long rail section through the Balkan states. Alternative routings are also an essential part of quality agreements in order to assure in time delivery.

Consequently the sub-objectives are to:

• Analyse the market requirements for typical supply chains along the entire corridor – or parts of it – and derive a coherent set of templates identifying the potential for modal shift by addressing O/D relations, requirements in terms of performance indicators such as commodities, total transit time, need for consolidation, cost, regularity, ...

• Develop an advanced business model for integrated, road competitive service offers which exploits the challenges set by the European legislation with respect to establishing a European Railway Area and will thus incorporate the experiences of new entrant railways, co-operation with other mode operators and co-operation in international rail freight transport.

• Develop and implement a coherent Quality Management System (QMS) including the necessary structural and process organisation which ensures monitoring the most important quality criteria punctuality, reliability, information, safety and flexibility, and identification of improvement measures.

• Outline corridor-specific train operation forms which are able to absorb and bundle sufficient quantities of cargoes to exploit the given resources and allow an efficient and cost-effective transport on the entire corridor – or parts of it. The proposed rail operating system will be able to link major hubs (cargo generators, intermodal terminals) and junctions as well as border crossing stations in an optimum manner.

• Outline and agree upon an efficient capacity management involving the relevant resources such as train slots, locomotives and personnel, appropriate wagon, terminal handling capacity, train capacity, ...

• Implement interoperability and improved border crossing procedures by optimal deployment of multi-system locomotives (MSL) and joint border crossing centres with local responsibility based on the experience of Mannheim-Woippy and Brenner case and providing a step-change towards the procedures in Eastern Europe.

• Deploy integrated telematic solutions taking up the expanded Infrastructure Managers information systems, ETCS, GSM-R, and supplementing them on corridor sections – mostly in South-East Europe – by satellite-based (Galileo/GPS) tracking and tracing systems.

• Research in the particular markets of temperature controlled cargo logistics and transport of semi-trailers in order to provide technical-operational concepts that allows to facilitate the modal shift of these still road dominated transport to intermodal rail-road transport.

Figure 4-2 is showing how the technological components are embedded in innovative concepts and finally contribute to improved rail freight services.
The Integrated Project shall be set-up by the stakeholders active and licensed to operate in the Corridor, which are committed to implement — after a necessary development and appropriate training phase — the following demonstration activities:

- Advanced business and efficient corridor capacity management model
- Quality Management System (QMS)
- Corridor-specific train operation form and Rail/Short Sea multimodal services
- Interoperability by MSL and improved border crossing procedures
- Integrated telematic solutions
- Temperature controlled cargo logistics and innovative service for non-craneable semitrailers

The objectives shall be transferred into an overall scientific and technical approach which enables the project to achieve its objectives. The approach shall be made of appropriate research, training and demonstration activities which are performed in logical succession to ensure that results of the research and technical development phase are communicated to managerial and operational staff (multipliers) concerned prior to their field-validation during demonstration.

This approach requires for assembling practical experience and expert knowledge from daily operations and the close involvement of actual and potential rail freight customers. It’s considered a “must” for the proper execution of the project. On the other hand consultants and researchers familiar with recent and ongoing RTD activities and a global future-oriented view are mandatory to stimulate the activities and integrate different solutions to a comprehensive project.

Based on these considerations the consortium shall be composed, first of all, of Railway Undertakings and Intermodal Operators, that serve the entire corridor and thus cover each and every country, as well as wagon and terminal operators, hi-tech IT industry, software developer, and independent university institutes. The interdisciplinary and multi-cultural composition of the consortium as well as the parallel phasing of initial RTD, training and demonstration activities is to ensure a permanent feedback between management strategies, technical and operational development and practical operational use during demonstration within each activity and between them.

In order to match the mission mentioned above, the implementation of the project, basically, is structured by the following steps of work:

- Analysis of underlying problems
- Conception: problem-solving
- Specification: produce the components of the conception
- Implementation: make the components available for demonstration
- Demonstration: field testing of concept and components
- Co-ordination loop: validation and continuous improvement of components
- Evaluation: assessment of “success of demonstration”

Innovative Components and Actions are therefore:

1. **Templates on innovative rail-based supply chains**

    1.1 **Analysis of market requirements compared to the benchmark “door-to-door road transport”**

    - Based on results of TREND project, structured analysis of transport flows
    - Investigation into logistic requirements of commodities carried on the corridor
    - Elaboration of main market clusters on transport flows providing for equal or similar logistic profiles validated by “User Group”
    - Assessment of the current performance and future development of road transport as benchmark for rail freight services with respect to logistic profiles

1.2 **Determination of templates on innovative rail freight services and supply chains**

    - Definition of performance features and elaboration of innovative production systems on new rail freight services matching requirements of market clusters
    - Ranking of market clusters with respect to rail’s capability to serve them appropriately and volume to be captured for rail (target markets)
    - Final determination of templates on rail-based supply chains on project corridor
2. **Advanced Business Models (ABM) for integrated rail freight services**

2.1 **Survey on rail freight customers’ expectations towards business relations**
Investigation on preferences of rail freight customers as concerns the commercial approach of Railway Undertakings (RU) and Intermodal Operators (IO), by expert interviews with shippers, forwarders and Intermodal Operators, structured workshop with a User Panel.

2.2 **SWOT analysis of current business models for rail freight services on corridor**

2.3 **Design, development and implementation concept of advanced business models**
- Design of selected business models incl. aspects of roles of stakeholders involved, commercial approach, procurement of equipment (locos, wagons) and operational approach.
- Development of business models.
- Development of schedule for implementation and demonstration selected business models.

2.4 **Validation, adaptation and improvement of business models during demonstration**
- Monitoring fulfillment of customer expectations
- Monitoring fulfillment of targets of involved partners
- Identification of weak points
- Development of adaptations

3. **Quality Management System (QMS)**

3.1 **Review and update of corridor-related analysis of quality deficits performed by TREND project**
- Update of information considering the work of partners in the meantime until start of Project
- Analyse complementary corridor sections, which were not yet investigated and which are required by partners

3.2 **Evaluation of transferability of blueprints of existing Quality Management Systems (QMS) for rail freight services**
- Evaluation of the Brenner QMS developed during the FP6 project BRAVO
- Conclusion on what components and systems are applicable to project corridor and on the scope of adaptations required

3.3 **Development and implementation of project corridor QMS**
- Preparation of a decision on whether a single QMS for the entire corridor is justified or not, taking account of differences in the “maturity” of rail markets on corridor
- Determination of quality objectives
- Development of one entire or differentiated QMS, including a quality manual, process descriptions, a Key Performance Indicator (KPI) system and quality agreements
- Fine-tuning of QMS with respect to ISO 9001 – 2000 requirements
- Implementation of QMS

3.4 **Validation, adaptation and improvement of the QMS during demonstration**
- Monitoring achievement of quality objectives
- Monitoring compliance with quality manual (process descriptions)
- Identification of weak points of QMS
- Elaboration of adaptations
- Identification of quality deficits to be treated by operational partners

4. **Innovative rail operation forms**

4.1 **Overall approach to match the “magic triangle” of rail transport**
- Taking up the results of the market analysis the innovative operational systems shall both be applicable to other corridors (blueprint) and also reflect the characteristics of this freight corridor and exploit their specific strengths
- Operational systems must optimise the “magic triangle” of rail transport: O/D transport flows; rail economics; infrastructure capabilities

4.2 **Rail operation system for intermodal rail / road services**
Rail production scheme which service design is able to reconcile individual O/D freight flows and their service requirements with the prerequisites of an efficient rail operation (optimum round trip schedule for resources, i.e. locos and drivers, high capacity load factor both ways).
4.3 Multi-mode rail/short sea operational concept for intermodal services from/to Turkey via Italy

Development of multi-mode intermodal service between Germany and Turkey via Italy based on results of TREND project and the market analysis.

4.4 Operational concept for extending intermodal rail services beyond the corridor to central Turkey and Middle East

- Development and evaluation of an applicable service extension of the corridor (via the Bosporus to the central Turkey and beyond (e.g. Iran, Syria))
- Study on the improvement of relevant parts of the Turkish rail infrastructure, the existing rail ferry service and the planned fixed link (tunnel)

5. Efficient Corridor Capacity Management (ECC)

5.1 Development of a basic ECC system

- Objective of ECC: optimising the employment of resources (wagons, locos, drivers, terminals) and train capacities on all sections of corridor and thus increasing the productivity of rail operations
- Analysis and evaluation of existing optimisation tools on RU and IO level; determination of improvement needs
- Elaboration of catalogue of requirements on ECC system
- Determination of system design and key components
- Development of key components including IT-tools for the most promising segments / sections of the corridor
- Elaboration of a migration concept for applying ECC on entire corridor

5.2 Impact assessment of improved train parameters

Feasibility study on the capacity limitations along the corridor and the potential to raise the capacity by:

- Increase use of train capacity (length, weight), improve performance of freight stations throughput and intermodal terminals
- Elaboration of a realistic schedule (incl. responsibilities) for the implementation within the corridor

6. Interoperability and border crossing

6.1 Development of an integration concept for the Betuwelijn as new infrastructure in international rail operation schemes

- Development and evaluation of an optimised technical concept
- Development of an economic concept for integration of the Betuwelijn
- Development of a concept for integration in the operational network of the corridor

6.2 Development of an innovative traction scheme on the corridor

- Development of optimised/innovative interoperable traction schemes (based on multi-system locomotives where applicable, or synchronised use of single system locomotives)
- Development of an application concept to support modern intermodal transport concepts
- Economic impact assessment including a business model to share risks and costs
- Specification for the locomotives to be used (tender dossier)

6.3 Customer-oriented adaptation of locomotives for interoperable services in the corridor

- Development of corridor-specific technical improvement of multi-system locomotives taking into consideration economic prerequisites of the interoperable traction scheme in the corridor based on the tender dossier
- Maintain and improve safety and security of rail freight services on the corridor
- Development of locomotives including pre-certification and matriculation for test runs in the countries and networks
- Accompany procurement and putting into practice (demonstration) by RUs

6.4 Streamlining concept for border crossing operations

- Development of concepts for cross border operation centres (based on experiences of Brenner Service Stelle and CIFFA) on relevant border crossing points of the corridor
- Review and update the corridor related analysis of cross border stations performed within TREND
• Integration of necessary interaction with remaining customs clearance and border police in concept
• Definition of competencies and responsibilities of border crossing operation centres
• Development of an implementation- and action plan for improvement of the border crossing processes
• Fine-tuning of implementation plan according to different bilateral situations along the whole corridor

7. Integrated telematic solutions for the train control and tracing of shipments

7.1 Analysis of current train control systems and possible migration potentials to ERTMS/ETCS
• Analysis of the current train control system on the respective lines in the corridor, and ETCS implementation plans proposed and agreed by the European co-ordinator designated to this task
• Development of suitable migration scenarios towards ERTMS/ETCS full application taking into account the results of TREND- and other corridor studies in the framework of the Memorandum of Understanding between the EC and the European Railway associations (Definition of an EU Deployment strategy for ERTMS)

7.2 Galileo/GPS-application for tracking and tracing of freight
• Investigation of most recent guidelines on security and deduction of requirements towards tracking and tracing of shipments during rail transport
• Analysis and comparison of different state-of-the-art tracking and tracing models along the transport chain (focusing on rail), e.g. exploitation of IM data (experienced in FP6 BRAVO project)
• Comparison of satellite based system versus GSM-R based (terrestrial) systems
• Recommendation of the most suitable solution or a combination thereof for coherent corridor wide tracking & tracing concept that can be exploited by existing customer information systems of the partners
• Development of an implementation plan for innovative tracking and tracing service, taking account of the mandatory security issues

7.3 Information and communication concepts
• Development of a concept for a joint international rail transport management centre
• Analysis of a multilingual versus uni- or bilingual solution
• Definition of responsibilities for collecting, harmonisation, processing and distribution of information
• Development of a harmonised customer information concept by linking the international rail transport management centre to the existing customer information systems (CIS) of the partners concerned
• Design of suitable interfaces for data exchange, considering TAF-TSI

8. Technology driven business cases

8.1 Temperature controlled cargo logistics (TCC)
• Determination of market potential and target services based on results of TREND project and market analysis
• Translation of TREND report on existing technical solutions into a corridor related technology approach matching customer requirements and ensuring rail productivity (energy supply, temperature monitoring)
• Calculation of investment and operational costs, risks
• Development and preparation of a safe and efficient process organisation to control and manage all “breaking points” of door-to-door supply chain (terminal, hub, port, border station)
• Development of appropriate customer information tool
• Design of back-up solution and emergency concept
• Elaboration of implementation concept for TCC services
• Preparation and enforcement of test runs, fine-tuning
• Validation and improvement during demonstration
8.2 Semitrailers in unaccompanied intermodal transport chains

- Review of a technical-operational concept to attract non-craneable semitrailers into unaccompanied intermodal transport chains in south-east Europe by exploitation of the concept developed in the BRAVO project
- Improvement of the system components such as wagon and terminal equipment
- Market analysis in south-east Europe to obtain information on potential customers, their volumes and most wanted routes
- Analysis of the railway network and the loading gauge as well as capabilities of the terminals to be adapted to the new technologies requirements (loading gauge, lifting capabilities of cranes and mobile equipment)
- Selection of most suitable terminals to be connected and equipped, terminal Wels of RCA being already confirmed
- Selection of most suitable wagon to be adapted and equipped
- Implementation plan