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## 1. EXECUTIVE PUBLISHABLE SUMMARY

To succeed in breaking the link between economic growth and growth in transport demand, as the European Council has set as a primary target, it is necessary to succeed in developing of truly intermodal Pan-European transport systems. To achieve this, the European Commission has stressed that research needs to be better linked to both policy making influencing the framework conditions, and to industry to enhance the competitiveness through technological and organisational innovativeness.

The scope of the EUTRALOG project has then been to identify recommendations for RTD-initiatives for supporting policy identification and policy making. Indeed, the core of EUTRALOG has been on the European Transport Industry and its practises. With the support of a Steering Committee composed of transport experts, the EUTRALOG results have not only implied thematic propositions and project ideas, but also widely encompassed recommendations to how this dialogue can be accommodated and enhanced on a European scale in the future.

Based on an extensive European and overseas assessment of government initiated or financed policy and R&D programmes with an impact on transport logistics, the following **open research issues** have been identified:

- Vertical supply chain perspective in programmes and projects
- Integrated multi-modal solution perspective
- Organisational aspects of transport logistics initiatives
- Transport logistics developments related to SMEs
- Transport logistics safety
- Monitoring and evaluation
- Dissemination from theory to practice (creating awareness)
- Linking of EU agenda to national agendas
- Practical improvements versus regulatory measures

A description of the **trends reshaping the current logistics systems** in Europe and elsewhere has been made, including an overview of the most recent trials of a scientific analytical assessment of the trends and their interrelation to transport relevant key indicators and the resulting research demand for policy-making decision support. Active trends have been isolated. Special attention has been given to reverse logistics as key element of closed loop supply chains, as well as the integration of reverse logistics in the concept of supply chain management. Furthermore, first mile concepts and their integration in existing distribution concepts have been analysed.

Regarding the **specific situation of SMEs**, it has been analysed that there are deficits between the self-assessment of the SMEs concerning their current position and their expectations for the future and the actual future requirements. This makes it essential to provide SMEs with suitable training measures to prepare them for future challenges. The existing training systems in Europe have to be adapted according to the needs of the SMEs. Associations and Chambers of Commerce and Industry have the closest contact to these companies. They can clearly point out the detailed advantages SMEs can gain from adopting new technologies and business models. This can be stimulated by embracing governmental incentives.

Regarding **intermodal transport**, the analysis revealed four major issues that influence the success of intermodal projects from a demand side perspective. These issues are refined into eight critical success factors for intermodal projects.

<i>Issue</i>	<i>Critical success factors</i>
Focus on logistics concepts	Increased focus on logistics requirements and involvement of shippers Exploration and development of logistics concepts integrating intermodality
Agreement on roles, risks and responsibilities	Commitment of shippers in intermodal projects Application of gain and risk sharing principles
Effective tools and technologies	Use of advanced Information and decision support tools Use of advanced intermodal technologies designed for system effectiveness
Focus on change management capabilities	Use of a step by step development approach Use of a champion or network coordinator

An overall policy strategy for the EU is to pay more attention to the demand side. A strategy aimed at stimulating the integration of existing intermodal services in logistics concepts (the first type of intermodal projects) could focus on:

1. Increasing awareness of the opportunities to fit intermodal transport into logistics concepts (e.g. via demonstrations, promotion, education, scans).
2. Create transparency in the supply of intermodal services.
3. Support RTD to explore the opportunities of de-hurrification in different industries.

Base on, the above analysis, roadmaps and the following **recommendations** have been drawn:

1. The existing gap between the “world of transport” and the interests of the European industrial shippers requires the design of a “European transport logistics business models”.
2. On short term a project should be started on making a survey and analysis of the “best practices of inventory deployment and supply chain operations”.
3. An RTD study should be started “to design course material on logistics which includes intermodality”. New approaches to form and content are needed because the actual structure and approach of the traditional education system shows insufficient results in the transport sector.
4. Projects have to be prepared for RTD on:
  - Further development of the Freight Integrator concept
  - Identification new intermodal concepts
  - Potential value of consolidation centres
5. It is highly recommended to improve the dissemination process of the results of the various EU projects. Only the internet appears to be not sufficient in particular when SMEs and shippers need to be reached. Additional communication lines / methods need to be used to utilize the full benefits of the projects.

## 2. OBJECTIVES AND STRATEGIC ASPECTS

EUTRALOG has addressed some of the central socio-economic challenges identified by the CEC and European Council: socio-economic scenarios for mobility of goods, driving forces in goods transport, policies for sustainable mobility, transport and mobility services at the strategic level where research, policy and industry requirements and objectives meet. In particular the stronger linkages between research, policy and stakeholders of **European transport logistics** as also asked for in the preparation documents of the 6<sup>th</sup> Framework Programme will be in focus. Though EUTRALOG addresses high-level strategic issues the ambition is to devise practical advice. That is, identification of themes, concrete steps and initiatives at the short, mid and long term for the European Commission in relation to the realisation of the 6<sup>th</sup> Framework Programme.

EUTRALOG has finally drawn up RTD Roadmaps for European Transport Logistics meeting these requirements. The identification of these Roadmaps has been based on three pillars:

- *Good policy practises – the international experiences:* Good policy practices and examples of successful policy programmes or pitfalls in sustaining the development of efficient transport logistical systems and practises from the *international community* will therefore give valuable input to the project. This concerns not the least also the way in which research initiatives are integrated in the programmes
- *Driving forces and direction of change:* What are the challenges of these developments to the vision of the European Union of an integrated transport system with seamless exchanges between transport modes and networks? What can be learned from overseas experiences? In particular the Asian-Pacific experiences size up a pool of very interesting knowledge which the EUTRALOG project could benefit much from. These are important questions addressed in EUTRALOG.
- *The constituency of future change:* The ambition of EUTRALOG project is to create a creative forum where research, industry and policy meet to exchange and develop RTD ideas and recommendations to how research and policy together can strengthen and push the process toward a fully integrated, seamless and efficient, sustainable transport systems. This not only implies thematic propositions and project ideas, but should also encompass recommendations to how this dialogue can be accommodated and enhanced on a European scale in the future. Short, medium and long-term steps are envisaged.

### 3. SCIENTIFIC AND TECHNICAL DESCRIPTION OF THE RESULTS

#### 3.1. State of the Art in European Transport Logistics policies and programmes, including the identification of open research issues

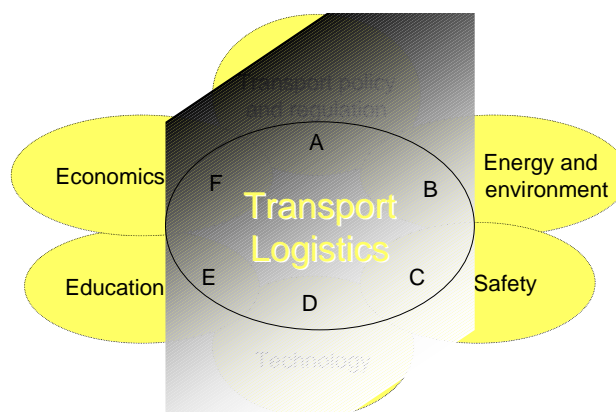
This part of the work reflects the activities which have been carried out in Work Package 1 of the EUTRALOG project.

The objectives of the Work Package were:

- To conduct a systematic analysis of R&D and implementation programmes and projects (EU and national levels) in the field of transport logistics;
- To review national and international policies in the field of transport logistics;
- To make a comparison of EU, US and Asian experiences in this field;
- To identify open research issues.

The overall intention of the Work Package has been to provide an extensive, but non-comprehensive European and overseas assessment of government initiated or financed policy and R&D programmes with an impact on transport logistics. The outcomes of the analysis within this Work Package have been directed input for Work Package 5 in which Future RTD Roadmaps have then been developed.

To guarantee a structured approach during the whole project, in data collection, analysis and reporting activities, at first an analytical framework was developed. Based on an analysis of e.g. current RTD programmes and EU policy documents like the White Paper on “European transport policy for 2010: time to decide” (COM, 2001, 370) 6 main elements of transport logistics policies and programmes have been defined as the main elements of the analytical framework as is shown below:



**Figure 1 - Analytical Framework**

Within each main element several more specific policy and research areas have been defined which are presented in the report.

The second step in this Work Package has been the development of a database with descriptions of transport logistics policies, programmes and projects in the EU countries, the Newly Associated Countries, some Asian countries as well as the United States. This has resulted in a database with several hundreds of inputs. The database has been used as one of the pillars for the analysis resulting in the open research issues and provides good insights in e.g. best practices, missing research issues, differences between countries, etc.



Besides the database also qualitative interviews have been carried out with experts in the field of transport logistics policies and programmes in order to gather more in-depth insights into open research issues, best practices and other relevant issues in several countries.

The third pillar of the analysis has been the definition of good practices. Some successful policies and programmes have been determined and analysed in order to make clear what factors strongly contributed to the success of these policies and programmes.

The *main conclusions of the database analysis* are:

- Mostly a uni-modal perspective is taken in transport logistics policies and programmes;
- The structural involvement of SMEs appears to be very difficult in transport policies and programmes;
- Overall, both on EU and on national level, there is little insight into success and fail factors of transport logistics policies and programmes;
- The involvement of the private sector can really lead to successes;
- Safety in transport logistics is not a key priority issue (yet).

Please note that the conclusions above reflect the current state of transport logistics policies and programmes.

The *main results from the qualitative interviews* can be described as:

- Large deviations exist between the EU and the national agendas on transport logistics policies and programmes;
- Experts conclude that an integrated modality and vertical chain perspective is essential;
- Monitoring and evaluation of policies and programmes are lacking both on EU and national level but are essential for successful future RTD;
- The organisational aspects of transport logistics should have a more central place (ICT systems, dissemination of knowledge, intermodal platforms, etc.);
- Thematic platforms can be a linking factor between different modes / layers in a supply chain (e.g. companies and organisations together with EU and national public organisations working together in transport logistics initiatives with a focus on practice);
- ICT developments are a driver for transport logistics developments.

Finally the *main conclusions of the good practices analysis* are:

- Integrated vertical chain perspective leads to successful projects;
- Active involvement / commitment of private parties guarantees structural results;
- Organisation of programmes is important (e.g. linking EU level to national levels);
- Dissemination essential for wider and longer lasting results.

Based on the conclusions of the three individual analysis pillars, a synthesis analyses has been carried out with the aim of identifying open research issues in transport logistics policies and programmes. This has resulted in a number of open research issues which are listed below:

- Vertical supply chain perspective in programmes and projects;
- Integrated multi-modal solution perspective;

- Organisational aspects of transport logistics initiatives;
- Transport logistics developments related to SMEs;
- Transport Logistics Safety;
- Monitoring and evaluation;
- Dissemination from theory to practice (creating awareness);
- Linking of EU agenda to national agendas;
- Practical improvements versus regulatory measures.

The table below gives an overview of the open research issues together with more specific potential research subjects / directions:

**Table 1 - Open research issues and potential research subjects/directions**

<b>Open research issue</b>	<b>Potential research subjects/directions</b>
Vertical supply chain perspective in programmes and projects	<ul style="list-style-type: none"> <li>• Identification of potential sectors of industries and/or types of supply chains</li> <li>• Research on the best ways of organising these types of collaboration projects</li> <li>• Practical efficiency improvements in supply chains with groups of companies</li> <li>• Etc.</li> </ul>
Integrated multi-modal solution perspective	<ul style="list-style-type: none"> <li>• Linking rail and barge transport with pre- and end road haulage</li> <li>• Organising pre- and end haulage for multiple terminals through one transport system</li> <li>• Intermodal opportunities in less obvious sectors of industry</li> <li>• Pan-European short sea networks (containers and other types of transport)</li> <li>• Etc.</li> </ul>
Organisational aspects of transport logistics initiatives	<ul style="list-style-type: none"> <li>• ICT-related research focusing at setting up systems for improving communication and collaboration between different companies in a chain or in an industry</li> <li>• Success and fail factors in logistics collaboration projects</li> <li>• The organisational aspects of international railway or barge transport</li> <li>• Training and education focused at improving organisation (capacities) within companies, groups of companies and also relevant public organisations</li> <li>• Setting up of platform organisations, e.g. on EU level, that are responsible for transport logistics initiatives and programmes within specific areas (geographically or per industry or per product type, etc.)</li> <li>• Etc.</li> </ul>
Transport logistics developments related to SMEs	<ul style="list-style-type: none"> <li>• The best way to reach SMEs in these developments (direct involvement versus dissemination/education)</li> <li>• SME-specific potential for road kilometre reduction, fuel emissions, etc.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Identification of SME sectors with large potentials</li> <li>• SME-pilot projects (e.g. road transport bundling concepts, intermodal transport opportunities, etc.)</li> <li>• Etc.</li> </ul>
Transport logistics safety	<ul style="list-style-type: none"> <li>• Security measures in main ports (seaports, airports, logistics centres, etc.)</li> <li>• Information systems (supply chain visibility, tracking and tracing protocols, information-sharing, etc.)</li> <li>• Harmonisation of security and safety rules and regulations throughout the EU</li> <li>• Etc.</li> </ul>
Monitoring and evaluation	<ul style="list-style-type: none"> <li>• Evaluation of successful monitoring and evaluation practices</li> </ul>
Dissemination from theory to practice (creating awareness)	<ul style="list-style-type: none"> <li>• Necessity of structural monitoring per type of programme / project / measure</li> <li>• Best practices</li> <li>• Possibility for setting up a European system of evaluation and monitoring of transport logistics developments</li> <li>• Etc.</li> </ul>
Linking of EU agenda to national agendas	<ul style="list-style-type: none"> <li>• Study on the possibilities for linking EU and national agendas on transport logistics</li> <li>• Thematic or geographical platforms (see also organisational issues)</li> <li>• More detailed analysis of differences in agendas</li> <li>• Identification of (country-neutral) common subjects and approaches that could (or should) be harmonised</li> <li>• Etc.</li> </ul>
Practical improvements versus regulatory measures	<ul style="list-style-type: none"> <li>• The effectiveness of LKW-Maut like measures versus more active intermodality stimulation (also looking at issues like dissemination, education, long-term results, economic consequences, etc.)</li> <li>• What transport logistics policy issues can be stimulated best through taxes and tolls and which ones better through research and practical implementation projects</li> <li>• Etc.</li> </ul>

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### 3.2. Emerging Logistics Trends and their Influence on Transportation Systems and Transport Demand

The European Union is currently facing a situation already for many years in which the annual growth rates of the transport performance in tonne-km is exceeding the growth of the economy in terms of the GDP development. The driving force of this development must be seen in the structural changes of the

way and manner of the realisation of physical economical exchange processes – in structural changes in the logistics system as their backbone.

However, the infrastructure development does not cope at all with the increasing transport demand; the degree of utilisation is increasing steadily resulting in traffic jams on 10% of the EU highway systems every day. Industry and retail organisations are facing an increasing opposition against transport-intensive activities from public and policy, depending in its characteristics and extent on the different circumstances in the various EU member states.

In addition, transport customers experience a creeping slowdown of the overall speed of the European transport system. In front of this background, pathways need to be explored, how the realisation of physical economical exchange processes can be undertaken in a manner that it does not contribute to this development as much as it did in the recent past.

The work done in workpackage 2 gives an overview about the state-of-the-art in transport-relevant logistics and SCM trend analysis research and provides a more in-depth assessment of the contribution of e-logistics and e-business activities to the emergence of these trends. All research activities are carried out in front of the overall objective of these work package's research activities to identify research demand for proper transport policy decision making. In addition to this general focus one of the most important trend is pursued – the development of reverse logistics – for which major impacts on transport are expected.

In accordance to this approach, a **description of the trends reshaping the current logistics systems in Europe** and elsewhere has been made, including an overview of the most recent trials of a scientific analytical assessment of the trends and their interrelation to transport relevant key indicators and the resulting research demand for policy-making decision support.

The topic of an embedded understanding of transport to achieve an integrated approach for transport related policy making is quite complex. In that context, it is necessary to identify the key fields for consideration to achieve the maximum results with generally limited resources for the proposed re-search activities. In this context, it appears to be necessary to identify and isolate those trends which have the biggest impact on transport relevant aspects. To identify these most transport relevant trends to be more closely observed in future research activities methodological steps from the scenario project analysis methodology are applied.

In the analysis, following active trends have been isolated: spatial concentration of production, spatial concentration of inventory, vertical disintegration of production and wider geographical sourcing of supplies and wider distribution of finished products. Furthermore, so called ambivalent trends are strongly influencing the European transport system but are also influenced strongly: application of time compression principles in retailing and manufacturing and product modularisation.

These isolated trends are considered to be of importance for future research activities. As the analysis reveals, these trends are the major drivers of the structure and volume of transport demand in Europe. These trends and their interaction with transport relevant figures – such as transport volume, transport performance, load factor, empty runs etc. – has to be analysed –as outlined above – empirically and in case studies including time series to fully understand the impacts of potential political measures on the overall transport system capacity utilisation and the feedback on industrial value creation – and thus on the community. Time series analyses are recommended to make decision makers in the industry aware of the impacts of their decisions on the transport intensity of their acting.

In addition, there is strong evidence that these trends in the logistics systems have lead to the freight structure effect of a continuous reduction of shipment sizes. Particularly this effect is responsible for the over proportional growth of road transport. The economies in the Eastern European countries have not fully adapted to the structures of western European industrial structures. Thus, it must be expected that the trends identified in the restructuring of the logistics system will be observed in Easter Europe as well, however, occurring with high probability with much higher speed. On the other hand, the rail share is still quite high compared to Western European states. If it is the political desire to safe as much as possible of this higher modal share of railroads policy makers should be aware of the interactions between the

changes in the economic structures and their underlying logistical system characteristics in order to identify opportunities of influence.

Furthermore, the identified trends have been assessed regarding their sensitivity in terms of their dependence from e-business and e-logistics activities. As the explanations regarding the research issues have made clear, that an urgent challenge of current IT-systems on the inter-organizational level is the adequate co-ordination of information within the entire supply chain. This applies on one hand to the performance of innovative logistical services (such as 4PL), and on the other hand to arrange efficient ad-hoc measures in the context of supply chain event management. A common informational basis for decision support regarding the indicated purposes has to contain extensive information to assess relevant decision alternatives for the management of supply chains. In terms of acceptance and breakthrough of innovative technical solutions, the transport industry is crucially dependent on the determinability of economic potentials in this respect. But besides such a technological-driven innovation in supply chain collaboration a concurrent innovation in the organisational-functional area is required. Considering the situation of companies in supply chains today, it is a common procedure that each company makes its management decisions quite isolated from each other, e.g. demand and capacity planning. Such company individual management focus leads to a number of compound supply chain-relevant trade-offs – often impacting transport most. In this respect, specific concepts of network integrators are not to be institutionalised by specific types of companies, but can rather be understood as a typical spectrum of logistical management and performance services. But nevertheless on the topic of impacts on the supply side the objective of research activities supporting the interest of the European Commission is clear: Collaborative approaches and ICT-based solutions must lead to an increase of the efficiency of the utilisation of transport fleets in Europe and to an increased efficiency of infrastructure capacity utilisation.

The technical part on a fundamental trend identified: reverse logistics, precisely the **reverse logistics as key element of closed loop supply chains**, consists of a chapter giving a broad overview on the background of the topic and a chapter on the integration of reverse logistics in the concept of supply chain management. Furthermore, first mile concepts and their integration in existing distribution concepts are discussed in a separate section. This work has been built on expert consultation gained in several workshops with members of the Collaborative Research Center 281 “Disassembly Factories for the Recovery in Product and Material Flows”. Insofar the results reflect the most current knowledge and perspectives of expertise in the subject of reverse logistics.

Generally spoken, reverse logistics concepts are becoming a continuously growing strategic key factor within the next years. Thus, the demand for smart reverse logistics is further growing: For example, there is the return of new products that are either rejected by the customer, damaged or an order mismatch. There are used consumer products that are designated for repair, refurbishment or resale. And there are end-of-life-products that must be prepared for dismantling, recycling, disposal or reuse. The diversity of all these return product types is the reason for an ambitious challenge: Conventional methods of "forward logistics" do not automatically lead to suitably economical solutions due to the uncertainty concerning mix and/or condition of returned products such as appliances combined with a large number of variations and with low value added. Adjusted concepts and technologies are required. The various aspects regarding the design and realisation of reverse logistics systems are de-scribed in detail. As the most crucial requirements identified for SCM, the linking of forward and re-verse logistics is needed and the availability of necessary product life-cycle information for re-use has to be ensured.

Due to major lacks in accomplishing the described requirements, there are a number of gaps regarding the integration of reverse logistics into SCM identified: First, on the process level there are no holistic process definitions according to the wide definition of reverse logistics at the beginning, second, on the information level, there are no specified requirements for data transfer, communication and integration into SCM software, also requirements for disassembly-oriented identification concepts are missing.

Public transport systems in urban areas are considered to become part of the reverse chain particularly in first mile concepts for collection. The reason must be found in there high accessibility. However, there are furthermore additional requirements in terms of a general co-operation-orientation and co-operation-willingness between involved parties (public transport operators, logistics service providers etc.)

identified. Willingness to co-operate is especially important, because cross-functional / interdisciplinary conception design of reverse logistics systems as a compound system in urban areas is crucial for their acceptance and economical success. In this respect, there are several aspects to be assessed in the future: there is no sufficient information on the performance capabilities of urban transport systems in terms of reverse logistics, a detailed analysis of options for integration and occurring economical effects is missing as well and also the technological requirements for high integration profitability have to be specified.

### **3.3. Situation and the future outlook of SMEs in the European transport logistics market.**

This part of EUTRALOG activities, covering workpackage 3, aimed at the development of management and training strategies for small and medium-sized companies to cope with the changes in the transport logistics sector. The increasing internationalisation and extension of the EU opens up new markets and provides companies with the possibility to generate a larger share of their turnover abroad. They also have to deal with new competitors and business environments. This means for SMEs to react and to adopt their business strategies to meet these challenges in the future.

A questionnaire action has been carried out in a number of European countries including accession countries in order to receive information about the situation of SMEs in the present logistics market and their future intentions as well as about the required skills and competencies of SMEs' personnel in the transport logistics sector. The response rate to the questionnaires was very low at all. Therefore it is not possible to give a well-founded statistical evaluation. The questionnaires in most cases can only be used to show general trends or to give statements. Nevertheless, there can be drawn some general conclusions:

- The limited availability of well-trained staff and the limited time for training measures are big problems for SMEs. In general these facts seem to have a greater impact on micro and small companies than on medium-sized ones.
- The limited possibilities to influence the decisions of policy makers as well as hindrances by imposed governmental administrative regulations are named as problems with a great impact independent from the size of the company.
- The use of e-commerce does not seem to play an important role in small and medium-sized companies. Especially the high costs for computer and networking technologies are specified as the biggest problem. Mainly micro and small enterprises consider e-business not as a way of doing business today or in the future.
- Activities concerning reconfiguration of companies and supply chain integration are mostly not seen as important impacts on the companies in their future. Especially micro and small enterprises assessed their willingness to establish/extend partnerships in the future as very low. Only the fact that the companies aim to respond to markets quicker is named with a strong impact in the future.
- While financial limitations in general are currently seen as problem of medium to low impact on SMEs, the limited budget to invest in personnel and/or technologies is a problem which has a strong impact on the majority of the companies. For the future an aggravation of the cost pressure is expected, mainly by medium-sized companies.
- The importance of increased customer requirements is assessed very different according to the several countries. The opinions regarding this future challenge range from a very strong impact to only low.

A desk research was undertaken to complement the results of the questionnaires. There exists much literature concerning the impacts of the political and economic changes on the European transport logistics sector. Mostly, these expertises concentrate on the "Global Players" in the transport logistics market. So, it is quite difficult to answer the question about the current market situation for SMEs on

the transport logistics sector really in detail. What became clear was that as in other business sectors the majority of companies in the transport logistics industry are small and medium-sized companies. They are described as flexible and innovative. Therefore small and medium-sized companies are named as the backbone of an economy. On this background it is important to provide them with the possibility to ensure their survival in a changing business environment. It astonishes that, named with a great importance for the economy of every country, relatively few information is available about SMEs on the transport logistics sector.

The SMEs in the transport business must develop new competencies which enable them to offer better and more competitive logistics services. The new market is characterised by customer orientation, innovation, punctuality, reliability, higher frequency, flexibility and world-wide advanced logistics services and solutions based on a high degree of know-how and comprehensive logistics resources. To meet these new requirements transport companies have to develop new core competencies and must have a skilled workforce in order to offer better and more competitive logistics services. Mainly the big players have already realised these changes and developed future strategies actively. If SMEs are missing the point in time to go further they will loose in future.

According to the survey negotiating as wells as communication and soft skills are the most important skills for SMEs in the transport logistics sector. It astonishes, that human resource management is mostly named as a skill of minor importance, especially under the point of view that the limited availability of well-trained staff is named as a big problem for SMEs.

Further, the research showed that SMEs are often lacking the ability to present themselves in public to communicate their competencies to existing and potential customers. This is a starting point for required training. Therefore skills in marketing are important as well as skills in information and communication technologies, especially internet presence. It has to be pointed out to SMEs that the importance of e-business is growing in the future and it will become more important for doing business. Adequate computer skills are essential.

According to the results of the research there is a wide range of training offered in the several countries. Furthermore, SMEs are interested in further vocational training. The point now is that the existing training measures have to match the requirements of the SMEs. Although the official educational systems in the different countries are assessed as satisfactory in general, as overall problems/insufficiencies the following points are named:

- The offered training courses are not up-to-date and there is a lack of practical orientation.
- The costs are too high and the accessibility is limited due to unrealistic dates

As a consequence it is necessary to examine the existing training measures and to change them according to the needs of the SMEs. An analysis on country-base gives a structured overview of the content and the accessibility of the existing training measures and identifies weak points and insufficiencies. For improvements well-developed systems can be consulted for benchmark purposes. SMEs have to be prepared to meet the future requirements of the market and their customers. Suitable training measures are essential, which have to be

- accessible regarding time and costs as well as
- up-to-date and practically oriented, especially on specific needs of SMEs.

Associations and Chambers of Commerce and Industry are the best way to reach the SMEs. For the development of suitable training measures the problems identified in the questionnaires have to be taken into consideration as well as paying attention to country-specific requirements. It is important to provide the SMEs with information concerning possible ways to cope with the future changes, especially if SMEs do not pay much attention to them currently, e.g. information and communication technologies as well as collaboration and supply chain integration. Governmental incentives can be used to stimulate the SMEs to adopt new technologies and business models.

Furthermore, attention has to be paid to adapt the education in logistics and transport to the future requirements of this sector to ensure the availability of junior staff in the future. Therefore comprehensive and practical orientated vocational trainings and courses of studies for logisticians are needed.

In summary, it can be concluded that there are deficits between the self-assessment of the SMEs concerning their current position and their expectations for the future and the actual future requirements. This makes it essential to provide SMEs with suitable training measures to prepare them for future challenges. The existing training systems in Europe have to be adapted according to the needs of the SMEs. Associations and Chambers of Commerce and Industry have the closest contact to these companies. They can clearly point out the detailed advantages SMEs can gain from adopting new technologies and business models. This can be stimulated by embracing governmental incentives.

### **3.4. Intermodal transport**

EUTRALOG work package 4 “Challenges to Intermodality” aimed to identify critical success factors of intermodal projects, organisational changes necessary for increased use of intermodal transport and policy strategies to lower thresholds for intermodal transport.

Three tasks were carried out in this work package: 1. Literature review and identification of latest developments; 2. Case-studies identifying the critical success factors innovative intermodal projects; 3. Workshops with shippers and logistics services providers in Rotterdam, Brussels and Warsaw.

#### **3.4.1. State-of-affairs in intermodal transport**

EUTRALOG analysed in depth the current situation in intermodal transport.

European intermodal transport has shown considerable growth over the last years. Nevertheless its market share is limited: 8.6% of all intra-European tonne-kilometres. If intermodal transport is to significantly contribute to solving experienced and expected problems due to road traffic growth, this market share will have to grow stronger.

European intermodal transport is mainly hinterland transport of maritime containers. It is furthermore concentrated on certain corridors:

- Rail: North-South corridor, especially Alpine crossing
- Inland shipping: Rhine corridor and Antwerp ↔ Rotterdam
- SSS: Channel, Med, Baltic

SSS (Short-Sea Shipping) and rail transport have a share of medium/long distance intra-European freight flows, especially through regions where road transport is hindered by geography or regulation (SSS: channel; rail: Alps, across CEEC borders and the channel). There are little successful short distance intermodal solutions, except on some concentrated maritime container corridors.



**Table 2 - Existing Intermodal Principals and Operators**

	<b>PRE/END HAULAGE MARITIME CONTAINERS</b>	<b>INTRA-EU TRANSPORT</b>
<i>Principals</i>	<ul style="list-style-type: none"> <li>• Container shipping lines (or agents)</li> <li>• Forwarders/big shippers</li> </ul>	<ul style="list-style-type: none"> <li>• Forwarders</li> <li>• Hauliers</li> <li>• Big shippers</li> </ul>
<i>Operators Intermodal SSS</i>	<ul style="list-style-type: none"> <li>• Regional feeder lines</li> <li>• Deep-sea operators</li> </ul>	<ul style="list-style-type: none"> <li>• Regional door-to-door operators</li> <li>• RoRo operators</li> </ul>
<i>Operators Intermodal rail</i>	<ul style="list-style-type: none"> <li>• ICF</li> <li>• National companies</li> <li>• New entrants <ul style="list-style-type: none"> <li>– Shipping lines</li> <li>– Port authorities</li> <li>– Pure traffic operators</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• UIRR family</li> <li>• National companies</li> <li>• Shippers (new entrants)</li> </ul>
<i>Operators Intermodal inland shipping</i>	<ul style="list-style-type: none"> <li>• (former) shipping companies</li> </ul>	-

**Table 3 - Existing Intermodal markets**

	<b>PRE/END HAULAGE MARITIME CONTAINERS</b>	<b>INTRA-EU TRANSPORT</b>
<i>Intermodal SSS</i>	Strong position from/to bigger ports	Continental LUs and RoRo on Channel, Med and Baltic
<i>Intermodal rail</i>	Strong position on North-South axis (esp. across Alps) and domestic, esp. in bigger countries	Domestic (e.g. in Germany, France, Italy) and Alp-crossing swap-bodies, RoRo and trailers
<i>Intermodal inland shipping</i>	Strong position in Rhine delta	Negligible (Some RoRo on Danube)

### 3.4.2. Challenges to Intermodality

#### 3.4.2.1. Supply-side perspective

For a real breakthrough, new medium/short distance solutions are required. The main challenges per market are summarised in the following table.

**Table 4 - Challenges per market**

	<b>PRE/END HAULAGE MARITIME CONTAINERS</b>	<b>LONG DISTANCE INTRA-EU (&gt;500 KM)</b>	<b>MEDIUM DISTANCE INTRA-EU (200-500 KM)</b>	<b>SHORT DISTANCE (&lt;200 KM)</b>
<b><i>Intermodal SSS</i></b>	<ul style="list-style-type: none"> <li>• Consolidate and increase share</li> </ul>	<ul style="list-style-type: none"> <li>• Develop new axes, e.g. lolo transport Western Europe – Iberia</li> <li>• Explore sea-river options</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>	<ul style="list-style-type: none"> <li>• -</li> </ul>
<b><i>Intermodal rail</i></b>	<ul style="list-style-type: none"> <li>• Consolidate and increase share</li> <li>• Develop pre/end haulage of SSS</li> </ul>	<ul style="list-style-type: none"> <li>• Develop new axes, e.g. lolo transport to CEEC, axis Germany-France.</li> <li>• Explore niches (consolidated, air cargo)</li> </ul>	<ul style="list-style-type: none"> <li>• Increase services (like Kombinetz 2000+)</li> </ul>	<ul style="list-style-type: none"> <li>• Predictable flows via “rail distribution”</li> </ul>
<b><i>Intermodal inland shipping</i></b>	<ul style="list-style-type: none"> <li>• Consolidate and increase share</li> <li>• Develop pre/end haulage of SSS</li> </ul>	<ul style="list-style-type: none"> <li>• Open up the continental market</li> </ul>	<ul style="list-style-type: none"> <li>• Open up the continental market</li> </ul>	<ul style="list-style-type: none"> <li>• Predictable flows from factories/suppliers to distribution centres</li> <li>• “City box” / Pallet-based solutions</li> </ul>

#### 3.4.2.2. Demand-side perspective

The demand for transport is a consequence of supply chain management decisions of companies. Shippers generally do not specifically demand a special transportation mode, but rather a transport performance. As a result, logistic service providers play a key role in increasing the intermodal potential. In order to control the complexity of intermodal goods flows, they need sophistication, ICT solutions and a pro-active behaviour towards shippers.

**Tableau 5 - Challenges per actor**

	<b>CHALLENGES</b>
<i>Intermodal world</i>	Increase sophistication, esp. interconnectivity, tracking & tracing Improve service Reduce transshipment cost Improve image and communicate successes
<i>Logistic service providers</i>	Increase sophistication, implement advanced IT systems to integrate different modes, thus controlling the flows Develop logistics engineering capabilities Pro-activeness towards shippers
<i>Shippers</i>	De-hurry processes Differentiate flows Build partnership with a limited number of Logistic service providers

### 3.4.3. Successful developments of intermodal supply chains: a description of cases

There are some examples of shorter/medium distance intermodal services that are successful. The reasons of these successes (and, at the same time: the reasons for the fact that their number is limited) have hardly been investigated. Experiences from a few intermodal success stories point out a number of logistics and “softer issues” that, on top of service quality and cost performance, might prove to play an important role in the success of intermodal transport initiatives, and might require more attention in R&D and policy making aimed at increased intermodal transport. These issues include:

- *Shippers' logistic requirements and logistic concept*: the way in which and extent to which the logistic requirements of the shippers are taken into consideration in the process of setting up and managing intermodal services.
- *Business model*: the way in which the required collaboration between shippers, logistic service providers, intermodal operators, and other actors involved is organised.
- *Change management*: The management of the innovation and implementation process
- *Tools/techniques* needed to manage the complexity of intermodal transport

In the case-studies, it was analysed how and to what extent these new issues influence the success of new intermodal initiatives. A total number of six case-studies were carried out, covering a variety of industries/products, several parts of supply chains and all modes (see table).

<i>CASE-STUDY</i>	<b>FLOWS CONCERNED</b>	<b>INDUSTRY/ PRODUCTS</b>	<b>MODES INVOLVED</b>	<b>STATUS</b>
<i>Distrivaart</i>	National distribution	FMCG	Inland shipping, road	Small scale implementation
<i>Vos</i>	Continental transport	Chemicals	Short-sea, road, rail	Implemented
<i>Rail4Chem</i>	Continental transport	Chemicals	Rail, Road	Implemented
<i>CargoDomino</i>	National distribution	Food, parcels	Rail, road	Implemented
<i>Overnight Express</i>	Continental transport	Flowers, food	Rail, road	Cancelled after pilot
<i>Stora Enso</i>	Continental transport	Forest products	Short-sea, rail, road	Implemented

The analysis of case studies allowed to identify the following elements:

There are new logistic concepts, supported by planning tools, which open up new market opportunities for intermodal transport. These concepts are based on the concept of “de-hurrification” and “collaborative planning.” De-hurrification comes down to improved control on the demand side creating slack in the transport planning. While this is usually not the primary objective of shippers, this allows for the use of slower transport modes for part of the goods flows.

The concept of de-hurrification may open up a number of markets that are historically not seen as potential markets for intermodal transport. A good example is the market for transport of FMCG from producers to retailer DC's, which has been entered by inland waterway shipping in the Distrivaart project. The cases did not provide a comprehensive overview of the specific industries/products that lend themselves for de-hurrification, but important characteristics of include: predictability of flows (usually stable, fast moving goods), voluminous, relatively low value density. These characteristics can be used as starting point for identifying qualified flows.

For intermodal concepts that are organised in this way collaborative planning techniques are a prerequisite. Furthermore, in order to allow for these techniques to be implemented, the parties involved must share a common understanding on the benefits of this sharing of information and also willing to make agreements on the investments necessary as well on the sharing of the gains involved. For these latter matters a certain level of trust is necessary, and this can mean that a cultural shift is necessary. The concept of collaborative planning means that the involvement of shippers is imperative: without them changing processes, or allowing their LSP(s) to change processes, it will not work. At this, shippers have to make the trade-off between increased control cost and reduced transport cost. These different cost factors can be outsourced or kept in-house.

For realizing the new opportunities mentioned above, there is no need for new types of intermodal services. The need for new services comes from the policy challenge (see deliverable 4.1) to substantially increase intermodal flows, which means that short/medium continental services are required.

However, the insights on the opportunities of new logistics concepts for intermodal transport can be used to increase the chances for success of new initiatives. Traditionally, most intermodal services are started up with limited involvement of the demand side, i.e. not starting from the logistics

requirements of shippers. The case-studies suggest that really innovative intermodal concepts (systems innovations, including technological aspects) are more likely to succeed if the logistics of shippers are taken as a starting point.

This does increase the complexity of new intermodal initiatives, as more actors are involved in the process. Therefore, the organization of the initiative (business model) and change management become crucial success factors. The case-studies show the importance of preventing conflicts by laying down a clear organizational structure. This does not necessarily require 4PL-like models - which have not been encountered in case-studies - but does require clear agreements on the roles and responsibilities before the pilot phase. Finally, the importance of change management has been illustrated by examples in all of the case-studies, but further scientific research would be needed to draw conclusions on this issue.

#### 3.4.4. Critical success factors and policy strategies

Improved supply chain planning opportunities lead to possibilities for integrating slow and fast modes of transport into one integrated system that can guarantee that the customer requirements are met. This is in contrast with traditional practices in which last minute requirements and short customer lead times left no openings for intermodal transport. To create opportunities for intermodal transport without the need for developing new high-speed intermodal services, the time windows available for transport need to be enlarged. If more time is available for goods in transit, transport flows are *dehurried*.

There are three logistics concepts that can be used to dehurry transport requirements: supply chain collaboration and coordination, parallel use of modes, and floating stock concepts.

Application of these concepts may open up a number of markets that are historically not seen as potential markets for intermodal transport. A good example is the market for transport of fast moving consumer goods from producers to retailer's distribution centres, which has been entered by inland waterway shipping in the Distrivaart project. When there is more time available for transport, the use of slower modes like short sea shipping and inland shipping become viable. An alternative strategy to open up markets, is the development of high speed short sea and rail services for cargo, as was shown by the OverNight Express initiative.

On the demand side two types of intermodal projects can be distinguished:

- *Integration of existing intermodal services in logistics concepts*: In these projects, shippers and LSPs aim to integrate existing intermodal services into their logistics strategy and systems. Opportunities for applying intermodal transport are created by concepts such as dehurrication. Case-study examples include Rail4Chem and Vos Logistics.
- *Development of new logistics and intermodal concepts*. In these projects, new intermodal services (for short- and medium distances) are developed based on the needs and requirements of shippers and logistics service providers. These projects are very complex, because they involve many different actors, include a new network/service design, development of new planning and control systems, and specification of a new business model. Moreover, they require a minimum level of volume to become economically viable. Case-study examples include Distrivaart, Stora Enso, Overnight Express and CargoDomino.

The case studies conducted in WP4 showed four major issues that influence the success of intermodal projects from a demand side perspective. These issues are refined into eight critical success factors for intermodal projects (see table S-1). Although important, success factors on the supply side (like increase in competition within modes, quality of infrastructure, etc.) were not addressed in this study. A comprehensive overview of supply side factors is provided in the Freight Integrators study (ZLU et al., 2003).

**Table 6 - Issues and critical success factors**

ISSUE	CRITICAL SUCCESS FACTORS
Focus on logistics concepts	Increased focus on logistics requirements and involvement of shippers Exploration and development of logistics concepts integrating intermodality
Agreement on roles, risks and responsibilities	Commitment of shippers in intermodal projects Application of gain and risk sharing principles
Effective tools and technologies	Use of advanced Information and decision support tools Use of advanced intermodal technologies designed for system effectiveness
Focus on change management capabilities	Use of a step by step development approach Use of a champion or network coordinator

An overall policy strategy for the EU is to pay more attention to the demand side. The following thresholds and potential policy measures to eliminate these thresholds have been identified.

**Table 7 - Thresholds and potential policy measures**

FOCUS ON LOGISTICS REQUIREMENTS OF SHIPPERS	
<i>Threshold</i>	<i>Policy measure</i>
<b>1.1 Development and application of logistics concepts integrating intermodal transport</b>	
a Lack of awareness of opportunities of new concepts to integrate intermodal transport	Demonstration projects and pilots of new concepts
b Lack of understanding how to evaluate the opportunities of new concepts	Support intermodal scans for new concepts
c Lack of knowledge of intermodal markets and services	Establish market transparency and competition in intermodal transport.
d Reluctance of sales representatives to involve customers	RTD to identify the full potential of the new intermodal concepts
e Reliability, costs and lead times are unfavourable compared to road transport	Continue focus on improvement of supply conditions
<b>1.2 Increased focus on logistics requirements and involvement of shippers</b>	
a Most shippers do not explicitly consider the option of intermodal transport	Increase the attractiveness of intermodal solutions
b Shippers and LSP reluctant to take initiative	Promotional campaigns about performance and advantages of intermodal transport.
c Unfavourable perceptions of and experiences with intermodal transport	Give financial incentives for shippers with high switching costs

<b>ROLES, RISKS AND RESPONSIBILITIES</b>	
<i>Threshold</i>	<i>Policy measure</i>
<b>2.1 Commitment of shippers in intermodal projects</b>	
a Shippers are not willing to invest in intermodal partnerships	Reduce financial risks of intermodal operators or shippers
b Roles and responsibilities are not well defined	Develop a 'handbook for (innovative) intermodal projects'
<b>2.2 Application of gain and risk sharing principles</b>	
a Measuring costs and benefits of intermodal concepts is difficult	Emphasize the need for collaboration
b No openness about costs and benefits of intermodal concepts	Focus on development of simple and standard cost & benefit models

<b>EFFECTIVE TOOLS AND TECHNOLOGIES</b>	
<i>Threshold</i>	<i>Policy measure</i>
<b>3.1 Use of advanced intermodal technologies designed for system effectiveness</b>	
a Tools for coordinating intermodal concepts still in early stage of development	RTD in management tools for coordination of innovative intermodal concepts
b Electronic data exchange across modes still difficult	Development of multi-modal- architectures
<b>3.2 Use of advanced intermodal technologies designed for system effectiveness</b>	
a R&D not driven by industry or initiative specific requirements	Emphasise and stimulate development of functional and performance requirements

<b>FOCUS ON CHANGE MANAGEMENT CAPABILITIES</b>	
<i>Threshold</i>	<i>Policy measure</i>
<b>4.1 Use of a step by step development approach</b>	
a Lack of resources of a stepwise approach	Stimulate or support a step wise approach to development of new initiatives
<b>4.2 Use of a champion or network coordinator</b>	
a Lack of (insight in) required process competencies	RTD for identification and development management competencies
b No suitable champion is available or the 'wrong' champion is selected	Create awareness of organisational complexities and the competencies required

### **3.5. Design of a Roadmap methodology for integrating RTD recommendations to policy, research and transport industry**

The scope of the EUTRALOG-project is to identify recommendations for RTD-initiatives that support policy identification and policymaking aiming at the realisation of freight intermodality in the European Transport System.

EUTRALOG work package 5 “RTD Roadmaps for European Transport Logistics” integrates the results of the other work packages:

1. State-of-the-Art and State-of-Practice in European Transport Logistics policies and programmes.
2. Trends reshaping the European Logistics System
3. Management and Training Strategies for SMEs
4. State-of-the-Art of Intermodal Freight Transport
5. Challenges in Intermodal Freight Transport from a Logistics Perspective

These results offer the basic elements for constructing roadmaps for future European Transport Logistics. Roadmaps are the obvious means to identify recommendations for RTD initiatives in the area of transport logistics by the European Commission.

#### **3.5.1. Roadmap methodology**

A roadmap is a strategic planning tool showing the development in the course of years to come of a series of characteristics which describe the situation of a particular field of interest in a large scale open systems environment.

The purpose of roadmaps is to show the moments / periods that the effect of certain characteristics are beginning to play a role in the development of the situation and to visualise the co-operation opportunities between partners “on the road”. Roadmapping is mostly used for strategic planning of products, technological development, and policy initiatives. Though the results are important, the process and the required multi-disciplinary co-operation are also an important learning process for the involved parties. There are many specific forms of roadmaps, which often have to be tailored (customised) to the specific needs of the respective context.

The first task of WP 5 was to outline a methodology to how roadmaps can be designed that integrate policy, research and stakeholder objectives with the scope of making concrete short, medium and long term recommendations.

The roadmap methodology is not (yet) applied extensively in industry. Some examples have been found in large companies. In most cases the applications are for determining technological product development or for planning the infrastructure of a region. One methodology especially developed to speed up the process of Roadmapping is the “T-plan” approach by the Institute for Manufacturing of the Cambridge University.

The format which is selected for the roadmap depends on a number of factors such as the purpose of the roadmap, type of organisation, a.s.o. The type of format selected for most applications is characterised by the following dimensions:

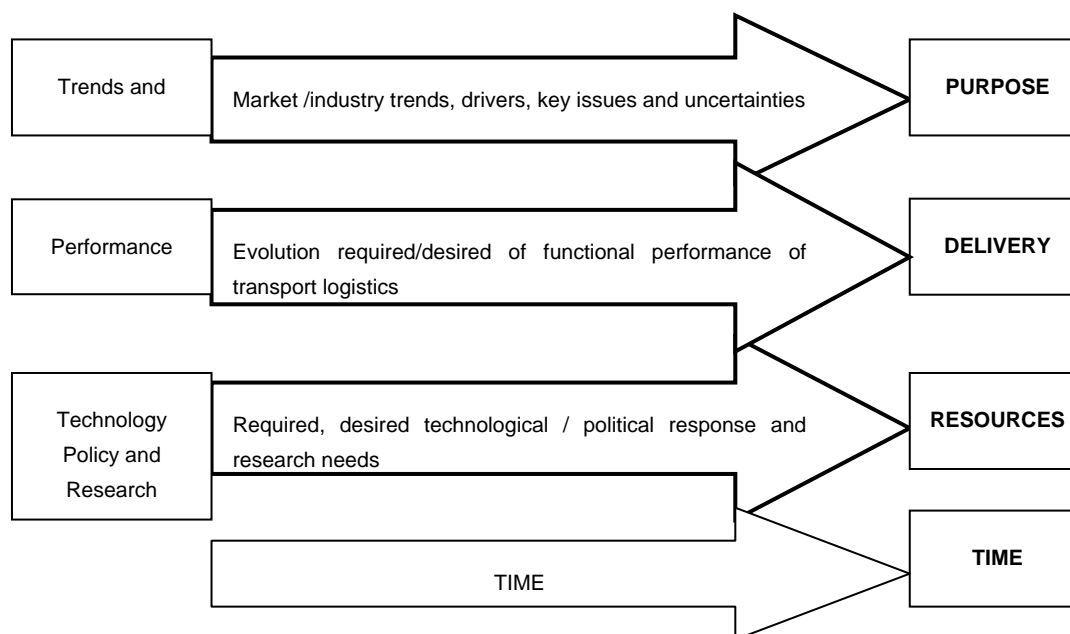
- multi layer representing the business / market,  
the product / service / capabilities / systems



the technology / skills / competences / resources

- a horizontal time axis with a horizon of 5 – 10 years , in case of infrastructural projects till 30 years
- the relationship between the several elements in the different layers

The architecture of this general format is presented in the following figure.



**Figure 2 - Roadmap architecture**

The Roadmapping process in the case of transport logistics consists of the following steps:

1. Describe the elements and characteristics that determine the situation of transport logistics, incl. EU-targets, strengths, capabilities and weaknesses.

These characteristics are:

- Transport policy and regulation
  - Energy and environment
  - Safety
  - Technology
  - Education
  - Economics
2. Identify the “driving factors” that have an impact on these elements and characteristics.
  3. Analyse the development and trends of these driving factors in the future by applying vision and expectations and by identifying trends and developments in: society, business, technology, markets, industries.
  4. Identify the steps in these trends and developments.
  5. Derive the actions which have to be taken by the agents/stakeholders to realise the developments, e.g.: research, policy deployment, education.

6. Describe the conditions which need to be satisfied in order to enable these developments, e.g. monitoring, regulation, standardisation, tax, toll.

When discussing the main objectives it is obvious that these need to be derived from the political aims set by the EC in the White Paper. These can be summarized as “to guarantee sustainable economic growth by better using the existing transport resources.” This can be reached by:

- eliminating bottlenecks
- balancing modal shift
- applying technologies in intermodality
- limiting environmental impacts
- increasing capacity by increasing utilization
- economic framework conditions which decrease marginal transport intensity and break the trend of over-proportional transport growth.

Therefore “(Influence on) Transport Logistics”, “Intermodality” and “SME’s in logistics” are chosen as topics for roadmaps in order to give recommendations for future research regarding these fields. In relation with the first point it has to be stressed that there is a need to influence the demand side of transport logistics.

### **3.5.2. Identification of prioritised research themes in the field of transport logistics**

The work has been carried out in several ad hoc working groups, presentations and discussions with the Steering Committee and involvement of the steering committee members.

Starting from the methodology which has been developed to prepare a road map for transport logistics, and using the inputs of the other deliverables, the road map for transport logistics has been prepared.

The first step has been to define the domains which contain the drivers that influence transport logistics. The following distinction has been made:

1. Trends related to the product
2. Trends in production
3. Trends and developments in logistics and supply chain management
4. Trends related to the developments in businesses and markets
5. Technological trends
6. Environmental trends
7. Trends in society and in the economy

The emphasis on speed of the flow of goods appears to be the most important driver of the trends in transport logistics.

The trends and developments as described previously are compared with the objectives as defined by the European Union especially in the “White Paper on future transport in Europe”. The prime attention has been on the objectives:

- to make intermodal transport a success
- to focus on the transport policy of the user i.e. the impact of logistics decisions on transport
- to increase the competitiveness of the European industry.

Comparison of the EU objectives with the consequences of the described trends effecting transport logistics and applying vision in the several domains results in identifying a number of areas where further actions and investigations are needed to bend these trends into developments which contribute to the achievement of the targets put forward by the European Union.

The following areas have been identified:

**1. Supply chain collaboration**

Better co-operation and “interconnectivity” in the supply chain offers the potential for higher utilisation of transport and selection of the best suited mode.

**2. Dehurrification**

Shift from “speed” to “reliability” (agreed delivery moment) offers the possibility for lower transport costs and the use of intermodal transport.

**3. Advanced stock management**

Using the concepts of “floating stocks” and “virtual warehousing” which will decrease the demand for transport (less emission), offers better planning possibilities.

**4. Differentiated logistics**

Different solutions for different situations in the distribution chain contribute to the competitiveness of industry.

**5. Professionalisation of Logistics Service Providers**

Better knowledge and insight of the processes in the supply chain enables better decisions regarding the use of alternative transport modes and will increase the efficiency and effectiveness of transport.

**6. The role of the logistics function in companies and in society**

Awareness to make logistics part of the business strategy and policy making offers the potential to make regulations which can better influence transport logistics.

On its turn the necessary actions and RTD themes can be derived from these required evolutions. Only a limited number of RTD themes and action points have been selected.

The criteria used for the prioritisation also have been restricted to:

- contribution to the objectives of the EU White Paper
- accordance with the objectives of the European industry.

In addition it has been determined which the urgency of the RTD themes / actions is and when the effect of the result will be noticeable.

The prioritisation carried out by the EUTRALOG steering committee resulted in the following ranking:

0. Develop best practice guidelines how to successfully organise intermodal projects. (Such project could start immediately and will show results at short term which can be used by LSPs, shippers and intermodal operators.)
1. Investigation and dissemination of best practices in inventory deployment.
2. Design educational programmes in which intermodality is included as an integral part of SCM.
3. Further development of the Freight Integrator concept.
4. Identify demonstration projects and pilots of new intermodal concepts.
5. Identify the potential value of consolidation centres.
6. Identify the potential value of the use of advanced enabling technologies.

7. Research to establish transparency of the processes in the supply chain.
8. Support intermodal scans for new concepts.
9. Logistics and social economic development.
10. Identify the full potential of dehurification.
11. Research of the positions of the logistics function in organisational structures.
12. Research to gain better insight in innovation processes in transport and logistics.

The high ranking RTD themes can be started at short term and will show results at short term. There apparently is a preference for practical projects which can be carried out with a relative short lead time.

It is therefore recommended to prepare the start of the projects numbers 1 to 6 and arrange for the beginning of the first two ranked projects.

### **3.5.3. Enhancing the interplay between policy, research and the transport industry**

#### **3.5.3.1. Approach**

First the stakeholders involved in transport logistics have been identified, and for reasons of making the analysis, are distinguished into several levels and are grouped according their function:

- Policy makers
- Researchers
- Industrial companies / SMEs
- Logistics Service Providers

The levels which have been distinguished are:

- EU level
- National level
- Regional level

The roles of these stakeholders have been analysed with a particular emphasis on the roles of the associations that represent the interests of stakeholders.

A questionnaire has been sent to each of the stakeholders' representatives and after having received the answers they have been discussed with the persons involved.

#### **3.5.3.2. Conclusions and Recommendations**

The main conclusions may be summarised as follows:

- The level of knowledge on transport logistics at SME companies is very low. Shippers mostly depend on the knowledge of the LSPs.
- Many RTD projects do not arrive at the implementation phase because of the poor dissemination of the results and recommendations.
- The interest associations often do not know in which DG certain issues on transport logistics are being dealt with.
- The results of many projects at national level are insufficiently disseminated to be utilized in other countries

These conclusions lead to the following recommendations:

- The level of knowledge on transport logistics especially in SMEs has to be increased.
- Establish closer ties between the EC, in particular DG TREN and the national transport ministries.
- Participants of relevant stakeholder groups should be involved in EU projects.
- The relation between universities and enterprises has to be improved.
- An information data base should be made and should be Internet accessible, of the all the EC RTD projects.
- Participants of relevant stakeholder groups should be involved in EU projects.
- To create a “European knowledge data base” on transport logistics which is easily accessible via the Internet. This requires a multi disciplinary project approach.
- It is recommended to have sufficient time available to collect the opinion of the stakeholders when making proposals for the European Parliament.

## 4. LIST OF DELIVERABLES

Deliverable n°	Title	Nature	Dissemination level	Due date	Actual delivery date
D0.1	Quality Management Handbook	Report	Confidential	Month 3	10/02/2003
D0.2	Management Report n°1 (01/01/03 -> 30/06/03)	Report	Confidential	Month 6	05/08/2003
D0.2	Progress Report n°1 (01/01/03 -> 31/12/03, with cost statements)	Report	Confidential	Month 12	28/02/2004
D0.2	Management Report n°2 (01/01/04 -> 30/06/04)	Report	Confidential	Month 18	30/07/2004
D0.2	Progress Report n°2 (01/01/04 -> 31/12/04, with cost statements)	Report	Confidential	Month 18	28/02/2005
D0.3.1	Final management report	Report	Confidential	Month 24	28/02/2005
D0.3.2	Final public report	Report	Public	Month 24	28/02/2005
D1	State-of-the-art and practices in national and international logistics policies and programmes	Report + database	Public	Month 12	30/01/2004
D2	Trends reshaping the European logistics system with special emphasis on future weak points as they result from the trend's development and are recommended to be covered by research activities	Report	Public	Month 12	04/02/2004
D3	Management and Training Strategies for SMEs to Cope with Changing Transport Logistics	Report	Public	Month 12	28/01/2004
D4.1	State-of-the-art of Intermodal Freight Transport	Report	Public	Month 9	17/12/2003
D4.2	Successful development of intermodal supply chains: a description of cases	Report	Public	Month 12	19/05/2004
D4.3	Strategies to integrate intermodal transport in supply networks	Report	Public	Month 18	22/10/2004
D5.1	Methodology to make integrated roadmaps	Report	Public	Month 20	20/11/2004

D5.2	Identification of prioritized research themes in the field of transport logistics	Report	Public	Month 24	31/12/2004
D5.3	Recommendations to enhance the interplay between policy, research and the transport industry and recommendations to enhance stakeholder involvement and expand the constituency of future RTD activities in the fields of transport logistics	Report	Public	Month 24	31/12/2004
D6.1	Dissemination plan	Report	Confidential	Month 6	15/09/2003
D6.2	EUTRALOG Public Web site	Web site	Public	Month 4	<a href="http://eutralog.mettle.org">http://eutralog.mettle.org</a>
D6.3	Newsletter	Newsletter	Public	Month 6	16/06/2003
D6.4	Newsletter	Newsletter	Public	Month 18	18/07/2004
D6.4	Brochure	Brochure	Public	Month 6	30/06/2003
D6.5	Workshop and conference presentations	Presentation	Public	Month 3	15/04/2003 (Steering Committee n°1)
D6.5	Workshop and conference presentations	Presentation	Public	Month 9	09/10/2003 (Steering Committee n°2)
D6.5	Workshop and conference presentations	Presentation	Public	Month 15	23/04/2004 (Steering Committee n°3)
D6.5	Workshop and conference presentations	Presentation	Public	Month 21	19/11/2004 (Steering Committee n°4)
D7.1	Steering Committee n°1	Meeting	Public	Month 3	15/04/2003
D7.1	Steering Committee n°2	Meeting	Public	Month 9	09/10/2003
D7.1	Steering Committee n°3	Meeting	Public	Month 15	23/04/2004
D7.1	Steering Committee n°4	Meeting	Public	Month 21	16/11/2004
D7.2	Report from Steering Committee n°1	Report	Public	Month 5	26/05/2003
D7.2	Report from Steering Committee n°2	Report	Public	Month 11	20/11/2003
D7.2	Report from Steering Committee n°3	Report	Public	Month 17	17/05/2004
D7.2	Report from Steering Committee n°4	Report	Public	Month 23	28/11/2004

## **5. COMPARISON OF INITIALLY PLANNED ACTIVITIES AND WORK ACTUALLY ACCOMPLISHED**

### **5.1.1. WP1 – State-of-the-art: Policy and Research Programmes**

There is no major deviation from the planned activities in WP1. The final version of the deliverable D1 has been presented and discussed with the consortium on the 16<sup>th</sup> of January 2004. Each consortium partner has until the beginning of February to provide WP1 leader with comments. The final version of D1 has been available since mid-February 2004. The final delivery of D1 has therefore been postponed of 4 weeks.

### **5.1.2. WP2 – Emerging Trends**

Like WP1, there is no major deviation from the planned activities in WP2. The final version of the deliverable D2 has been presented and discussed with the consortium on the 16<sup>th</sup> of January 2004. Each consortium partner has until the beginning of February to provide WP2 leader with comments. The final version of D2 has been available since mid-February 2004. The final delivery of D2 has therefore been postponed of 4 weeks.

### **5.1.3. WP3 – Strategies of SMEs**

Work package 3 has slightly modified the original calendar by starting task 3.2 earlier. This was made in order to be able to integrate the skills and competences for SMEs in the questionnaire.

Task 3.2 started already from the beginning in order to consider these aspects in the questionnaire action. Evaluation of questionnaires was postponed by one month because of slow response. The delivery of final version of D3 is postponed by two weeks to give the partners more time for comments, after the Management Committee meeting of the 16<sup>th</sup> of January 2004.

### **5.1.4. WP4 – Challenges to Intermodality**

Work package 4 has been started earlier, in order to be able to use the first meeting of the Steering Committee to foster the initial research of cases.

Due to lacking of some case-studies, the delivery of D4.2 has been postponed to the end of February 2004.

### **5.1.5. WP5 – RTD Roadmaps**

Workpackage 5 was progressing according to schedule.

### **5.1.6. WP6 – Dissemination of results**

Workpackage 6 was progressing according to schedule.



**5.1.7. WP7 – MC and SC involvement and international cooperation**

The major deviation from the planned activities in WP7 is the organisation of the EU-Asia workshop. Due some difficulties mentioned on section, the European Commission finally suggested to re-focus the workshop on Accession countries with the organisation of a Steering Committee meeting in Poland.

## 6. MANAGEMENT AND CO-ORDINATION ASPECTS

### 6.1. EUTRALOG partners

The EUTRALOG project was carried out by the following group of organisations, institutes and companies:

CONSORTIUM OVERVIEW				
Nr	Organisation Name	Country	Organisation Name (Abbreviated)	RTD Role in project
1	METTLE GROUPE	F	METTLE	Project Coordinator WP0, WP6 and WP7 Leader
2	Technische Universitaet Berlin	D	TUB	WP2 Leader
3	Buck Consultants International	NL	BUCK	WP1 Leader
4	The Netherlands Organization for Applied Scientific Research	NL	TNO	WP4 Leader
5	European Logistics Association	B	ELA	WP5 Leader
6	Grimaldi Logística España SL	S	GLE	Project Partner
7	METTLE Deutschland GmbH	D	MDG	WP3 Leader

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## 7. RESULTS AND CONCLUSIONS

The recommendations of EUTRALOG have been prioritised, based on the results of the studies carried out in EUTRALOG, the partners' expertise and the support of the Steering Committee. In general it can be said that the experts are of the opinion that nearly all of the proposed RTD themes and actions can be started at short term and that there is a significant preference for those activities that are expected to deliver results at short term.

The results of the prioritisation also show a strong preference for practical applications; the best practices are considered to act best for instruction and improvement c.f. the methodology of benchmarking which also has proven to be very effective to start and to support improvement processes. Sharing experiences and adaptation of best practices is emphasised as an effective means for improvement.

The top ranking of the action on "best practices of intermodal projects shows that there apparently is a necessity to know more about the application possibilities of intermodality. This confirms the actions already taken by the EC to start a project in the 6<sup>th</sup> frame work on "logistics best practices".

The next best score is the "application of advanced inventory deployment". Here the issue of logistics planning and the use of information technology play an important role and this is predominantly a research project.

It also is remarkable to notice that the need for educational programmes to include intermodality scores very high. This means that the existing education programmes apparently pay insufficient attention to the subject of intermodality and that there is a strong need for further education in this sector.

The high score of the following RTD themes:

- Further development of the Freight Integrator concept
- Identify new intermodal concepts
- Potential value of consolidation centres

does indicate that these are seriously to be considered as potential projects.

The development of ICT systems that act as means of integration of the links in the supply chain is also one of the most important drivers in transport logistics. The backlog in know how and education is a barrier for the required development in this sector.

It is further remarkable that the "dehurrification" project is not considered of high importance though it has a great potential for reducing the share of road traffic and increasing the potentials of intermodality.

Also the organisational RTD themes regarding the situation of the logistics function and its role in companies and society and the research in the innovation processes of transport logistics apparently do not deserve a high priority.

In general overlooking the results it appears that "transport" and "logistics" are still two different disciplines, each focussed on their "own world". Real integration can only be achieved if the barriers between the "external transport" and the "interests of the industrial shippers" disappear, i.e. that a real "open system" based on trust and open information (ICT impact) exchange will exist. In fact the expenses for transport are relatively low compared to the costs of the products. An integrated business model of transport logistics does not exist as far as we know.

As a result of the roadmap analysis these conclusions lead to the following recommendations:

1. The existing gap between the "world of transport" and the interests of the European industrial shippers requires the design of a "**European transport logistics business models**". This will better accommodate future needs, can act as a basis for further development of the European

infrastructure and increase the efficiency and the effectiveness of the European transport logistics operations. This also can serve as a guideline for the European policy makers.

2. On short term a project should be started on making a survey and analysis of the **“best practices of inventory deployment and supply chain operations”**. Learning cases should be build (e.g. examples of best practices in different industries) which can function as ‘standards’ for other companies. The aim should be to create awareness and to make clear that advanced inventory management can contribute to both the company’s economic goals and to the sustainability of the company’s supply chain activities. Best practices can e.g. be found in the application of floating (or rolling) inventory concepts, virtual warehousing concepts, consolidation centres, inbound logistics collaboration, etc. The focus should be on the contribution that these Best Practices have on the sustainability of logistics systems, in combination with the advantages for the businesses involved.

This project should start by creating first a theoretical basis and additionally making the survey selecting best practices. The emphasis in the first part of the project should be on the delivery of the theoretical basis and therefore an important contribution has to be given by universities and consultants. In the second part of the project the main roles are to be fulfilled by shippers and LSPs where already stock control is carried out. The approach can be similar to benchmarking projects and results can be expected at short term.

3. An RTD study should be started **“to design course material on logistics which includes intermodality”**. Intermodality should be a fixed issue on the mental map of logistics professionals. Therefore RTD should focus on determining what specific intermodal subjects should be included in the logistics education programmes (both academic and practical). Also RTD could be focused at determining the potential and necessity of setting up a European Intermodal Logistics education programme (e.g. like the current ELA general logistics education standards).

New approaches to form and content are needed because the actual structure and approach of the traditional education system shows insufficient results in the transport sector.

The best approach seems to assign this to one or two logistics associations which have experience in course development and already apply the European levels in logistics education as implemented by the European Certification Board on Logistics (ECBL).

4. Projects have to be prepared for RTD on:

- **Further development of the Freight Integrator concept**

The already ongoing Freight Integrator or Supply chain integrator developments need further RTD actions aiming at e.g. the adaptation by the industry, educational requirements within potential freight integrators, the role of and relationship with those companies that do not become integrators the relationships between different transport modes within and between different LSPs and the way it is organised. For many LSPs setting up intermodal concepts is real innovation. This should include the position of SMEs in this development, the acceptance by shippers, etc.

- **Identify new intermodal concepts**

Little is known on how innovation takes place in transport and logistics. The transport and logistics industry invests little in innovation. It is often claimed that the industry does not have the means to invest in innovation. This might be the overall picture, but while the returns for hauliers are limited, other logistics segments are profitable enough. The big innovations in logistics (e.g. JIT, RFID) did not come from the transport and logistics industry, but from shippers (Toyota, Wall-Mart). Maybe, the contribution of the industry to innovation is via investments in R&D intensive products like the state-of-the-art trucks or ICT-tools. A number of questions arise on the innovation processes in transport and logistics: how does innovation

take place, in which segments? Should we look at the transport and logistics industry if it comes to innovations in logistics, or at shippers?

- **Potential value of consolidation centres**

These are RTD themes which require careful preparation and an international multi-disciplinary team approach. In the case of the potential consolidation centres there is a great impact on the design of rail and road systems and therefore on the European infrastructure. These projects increase the insight in the need for future infrastructure.

5. It is highly recommended **to improve the dissemination process** of the results of the various EU projects. Only the internet appears to be not sufficient in particular when SMEs and shippers need to be reached. Additional communication lines / methods need to be used to utilize the full benefits of the projects.

Regarding the involvement of stakeholders, based on the enquiries and analysis and on the results of the other Work Packages the following recommendations can be made:

**1. Establish closer ties between the EC, in particular DG TREN and the national ministries.**

The national initiatives on improvement projects should be known and the results disseminated to other countries in order to create synergies and to avoid duplication of efforts. A structural communication has to exist between all the stakeholders like the “Transport Programme Committee on Research”, an initiative of DG Research. However not all involved DGs participate and therefore some areas remain out of the scope of this committee. Intensification of the internal communication between the different DGs could contribute to solve this problem.

**2. Participants of relevant stakeholder groups should be involved in EU projects.**

This can be achieved by setting up a sustainable EU logistics network where all stakeholder groups are represented.

The basis can be a “transport logistics platform” where a strategic research agenda is being discussed, priority issues can be identified and which enables a common European approach.

All stakeholders should participate in this platform so the dissemination of results can be facilitated and implementation accelerated.

**3 The level of knowledge on transport logistics has to be increased especially in SMEs.**

Stimulate the participation of schools and universities in logistics projects where SMEs are involved and have trained logisticians execute assignments in (small) companies even on a temporary basis.

**4 The relation between universities and enterprises has to be improved.**

Stimulate the RTD focussed on the requirements of the companies and have this prevail in some cases over the RTD with a strong emphasis on fundamental research. Chose for a thematic approach when stimulation innovations in companies and promote the creation of pilot projects.

**5 In order to promote the implementation of supply chain management in European companies the co-operation between companies has to be improved and to achieve this to assign “middle men” for these functions.**

**6 Create a European “knowledge data base” on transport logistics which is easily accessible via the Internet.**

This requires a multi disciplinary project approach. In particular the results and experiences of pilot projects is of high interest and very valuable to shipping companies and can also serve as a means of



education in transport logistics. For example the experiences collected with new technologies as RFID and E-business can be much faster implemented.

**7 An information data base should be made and be Internet accessible of the all the EC RTD projects.**

Distinction to be made between the projects in preparation (only accessible to a restricted circle of persons), projects in the phase of tendering, projects in course of execution and projects recently finished.

**8** In many cases when comments by the interest associations are being required on EC proposals the time period available for consulting their members often is insufficient. In this situation the quality of the response of the stakeholders might suffer. It is therefore recommended to have sufficient time available to collect the opinion of the stakeholders when making proposals for the European Parliament.

**9** As long as in the European rail situation every country remains in control of the traffic on their territory and moreover the technical harmonisation is still far away the chances for intermodal transport remain very little. The EU should firmly take initiatives to improve the performance of European rail transport which then will be in a position to achieve the efficiency comparable to the USA.

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## APPENDIX A: STEERING COMMITTEE

### *Steering Committee involvement*

The Steering Committee has been built. METTLE was in charge of finding potential members and carrying out the administrative procedures concerning the formal involvement in the EUTRALOG project (through subcontracts to METTLE Groupe). The members are:

- Thomas Miller & Co Ltd - UK
- Universidade Portucalense Infante D.Henrique-Cooperativa de Ensino Superior (Uportucalun) - Portugal
- Zentrum fuer Logistik und Unternehmensplanung (ZLU) - Germany
- Research Center Athens University of Economics and Business (RCAUEB)- Greece
- Institut fuer Seeverkehrswirtschaft und Logistik (ISL) - Germany
- FREIGHTFORWARD EUROPE (FFE) - Belgium
- Chalmers University - Sweden
- Roskilde University, Department of Environment, Technology and Social Studies (RUC) - Denmark
- Logistics Pool Austria - Austria
- TECHNION – Israel Institute of Technology - Israel
- Stratea Consulting - Italy
- INCERTRANS - Romania
- CDV Transport - Czech Republic
- Istituto di Studi per l'Integrazione dei Sistemi (ISIS) – Italy

The Institute of Logistics and Warehousing, as coordinator of the POLLOCO project, is also member of the Steering Committee but will not be reimbursed of their participation as the other members are.

A handbook has been prepared to the attention of the Steering Committee members, presenting the global scope of EUTRALOG, its structure, the role and duties of the Steering Committee, and the administrative procedures.

## APPENDIX B: INDUSTRY WORKSHOPS

Three industry workshops were organised. The industry workshops were used to validate the results of the (ongoing) research activities and to gather and discuss the views and opinions of lading shippers and logistics service providers in Europe with respect to the barriers to the development of intermodal transport and the organisation changes required to promote the use of intermodal transport.

### Industry workshop 1: Views and opinions of shippers

The workshop was held on August 28, 2003 in Rotterdam (the Netherlands).

	Company	Name
1	AVEBE	Mr. J. Poelman
2	Coca Cola Enterprises	Mr. P. Cosman
3	Dow Europe	Mr. H. van Duyse
4	Philip Morris	Ms. I. Janssen
5	Philips International	Ms. E. Liskamp
6	Philips Lighting	Mr. J. Brans
7	Rockwool	Mr. J. Schmitz
8	Shell Chemicals	Mr. E. van der Werff

### Industry workshop 2: Views and opinions of Logistic Service Providers

The workshop was held on January 21, 2004 in Brussels (Belgium) and hosted by FFI.

	Company	Name
1	ABX Logistics	Mr. P. Wouters
2	DHL Freight	Mr. B. Selmoni
3	Exel	Mr. G. Jaburg
4	Geologistics	Mr K. Karl
5	Panalpina	Mr. C. Steinle
6	Schenker	Mr. S. Eriksson
7	FFI Secretariat	Ms. K. Otten

### Industry workshop 3: New member states perspective: case of Poland

The workshop was held on April 23, 2004 in Warsaw (Poland). The workshop was organised in collaboration with the Institute of Logistics and Warehousing

	Company	Name
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1	Chem Trans Logistic	Mr. Z. Golebiewski Mr. A. Podwysocki
2	Gefco	Ms. A Galewska
3	Institute of Logistics and Warehousing	Mr. M. Tumas
4	Nijhof Wassink	Mr. T. Debski
5	OBET	Ms. E. Miazga
6	Philips	Mr. T. Markowski
7	Prologis	Mr. M. de Jong-Douglas
8	Spedcont	Mr. A. Olczyk