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TO THE COUNCIL, THE EUROPEAN PARLIAMENT,  
THE ECONOMIC AND SOCIAL COMMITTEE  
AND THE COMMITTEE OF THE REGIONS

**INTERMODALITY AND INTERMODAL  
FREIGHT TRANSPORT  
IN THE EUROPEAN UNION**

*A SYSTEMS APPROACH TO FREIGHT TRANSPORT*

*STRATEGIES AND ACTIONS TO ENHANCE  
EFFICIENCY, SERVICES AND SUSTAINABILITY*

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## EXECUTIVE SUMMARY

1. An efficient transport system is an essential prerequisite for the European Union's competitiveness. With the projected growth of international trade, the possible extension of the Union to the Central and Eastern European countries and enhanced cooperation with the Mediterranean countries, the role of transport will become even more important.
2. Since 1970 European freight transport has increased by about 70 %. Annual growth of about 2 % is expected for the next two decades. Present figures put the costs of traffic congestion at 120 billion ECU or 2 % of the EU GDP. Accidents, air pollution and noise amount to a further 2 %. These costs undermine European competitiveness, when transport demand requires flexibility, reliability and cost-effectiveness.
3. Unless the transport sector considers mode-independent service requirements and utilizes spare capacities in other modes, road transport is likely further to increase its present market share of 72 % (from almost 50 % in 1970). The share of rail transport has since 1970 decreased from about 32 % to less than 15 % in 1995. This decline is likely to continue if present trends persist.
4. In order to achieve socio-economic and environmental sustainability, the efficient and balanced use of existing capacities throughout the European transport system has become a key challenge.<sup>1</sup>
5. The policy instruments used for a "business as usual" approach cannot solve the future problems associated with transport. The present approach must therefore be changed into a systems approach.
6. The promotion of Intermodality is a policy tool enabling a systems approach to transport. Transport services are offered as mode-independent door-to-door connections based upon a range of viable modal transport alternatives by making a new, efficient use of the transport system, reducing transport costs and allowing the generation of added value.

**The objective is to develop a framework for an optimal integration of different modes so as to enable an efficient and cost-effective use of the transport system through seamless, customer-oriented door-to-door services whilst favouring competition between transport operators.**

7. A number of obstacles have been identified which prevent the extensive use of intermodal transport. These include the lack of a coherent network of modes and interconnections, the lack of technical interoperability between and within modes, a variety of regulations and standards for transport means, data-interchange and procedures. There are uneven levels of performance and service quality between modes, different levels of liability and a lack of information about intermodal services. As a result, mode-independent door-to-door transport is underdeveloped.
8. Implementing a European intermodal transport system requires coordinated development of transport policy on European, national and regional level. Four key strategies will provide the necessary impetus to the development of intermodal transport in the overall context of the Common Transport Policy (see table 1).

<sup>1</sup> The Community thus inter alia aims at the "right balance of policies favouring the development of coherent, integrated transport systems for the Community as a whole." (see White paper: The future development of the common transport policy - A global approach to the construction of a Community framework for sustainable mobility, ISBN 92-826 5911-9, §40b)

**Table 1: Key issues of intermodality**

- A European strategy on infrastructure: trans-European transport networks and nodes
- The Single transport market: harmonisation of regulation and competition rules
- Identification and elimination of obstacles to intermodality and the associated friction costs
- Implementing the Information Society in the transport sector

9. Since intermodal transport is more data-intensive than conventional transport, the Information Society's role in transport is of crucial importance. Computer Aided Transport CAT - the use of information and communication technologies - is key to efficient and customer oriented transport services. Open and flexible information and decision support systems are changing the way transport is organised and managed and will enhance present and create future market opportunities. In addition the use of the information infrastructures and the development of additional specific capacities for intermodal operations will increase the attractiveness of the new approach.

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

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

11. The Commission will take the necessary initiatives where regulatory or legal issues are concerned. While respecting the principle of subsidiarity, the Commission will also address areas where intermodality depends on coordination at European level (see table 2).

**Table 2: Key actions towards intermodality**

<b>Integrated infrastructure and transport means</b> <ul style="list-style-type: none"> <li>➤ Intensify intermodal design of the trans-European transport networks</li> <li>➤ Enhance design and functions of intermodal transfer points</li> <li>➤ Harmonise standards for transport means</li> </ul>
<b>Interoperable and interconnected operations</b> <ul style="list-style-type: none"> <li>➤ Integration of freight freeways in an intermodal context</li> <li>➤ Development of common charging and pricing principles</li> <li>➤ Harmonise competition rules and state aid regimes on an intermodal basis</li> </ul>
<b>Mode-independent services and regulations</b> <ul style="list-style-type: none"> <li>➤ Harmonisation and standardisation of procedures and EDI</li> <li>➤ Intermodal liability</li> <li>➤ Research and demonstration</li> <li>➤ Benchmarking</li> <li>➤ Intermodal statistics</li> </ul>

12. Together with other policies already proposed by the Commission, the actions proposed in this communication are aimed at eliminating the current barriers to the development of intermodal door-to-door transport, and thereby promote a greater use of environmentally friendly modes of transport with spare capacity. By improving the potential of rail and waterborne transport and by offering, where appropriate, effective alternatives to unimodal road journeys, intermodality will help to overcome congested road networks. Performance improvements in railways, the full internalisation of external costs and the promotion of intermodality are part of an overall strategy for sustainable mobility.

## Chapter 1 The concept of Intermodality

13. Because of growing freight traffic and an increasing imbalance in the use of the various transport modes and infrastructure, the transport system in the European Union is showing signs of inefficiency from a socio-economic point of view. Increasingly, freight transport appears as a source of environmental and social costs to its citizens.

14. The “business as usual” scenario, based on modal policies, is unlikely to be able to cope with the complexity of today’s and tomorrow’s mobility requirements in a sustainable manner. An overall systems approach is called for. The furthering of intermodality is a promising and innovative policy tool which can support an overall transport systems approach aimed at a more balanced and efficient use of the available transport capacity (infrastructure, rolling stock, handling equipment etc.).

15. In order to create a common understanding of the concept of intermodality, the Commission proposes the following definition of intermodality. Intermodality is a characteristic of a transport system, that allows at least two different modes to be used in an integrated manner in a door-to-door transport chain.

16. Intermodality<sup>2</sup> is a quality indicator of the level of integration between the different modes: more intermodality means more integration and complementarity between modes, which provides scope for a more efficient use of the transport system. The economic basis for intermodality is that transport modes which display favourable intrinsic economic and operational characteristics individually, can be integrated into a door-to-door transport chain in order to improve the overall efficiency of the transport system. The integration between modes needs to take place at the levels of infrastructure and other hardware (e.g. loading units, vehicles, telecommunications), operations and services, as well as the regulatory conditions (see figure1)).

**The objective is to develop a framework for an optimal integration of different modes so as to enable an efficient and cost-effective use of the transport system through seamless, customer-oriented door-to-door services whilst favouring competition between transport operators**

17. Intermodal policy should provide the framework in which the transport user himself can decide the optimal use of the different transport modes. The door-to-door approach of intermodal transport will therefore entail a strong consideration of the transport user’s requirements.

<sup>2</sup> Intermodal transport can then be understood as the movement of goods whereby at least two different modes are used in a door-to-door transport chain.

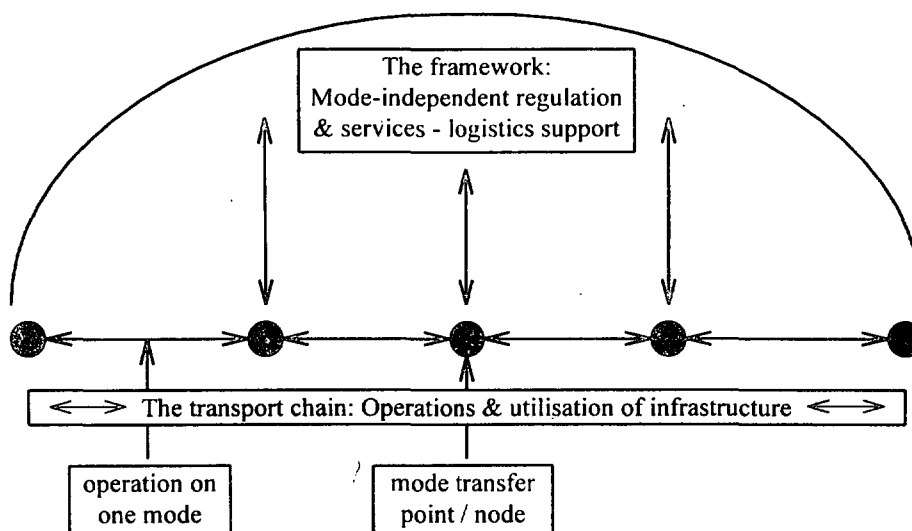
The Commission’s understanding of intermodality and intermodal transport goes beyond earlier definitions that have been put forward by several institutions. The definitions proposed by the European Conference of Ministers of Transport restricts intermodal transport to unitised transport, while unitisation is but one possible, though important, means to facilitate the transfer of goods between modes. Regarding combined transport the EU uses e.g. in the framework of Directive 92/106 a more restricted definition, aiming to promote only such types that limit road use in specified ways.

Intermodal transport (ECMT): The movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes.

Combined transport (ECMT): Intermodal transport, where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final leg carried out by road are as short as possible.

18. Intermodality is not bound to certain modes. It is a trading and mobility issue in which rail, water, air and road are called on to contribute to the optimisation of the whole, where they are supported by advanced information and communication services. On the level of transport operations new services, information and communication technologies will improve the utilisation of the existing capacities.

*Figure 1: The Intermodal Transport Chain*



Source: CEC

19. Intermodality clearly is not about forcing a specific modal split. However, by improving the connections between all modes of transport and integrating them into a single system, intermodality allows a better use to be made of rail, inland waterborne transport and short sea shipping which, by themselves, in many cases do not allow door-to-door delivery. Intermodality is, therefore, complementary to other EU transport policies such as liberalisation of transport markets, developing the TENs and the promotion of fair and efficient pricing.

## Chapter 2 Logistics: The complexity of demand

20. Freight transport is a derived demand. It is therefore part of the economic process. The requirements of industrial processes have changed drastically during the past 10 years and can be characterised by global competition, shorter production processes and product-life-cycles and the need to cut costs. The use of just-in-time delivery, customised production and the concentration of supply- and distribution centers has led to a close interrelationship of production and distribution processes and transport, aimed at high service performance, reduced time-to-market and lower costs. At the same time, competition in global markets has increased the number of players and the geographic scope of the supply- and distribution chains.

21. Efficient logistics have become a crucial factor of competitiveness.

**Logistics can be defined as managing the flow and storage of raw materials, work-in process, finished goods and the associated information from the point of origin to point of final consumption in accordance with customers requirements. In a wider sense it also includes the recovery and disposal of waste.**

22. Transport plays a major role in the logistics and service quality of the overall supply and distribution chain. Freight transport has to meet increasing quality requirements in terms of flexibility, speed and reliability in order to deliver the goods at a precise time and place. This includes the movement of goods as well as storage/warehousing functions, packaging or customisation. Depending on the type of good, logistics costs can account for up to one third of the final market price, although this proportion is often smaller and has generally decreased over the last decades. About one quarter of these can be transport-related costs.

23. Taking into account the complex interaction of sourcing; suppliers, manufacturers, retailers and consumers, intermodality will allow the integration of a broad range of transport services in the supply- and distribution chains.

24. Well functioning information and communication flows are indispensable for the management of multi-party supply- and distribution chains. They allow pre- and on-trip information exchange, including service availability, negotiation procedures, tracking and tracing, information on disruptions and the flow of transport documents. Advanced services such as real-time information accelerate the information flow and make it more reliable which enhances service quality.

25. As a result of business strategies which concentrate on core-competences, third party logistics services are a growth market. Specialised logistics service providers stem from production management, warehousing or transport operations. They are entering the market in greater numbers. Their function is to offer sector and customer-tailored solutions for integrating intra-company flows of material and goods with inter-company transport procedures. Increasingly, they will play a major role in defining transport demand requirements on behalf of their industrial clients, and explore how transportation can add value to the overall logistics chain.

### **Chapter 3 Obstacles to the use of Intermodal Freight Transport**

26. In the current modally-oriented transport system, any change of mode within a journey involves a change of system rather than just a technical transshipment. This creates friction costs which can make intermodal transport uncompetitive in comparison with unimodal haulage.

**Friction costs are a measurement of the inefficiency of a transport operation.**

They are expressed in the form of

- higher prices,
- longer journeys, more delays, or less reliability on time,
- lower availability of quality services,
- limitations on the type of goods,
- higher risk of damage to the cargo,
- more complex administrative procedures.



27. In order to make intermodal transport attractive for the user, friction costs must be identified, quantified, qualified and reduced.

28. At the same time, logistics services within the intermodal transport chain will need to provide added value in order to offset friction costs. The nodes and transfer points in the network should be particularly well suited to offering services such as warehousing, information management or product customisation. The market must be able to identify and exploit these opportunities, and intermodal transport policy must eliminate any bottlenecks which may prevent operators from realising such opportunities.

29. Intermodal transport users incur friction costs because of lack of interconnectivity at three levels:

- (1) infrastructure and transport means,
- (2) operations and the use of the infrastructure, especially terminals, and
- (3) modal based services and regulations.<sup>3</sup>

### **3.1. Infrastructure and transport means**

30. For a number of high density corridors in Europe, a coherent network of modes and interconnections between the modes is lacking. Missing stretches of infrastructure within one mode or missing links between modes, however small they might be, can prevent seamless intermodal chains. They impose additional transfer and friction costs on operators. Inadequate access by rail, road or waterborne transport to existing transfer points can hamper the integration of these modes and transfer between modes. They can also prevent an efficient dispersion of large volumes into smaller ones, e.g. on intercontinental or long-distance transport.

31. Because the current system is financed and managed separately for each mode, responsibility for strengthening the links between them is unclear. Moreover, the existence of different forms of ownership and charging for the use of infrastructure and terminals does not facilitate a transparent and co-ordinated infrastructure planning at local and regional level, let alone at European level.

32. Intermodal transport is as strong as the weakest link in the transport chain. Therefore, the lack of interoperability within some modes poses significant problems. The obstacles are well documented. For example, the different railway signalling systems and loading gauges, and different bridge heights along Europe's inland waterways are hindrances.

33. Technical specifications for transport means are often regulated differently by country and by mode, which also raises questions of interoperability. In addition, individual operators have a tendency to acquire the rolling stock and/or vehicles which suit their operation and choice of loading units. Dealing with a variety of vehicle types for different operators is a source of congestion at terminals and causes inefficiency. Different measurements for transport means and infrastructure lower the levels of interoperability between different modes as well, for example between air and rail cargo.

34. The wide variation of loading unit dimensions across modes is another factor which reduces interoperability between modes. The incompatibility of the transport equipment for road, rail, short sea and inland waterway traffic raises transfer and handling costs and necessitates cumbersome transshipment techniques. If left unchanged, the growing complexity of the logistics

<sup>3</sup> The obstacles and friction costs have been discussed and to a large extent listed by industry experts within the Task Force Transport Intermodality.

requirements, and the projected growth in international trade, will reinforce the tendency of transport units to diverge. The use of specialised loading units will increase the occurrence of their empty returns.

### **3.2. Operations - The use of the infrastructure**

35. The weakest links in the current intermodal transport system and a major generator of friction costs, are the points of transfer between modes. One reason is the lack, or inadequacy of technical interoperability between modes and loading units. Another is that present-day terminals, which are usually marked by a combination of heavy engineering and manual processes, are not managed efficiently with appropriate telematics support. Also, functionalities such as the identification of vehicles, loading units and cargo, or the advance information for disposition purposes are often not available on an intermodal basis. In order to minimise the risk of a break in the intermodal chain, operators increasingly set up their own dedicated terminals. Although this increases their control, it also raises the cost of the door-to-door transport service to the user, particularly when there is no optimal utilisation of capacity.

36. Road, rail, air and waterborne transport are marked by unequal levels of performance and service quality. This is due partly to intrinsic differences in their cost structures, but also to diverging levels of competition and liberalisation within each mode. The user perceives road haulage as the benchmark for freight transport in Europe: it is competitive and dynamic and continues to improve service performance and reduce operational costs. Modes where operators are confronted with a high threshold for access to their infrastructure tend to involve a monopolistic behaviour resulting in a lack of customer-oriented operations and sub-optimal use of capacity. Operators, who receive state aid and who are not challenged within a mode may be tempted to use the revenues from their dominant position to cross-subsidise their operations in another mode, thus distorting competition.

37. Because operators own their own fleets or even infrastructure, they often tend to stay to one mode of transport and disregard better options which may exist on other modes. They do not coordinate their information and marketing activities and in many cases are not fully able to control all the operations and activities that take place within the transport chain from door to door.

38. An added source of friction costs in intermodal transport is the unequal levels of working time in each mode. The problem is not only the effective duration of work, but also the lack of flexibility for arranging the working time of drivers and crews in ways which will match the operations between modes. This is particularly valid for terminals. As an interface between modes, terminals are not always able to respect the schedules of trains and ships which operate 24 hours a day.

39. Potential intermodal transport users may be discouraged by unnecessary delays in the transport chain due to the non-alignment of timetables between modes. A consignment which remains idle for several hours, even days, while it is waiting to be transferred to the next mode adds friction costs compared to unimodal transport.

### **3.3. Modal-based services and regulations**

40. The absence of a systematic network for data interchange along the entire intermodal transport chain is a source of high costs and service deficiencies. It has given rise to the progressive growth of modal and local systems, and in-house procedures. Existing modal-based information transmission systems require users to re-enter similar data at each interface, possibly according to

different message or EDI standards. The lack of generalised systems for electronic communication between the different partners in the intermodal chain prevents sufficient forward and just-in-time planning of operations. The absence of systems which enable tracking and tracing during the whole journey across modes, does not allow for a quick detection of errors and false routings.

41. In the event of damage to cargo, it is difficult for intermodal transport users to determine who in the transport chain is ultimately responsible for the failure, given that international transport in Europe is regulated by different liability conventions for each mode.<sup>4</sup> Operators in one mode have a higher degree of liability than those in another mode. The situation is further complicated by the special liability regimes that countries still have in Europe for national transport.

42. The competitiveness of intermodal transport is also being hampered by administrative bottlenecks. Transport documents are to a large extent still based on paper and differ according to specific modes, as e.g. in maritime, rail, road or air transport. The rules for customs transit operations also differ according to the mode.

43. In order to guarantee that goods will arrive at their destination within the given timeframe, intermodal transport requires a full and effective management and control of the door-to-door chain. However, users claim that, since most transport operators are modal-based, they are not fulfilling this management and control function. This is partly explained by the competitiveness and flexibility of road transport in Europe. Another reason is that new intermodal services may require more planning than alternative single-mode journeys, inter alia because of the need to ensure that sufficient demand is available to support regular services. A further reason is a possible lack of awareness of the potential benefits of intermodal transport and a desire of operators to optimise the use of their own assets and vehicles.

### 3.4. Conclusion

44. In conclusion, intermodal freight transport in Europe today seems unable to meet the increasingly complex logistics requirements of an economy which operates in a competitive and global market. Transfers between modes generally create too many friction costs and do not allow sufficient scope for offering value added services in the door-to-door chain. A better use of all infrastructure across the different modes will therefore become imperative, particularly in view of the projected growth of freight transport.

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<sup>4</sup> Maritime Transport: Hague - Visby Rules 1968  
 Air Transport: Warsaw Convention 1929  
 Rail Transport: Convention on the Contract for the International Carriage of Goods by Rail (CIM) 1985  
 Road Transport: Convention on the Contract for the International Carriage of Goods by Road (CMR) 1956

## Chapter 4 Europe's Intermodal Freight Transport System: Steps towards realisation

45. The challenge for policy makers is to provide a policy framework for an optimal integration between transport modes. Interoperability and interconnectivity will enhance the efficient and effective use of transport infrastructure and capacity. This will facilitate customer-oriented door-to-door transport services which draw on the strengths of each mode.

**The Commission advocates an intermodal transport system which encourages co-operation and complementarity between the transport modes and which favours competition between transport operators.**

46. The actions described below represent steps which need to be taken to realise a truly intermodal transport system in the long term. These actions will require the commitment of policy-makers and those involved in the transport market.

47. The actions can be grouped in four areas:

- A. Integrated infrastructure and transport means
- B. Interoperable and interconnected operations
- C. Mode-independent services and regulations
- D. Horizontal activities

### A. Integrated infrastructure and transport means

#### **4.1. A coherent infrastructure network at European level**

48. Infrastructure planners and managers in Member States should co-operate more at a European level on a cross-modal basis in order to establish coherent infrastructure networks. The definition of intermodal links will result in a European network of transfer points, based on criteria which take into account the actual and prospective flows of goods, the requirements of the supply- and distribution chains, and land-use and environmental constraints.

49. In the long term, this co-operative strategic approach at European level should lead to an intermodal infrastructure network which provides for interoperability as well as interconnectivity between the modes (i.e. at a systems level). This approach should assess the potential integration of local and regional infrastructure programmes into the European-wide framework. The feasibility of reviving available but unused infrastructure at relatively low cost should be discussed with the Member States with a view of bridging any missing links.<sup>5</sup> Furthermore, the importance of evolving operational and service concepts for the overall transport chain and for the functions of transfer points on short- and medium-hauls should be taken into account.

#### ***Action: Revision of the trans-European transport networks***

50. The Community has recognised the need for a network approach to transport infrastructure planning<sup>6</sup> and has consequently adopted the Guidelines for Trans-European Transport Infrastructure Networks (TEN-T)<sup>7</sup>. The first general revision of the 1996 TEN-T guidelines,

<sup>5</sup> A number of European RTD actions, such as EUFRANET (rail) or EUDET (inland waterways) can provide valuable input in this regard.

<sup>6</sup> Article 129b of the EU Treaty, White Paper: "The future development of the common transport policy".

<sup>7</sup> Decision on Community guidelines for the development of the Trans-European transport network (Decision Nr 1692/96/EC of 23 July 1996,

envisaged for 1999, will reinforce the intermodal design of the TENs. The European Commission has therefore set up a Multimodal Working Group with experts from the Member States. This group will develop an intermodal outline plan for all modes of transport and will propose criteria locating interconnections and terminals. The work will take account of the results of ongoing research projects<sup>8</sup> related to intermodal policy and transport concepts. Examples include the EMOLITE (Evaluation Model for the Optimal Location of Intermodal Terminals in Europe), IQ (Quality Improvement of Intermodal Networks and Terminals) and IMPULSE (Technological Improvements in Intermodal Networks and Terminals) projects.

#### **4.2. Value adding interconnections and nodes**

51. The points of transfer between modes will be the nodes of the intermodal network. Activities and services there should add value to the overall transport chain. Some of these nodes will become centres of economic activity, integrating regional economic supply and demand potential into competitive logistics structures and markets. The establishment of production or product customisation facilities, the networking of local supply-chains and the organisation of distribution patterns centered around nodal points will take these nodes beyond simple transport-related functions. For transport service providers and transport operators, support functions such as the possibility of returning (leased) vehicles or loading units for a range of modes could be an interesting argument in support of intermodal transport.

52. New transshipment concepts and enhanced automation can reduce friction costs for users by speeding up transfers between modes. They will allow for an efficient dispersion of high density transport flows into lower density regional flows. They will also increase the opportunity for consolidating transport flows from different origins into common flows on the principal networks. Terminals and nodes will function as interfaces between high volume transport corridors and low volume regional and local networks.

#### *Action: Identification of opportunities and elimination of bottlenecks for adding value to logistics*

53. The Commission will support a study and finance demonstration projects on the opportunities for providing logistics services in the transfer points, and the potential of these services for adding value to the overall supply and distribution chain. The study will highlight the requirements for integrating transport and logistics, and, in this regard, will assess the economic efficiency of nodes and transfer points. The Commission will take appropriate initiatives with the sector, e.g. the establishment of Round Tables, to eliminate possible bottlenecks such as restrictive opening hours or burdensome administrative procedures.

#### **4.3. Harmonised standards for loading units**

54. The variety of loading units (such as containers of different sizes, swap-bodies) should be assessed according to the requirements of intermodal transport and their users. Harmonisation of standards for sizes, weights and other features across modes will facilitate intermodal transfers for a high proportion of goods to be transported. New loading units, especially for smaller consignments, and flexible transshipment technologies will allow modular capacity planning and utilisation. Flexible leasing solutions will enhance innovation and enable transport operators to reduce their fixed costs. The more efficient use of loading units in pooling or circulation systems will contribute to higher load factors and avoid empty hauls.

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Official Journal, L228, Volume 39, 9 September 1996)

<sup>8</sup> Part of the Transport programme in the 4th Framework Programme for Research, Technological Development and Demonstration 1994-98

***Action: Steering the process of harmonisation of loading units***

55. Whilst respecting the existing EC-legislation for dimensions for road trucks and buses<sup>9</sup>, and building on the work of different standardisation bodies, the Commission will set up working groups with different market sectors to analyse bottlenecks and the opportunities for harmonising the standards of loading units across transport modes and industries in Europe. Given the importance of global trading practices, harmonised standards will need to be identified and developed. They will also need to take account of the impact of vehicle certification on the interconnectivity between modes. The conclusions of a study on the impact of different standards for rolling stock, vehicles and vessels will be included. The work will result in a definition of best practices and strategies for harmonisation efforts. The Commission intends that it should then act as a driving force in the relevant standardisation bodies and international organisations.

**B. Interoperable and interconnected operations**

**4.4. Intermodal freight operators**

56. Europe's transport market will see intermodal operators compete with each other across modes and increase their market-share. In addition to operators specialised in carrying goods on certain modes of transport, a new generation of integrated operators will provide transport services on a door-to-door basis. These operators will have a neutral view of the different modes. They will try to find the most cost-effective combination of modes and services, in such a way that it adds the most value to the entire supply chain. Their services will be tailored to the needs of the end-user and will include a full control of the operations and management of the information on the goods transported from door-to-door.

57. Management and control of the complete door-to-door chain will be essential. In order to achieve this control, the integrated operator will either have to operate the vehicles in which the goods are carried (carrier-type) or ensure the control through the effective organisation of the chain and management of the relevant information (freight forwarder-type).

***Action: Market analysis aiming at further integration of transport and logistics***

58. The Commission will conduct a survey of the various types of actors in the transport market, analysing their size and the type of services they offer or require. The survey will identify the obstacles and opportunities that each type of actor faces in order to fulfil intermodal transport functions and meet logistics requirements. It will highlight the commercial, technical and regulatory areas where there is scope for action by the authorities or the actors involved in the market.

***Action: Prolongation of PACT***

59. The PACT programme<sup>10</sup> (Pilot Actions for Combined Transport) supports operators in launching market-oriented and innovative projects in the field of combined transport (rail, road, inland waterways and coastal shipping). Under the first PACT programme (1992 - 1996), 66 projects on 33 routes in all Member States were co-financed. The Commission has proposed to extend the programme until 2001 and has included Short Sea Shipping as an additional mode.

<sup>9</sup> Directive 96/53, O.J.L. No. 235, 17.09.96

<sup>10</sup> Commission Decision concerning financial assistance to pilot actions for combined transport 93/45/EEC of 22.12.92, O.J. No. 16, 25.01.93, and the Proposal for a Council Regulation concerning the grant of Community financial assistance for actions to promote combined goods transport, COM(96) 335 final, 24.07.1996, O.J. No. 343, 15.11.1996

#### 4.5. Open access to infrastructure

60. The separation of infrastructure management and operations will guarantee open and non-discriminatory access to the network to new and existing operators.<sup>11</sup> It will include an adequate level of transparency as far as infrastructure charges and rules are concerned.

##### *Action: Integration of rail freight freeways in an intermodal context*

61. The issue of open access to infrastructure for all licensed operators is particularly relevant in rail. The Commission proposed the creation of trans-European Rail Freight Freeways, characterised by open access and the removal of a wide range of obstacles to international traffic<sup>12</sup>. The idea is being implemented by railway companies, Member States and shippers. The first freeways are expected to become operational before the end of the 1997. As the freeways are likely to become an important element of the intermodal transport system, the Commission will give priority to their development<sup>13</sup>.

#### 4.6. Infrastructure charging and transport pricing

62. Taxes and charges are currently set in very different ways across different modes of transport and there are large differences in the extent to which infrastructure and external costs are covered<sup>14</sup>. This causes two problems. First, modal choices are distorted, due to different cost coverage ratios and the use of different bases for cost imputation (e.g. average, marginal costs and lump sum charge). This leads to inefficiencies in combining different modes in an intermodal transport chain. Secondly, the existence of different pricing systems, which have developed along purely modal lines, implies that the charges for the constituent parts (e.g. road and rail) are based on different and sometimes conflicting principles. It is therefore generally hard to establish the price base for the intermodal operations. This is hindering the very development of intermodal services.

##### *Action: Development of common charging and pricing principles.*

63. The Commission will develop common charging and pricing principles for the different modes. The development of such a set of principles will obviously have to be gradual and take account of the specifics of the various modes. The objective is to evolve existing legislation and develop new legislation where required with a view to ensuring a greater degree of homogeneity in underlying principles for infrastructure charging.

#### 4.7. Intermodal transport and competition

64. Basic principles will have to apply to all transport operators, irrespective of the mode in which they operate. This should create a level playing field across Europe for all transport modes. The autonomy of the operator will be maintained. Operators undertaking business at their own commercial and financial risk should not find themselves unduly disadvantaged by competitors who enjoy state aids.

<sup>11</sup> For rail transport see Art. 6 and 10 of Dir. 91/440/EEC, Dir. 95/19/EC and Dir. 95/18/EC.

<sup>12</sup> European Commission White Paper: "A strategy for revitalising the Community's railways", COM(96) 421 final, 30.07.96, and COM(96) 421/2 final June 1996

<sup>13</sup> see the Communication on trans-European Rail Freight Freeways [COM(97)242 final] 29.05.1997

<sup>14</sup> see Green Paper on Fair and efficient pricing (COM(95) 691 final)

65. New rules will need to address the competition between intermodal operators which operate in several modes at the same time. A key element will be the scrutiny and regulation of any abuse of dominant positions by carriers and operators. Examples of illegal practices by dominant players, which carry heavy fines under EC law, include the cross-subsidisation of revenues from operations in one mode in order to eliminate competition in another, structural foreclosures of markets, predatory pricing and the exploitation of sub-contractors.

***Action: Revision of Regulation 1107/70 with regard to aid in combined transport***

66. The Commission will propose the necessary modifications to update Regulation 1107/70<sup>15</sup> which, among others, covers aid to combined transport. The update will bring the Regulation in line with recent developments and take account of the need to improve the competitiveness of combined transport. At a later stage the Commission will undertake a general revision of Reg. 1107/70 in order to create a coherent framework for aid in all inland transport modes.

***Action: Intermodal guidelines for state aid***

67. Furthermore, the Commission will continue to examine several existing state aid regimes in transport and assess their potential for distorting the transport market and to ensure that any state aids given within one mode do not affect the efficiency of intermodal transport chains. Where necessary, it will revise existing state aid regimes. The Commission will also examine the possibility of defining guidelines for the provision of state aids to intermodal transport operators, for sectors not covered by Regulation 1107/70.

***Action: Application of competition rules to Intermodal Freight Transport***

68. Equally important is the permanent monitoring and regulation of restrictive agreements between operators across different modes leading to undue distortion. The Commission is increasingly adopting a horizontal approach to the transport market, whereby a transport mode is not considered as a specific sector with special needs. It is on this basis for instance that the inland rate fixing by liner shipping conferences is reviewed. The report of a Committee of wise men set up to advise on the inland rate fixing will be taken into account by the Commission when it elaborates this part of its policy<sup>16</sup>. The co-operation agreements between railway companies will be reviewed in the same light. On the basis of an assessment of a sufficient number of individual cases the Commission will examine the need for guidelines covering intermodal collaboration agreements with the view to clarify the application of the competition rules.

#### **4.8. Co-ordination of intermodal timetables**

69. The co-ordination of timetables across modes, both at European (for long-distance hauls) and at regional (for local hauls) level, will be facilitated through an information network which acts as a clearing mechanism (electronic forum) where transport operators, infrastructure managers and service providers will meet. From a Community point of view such co-ordination will particularly be important for cross-border hauls and high-density, fast-flowing corridors where different modes contribute to an intermodal chain.

<sup>15</sup> Regulation of the Council: Granting of Aid for Transport by Rail, Road and Inland Waterways, O.J. No. 130, 15.06.70

<sup>16</sup> At this stage there hardly are any convincing arguments that collective inland price fixing is indispensable for the provision of intermodal transport services. Accordingly, the Group currently takes the view that there is no reason to grant exemption in respect of collective inland price fixing. (Part III: Conclusions and Recommendations of the "Interim Report of the Multimodal Group", Office for Official Publications of the European Communities, March 1996 (ISBN 92-827-6964-X))



***Action: Electronic forum for coordination of timetables***

70. The European Commission, in co-operation with relevant service providers, will promote the use of information networks for establishing an electronic forum where operators of transport services can meet to align their timetables in an intermodal context. The Commission will act as a catalyst in identifying best practices. The service will be run by third parties.

**C. Mode-independent services and regulations**

**4.9. Information and management systems**

71. The use of telematics, combining informatics and telecommunications, will increase the importance of customer oriented transport services which provide automated interfaces between the order of goods, transport management, invoicing and payments. Open and easy-to-use information systems will enhance the widespread use of advanced electronic services.

72. In order to facilitate the management and control of the transport chain from door to door, the information and management systems will cover several modes and will be open to any interested service provider through an open systems architecture. The systems will provide the end-user with real time information on possibilities for intermodal transport as well as the status of their consignments. At the same time, they will enable an optimal co-ordination between operators in the same transport chain. The systems will allow a high degree of forward planning and offer further opportunities for integrating transport to the management of the full supply chain.

73. Harmonised communication standards, procedures and transport documents (waybills) on an EDI basis will increase the use of electronic transactions in transport. Tracking and tracing of cargoes across modes in Europe will be possible by the adoption of standard procedures for Automatic Equipment Identification (AEI) and for reading barcodes. The dissemination of electronic commerce will provide the platform for the paperless administration of transport operations.

***Action: Intermodal real-time electronic information and transaction systems***

74. The Commission is setting up a working group of experts in order to formulate a common architecture for intermodal real-time electronic information systems and to identify the obstacles which stand in the way of creating such systems.

75. Information systems should provide for such functionalities as:

- the provision of information (timetables<sup>17</sup>, operators and terminals, average prices, average transit times,...);
- booking and reservation of space and services;
- contracting;
- tracking and tracing of consignments; and
- communication between operators in the door-to-door transport chain.

76. Once the intermodal real-time systems architecture has been established, it should become commercially driven and self-supplying.

77. The Commission will provide recommendations on a legal framework where that may be deemed indispensable, on the type of information that is required and possible message formats.

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<sup>17</sup> Hence the importance of the electronic forum for coordination of timetables.

***Action: Information Society technologies to the benefit of intermodal transport***

78. The use of existing information infrastructures fixed or mobile as short range communications, satellites or GSM to determine and communicate the position of consignments can substantially enhance the tracking and tracing of cargo across modes. However, despite the readiness of technical solutions, the exploitation of the possibilities offered by these technologies is mostly limited at this stage to modal-based systems. Therefore, the Commission will continue to support research for the creation of interoperable tracking and tracing systems in intermodal transport, including a cost-benefit assessment of the use of satellite technology in intermodal transport. Together with the relevant market parties, the Commission will define a process architecture integrating the positioning, communication and identification functions. The issues covered will include standardisation requirements (message formats and type of information transmitted), the choice of transmission means (frequencies, bandwidths, and infrastructure) and the system's financing on an intermodal basis (cost allocation). The Commission will examine the possibilities offered by the guidelines on the trans-European Telecom networks to support the creation of intermodal freight logistics services that are interoperable at a European level.<sup>18</sup>

***Action: Paperless transport: Harmonisation of standards***

79. In an effort to disseminate electronic commerce in transport, and to harmonise standards for EDI, AEI and barcodes, the European Commission will act as a driving force by bringing together representatives from different market sectors and stimulating further efforts for voluntary standardisation frameworks for electronic systems.

80. At present transport documents and procedures differ between modes and operators. The transition from paper-based documents to electronic messages, which is currently taking place in a number of transport modes, provides a window of opportunity for creating a uniform system for electronic transport documents and procedures. In order to establish the appropriate criteria for standardisation, the Commission will start a dialogue with relevant parties (industry, operators, authorities). This effort will encompass the customs procedures for transit and import/export, in the framework of the current computerisation of the Community Transit regime and the implementation of the Customs 2000 programme.

#### **4.10. Liability**

81. The intermodal operators should be able to offer their customers a clear set of transparent liability conditions and procedures for any cargo that is damaged or lost in its journey. From the end-user's point of view, the liability rules should not be mode-specific and should not distinguish between national and international transport. In addition to covering the actual transport of goods, these rules will also cover the damage or loss that may result from the performance of a value added logistics activity in the intermodal chain, for example warehousing or product customisation at the nodal point.

***Action: Promotion of voluntary intermodal liability regime***

82. The Commission has called for a working group of experts to examine the possibility of creating an intermodal liability concept. The Commission will support initiatives by those

<sup>18</sup> It will also promote actions for participation by relevant companies in the INFO 2000 programme which can support the creation of intermodal information content services. The Commission will also continue to promote standardisation activities within CEN TC 278 (Road Traffic and Transport Telematics). In particular, emphasis will be given to work on a European Freight and Fleet Management Architecture standard which takes account of freight intermodality architecture needs.

involved in the market to establish voluntary liability rules as part of a door-to-door intermodal service. It will play the role of a catalyst in bringing relevant operators, users and insurance companies together. In a second phase, the Commission, in close cooperation with the Council, will examine how to reopen the discussion on the International Convention on Multimodal Transport which was adopted in the UNCTAD framework in 1980.

## **D. Horizontal activities**

### **4.11. Research and innovation**

83. Through targeted projects for research and technological development (RTD), the Commission is giving support to the market for innovation in the use of new technologies, the development of new services and the improvement of productivity. At this stage in the Fourth Framework Programme for RTD (1994 - 1998), the Commission is co-financing more than 25 large-scale projects dealing with intermodal network efficiency, transfer points and the use of information and communication technologies. Other projects develop new appropriate instruments for decision-making support in order to link market and policy requirements. The latter projects address legal, institutional and economic issues.

84. In 1995, the Commission set up the Task Force Transport Intermodality with the aim of developing a consistent intermodal transport development effort, co-ordinating the different relevant RTD programmes<sup>19</sup> at European level and linking research with policy and industry needs. Numerous consultations with all intermodal interests have ensured that the Task Force's work and the Commission's RTD priorities meet the market's needs.<sup>20</sup>

#### ***Action: Additional Call for Proposals for demonstration projects***

85. The adoption of the Commission's proposal concerning supplementary funding under the Fourth Framework Programme by the European Parliament and the Council will enable the Task Force Transport Intermodality to co-finance RTD projects which demonstrate the competitiveness of intermodal transport over short and medium distances, the potential contribution of freight freeways, and the implementation of new concepts for distributing goods in urban areas.

#### ***Action: Establishment of a research network***

86. In order to enhance the synergy between researchers and the intermodal transport market, the Commission has launched the establishment of an open European network of universities and research institutes dealing with intermodality, INTERACT. The network will be a forum for discussing and planning RTD projects and linking their results to market needs. It will work in close connection with the Task Force Transport Intermodality.

#### ***Action: Research in the 5th Framework Programme***

87. In the 5th Framework Programme the Commission has proposed to cover Transport research under the two major themes "sustainable growth and development" and "creating a user friendly information society". In both themes the issues of promoting intermodal transport will be addressed; in the case of the first programme through the key action on sustainable mobility and intermodality, in the second through the development of appropriate information society systems

<sup>19</sup> The relevant programmes are the Transport research programme, Transport telematics, Industrial and materials technologies, the Information technologies programme ESPRIT, and the Energy programmes JOULE/THERMIE.

<sup>20</sup> Task Force reports: Diagnosis report from 01/03/1996, Inventory report from 28/02/1996, Progress report from 12/03/1996, Priority report from 29/02/1996, Prioritisation of RTD tasks, Reports of the Working Panels from 23/05/1996, Final report from 27/09/1996.

and applications. Aiming at sustainability it will look at possibilities for enhancing efficiency, quality, safety, security and environment-friendliness, and will highlight human aspects. Intermodality is, in addition to the developments within the individual modes, a crucial point for developing sound solutions for interconnecting networks and -nodes to a common European transport system which reinforces industrial competitiveness and increases the quality of life of the European citizens. Demonstrations will play a prominent role in the programmes in order to show the feasibility of innovative solutions.

#### **4.12. Evaluation and benchmarking**

88. Benchmarking is used by many companies in different sectors in order to measure their output against the performance of their competitors. It will also be applied to certain policy areas<sup>21</sup>.

##### ***Action: Development of methodologies for benchmarking in transport policy and intermodality***

89. The Commission will develop appropriate methodologies and criteria for evaluation and benchmarking in transport policy. On this "macro-economic" level, the assessment for intermodal transport policies will incorporate the needs and expectations of the European citizens, i.e. impact on the environment, employment and social and regional development and cohesion.

90. Benchmarking on "micro-economic" level will focus on the possibility of common standards for the quality performance of terminals and transport chains. The Commission has already launched a study on benchmarking in the railway sector.

##### ***Action: Establishment of an European Intermodal Reference Center for Freight Transport***

91. In order to identify best practices in intermodal transport the Commission will support, together with relevant parties, the establishment of a European Intermodal Reference Centre for freight transport. In addition to monitoring trends in intermodal demand and supply, this Reference Centre will disseminate best practices in intermodal transport from around Europe and raise the awareness of the innovative potential of intermodality. A call for tender will be published in the course of 1997.

#### **4.13. National Round Tables**

92. Competitive intermodal networks require the full participation of all actors in the chain. Several actors such as a number of road hauliers, freight forwarders or shippers are traditionally working in modally-oriented or segmented transport markets and are not aware of their possible function in an intermodal transport chain. A lack of awareness and information often creates unnecessary bottlenecks, which can be removed through co-operation between actors at a local level.

##### ***Action: Organisation of Round Tables by Member States***

93. The Commission will encourage national authorities to launch a Round Table in each Member State. The Round Tables should aim to facilitate the formation of regional or local intermodal communities where different industries and public and administrative bodies adopt common

<sup>21</sup> Communication from the Commission to the European Parliament and the Council "Benchmarking the competitiveness of European industry" COM(96) 463 final, 09.10.1996

approaches to intermodality and jointly remove local obstacles. The transfer nodes would appear to be the appropriate platform for such intermodal communities to grow.

#### 4.14. Intermodal freight statistics

94. In order to improve the basis of transport policy measures in a competitive market, intermodal statistics which can provide details on the volume and structure of transport flows are needed. Data on the transport modes and loading units used, on the types of goods transported and on other quality parameters of transport is required in order to allow a comparison to be made with unimodal transport. The organisation of intermodal statistics in some countries shows that shippers as well as transport operators can be direct suppliers of relevant data, and that data collection can be organised by private organisations on a self-supporting basis. In order to collect the relevant information in a cost-effective way, the future system should be based on sample services, complemented by information from modal statistics and traffic counts.

95. The increasing use of electronic data interchange and new technologies such as GPS will facilitate the collection of intermodal transport statistics in the future. The promotion of the use of EDI techniques for assessing transshipment points and the successive parts of a transport chain will be an essential component in the new statistical system to be considered.

#### *Action: Development of concepts for intermodal statistics*

96. The Commission is currently examining the appropriate concepts for future intermodal transport statistics, in order to direct further work on the collection and analysis of data.

## Chapter 5 Intermodality and other policy areas

97. The inter-relationship between transport policy and other areas of policy making must be highlighted clearly. For intermodality, this means further cross-fertilisation and coordination between the following areas:

### 5.1. The Information Society

98. As far as the technologies of the Information Society have been introduced in industrial production processes they have led to significant changes in the structure and management of the supply and distribution chain. Information technologies have become key instruments for the management of complex, multi-party cooperation, and thus in logistics. In addition, the continuous development of the communication infrastructures in Europe, particularly the mobile networks (GSM) and the development of multimedia devices offering easy use and access to the European citizen are creating new opportunities. It is necessary that appropriate actions are undertaken to exploit these opportunities and new technologies for intermodal operations and to inform and train intermodal operators and users.

99. Electronic services may in certain cases be able to replace physical transport (e.g. in the field of printed information, software transfer in concurrent engineering/proto-typing/manufacturing), but they also increase it, e.g. the number of trips for delivery, the number of small consignments, the dispersion of receivers due to electronic commerce<sup>22</sup>.

<sup>22</sup> Communication of the Commission "A European Initiative in Electronic Commerce" COM(97) 157, 16.04.1997

100. Research is needed in order to estimate and assess the interrelationship of electronic commerce, logistics and transport operations and the long-term effects of information and communication technologies.

## **5.2. Regional development and cohesion**

101. Intermodal infrastructure planning should take account of the interaction between nodes and terminals, transport flows, industrial relationships and the size of regional markets on the one hand, and the impact on their surrounding regional and local environment on the other hand.

102. Intermodal transport provides a new opportunity to choose between modes. Taking into account the peripheral status of many cohesion countries, intermodal transport can contribute to their better integration into the trans-European network. Intermodality is expected to enhance cohesion and retain/attract industrial locations, services and employment if regional/local nodes integrate the supplier and consumer market into larger structures. Therefore, investment in intermodal transfer points and modes is important, e.g. in order better to integrate short-sea shipping and/or rail transport.

103. Research will provide new approaches for the localisation of nodes and terminals and improve the knowledge about the interactions between industrial locations and activities, transport systems and regional markets. It will therefore facilitate the necessary decisions and contribute to evaluation and benchmarking exercises on policy level.

## **5.3. The integration of SME's**

104. Small and medium-sized enterprises (SMEs) account for almost 70% of the total EU company turnover. Because they are involved mainly in short-distance procurement and distribution, they influence the structure of the Community's trade flows. They also play an important role in the transport sector. Their needs and opportunities are therefore important in defining the intermodal transport system of tomorrow.

105. In order to retain their competitiveness, specific actions should be considered to prepare SME's for the substantial changes they have to face due to intermodality. These actions may lie in education, training and information on the market as well as in the application of new technologies, providing easy access to information systems and services.

## **5.4. Environment**

106. Sustainable mobility in line with environmental objectives is the main objective of the Common Transport Policy. As different transport modes have different impacts on the environment, for example in terms of their emissions, energy efficiency, noise and land-take, promoting the development of more environmentally friendly transport modes in the transport market is a major way of improving the transport system's environmental performance as a whole. In this light, the decline in the modal share of railways is of special concern. Environmental problems caused by road traffic are particularly severe in certain transit regions where a shift to rail transport offers an obvious remedy.

107. The action programme put forward in this communication will promote a shift to railways and waterborne transport by reducing friction costs in the transport chain and facilitating modal transfers. It is thus part of an overall policy of sustainable mobility. The effectiveness of these and of other measures already put forward by the Commission in, *inter alia*, its Green Paper of Fair and Efficient Pricing and in its White Paper on Revitalising the Community's Railways will have to be measured not least on whether they will halt and reverse the decrease in the railways' market share in Europe.

## Conclusions

108. Intermodality is an essential component of the European Union's Common Transport Policy for sustainable mobility. It provides the policy tool for a systems approach to transport in view of integrating the different modes into one coherent transport system which caters for the needs of Europe's citizens and industry.

109. The action programme for intermodal freight transport in Europe is a next step in realising the Common Transport Policy. It will require the co-operation of transport operators and users, the relevant supply industries, Member States, and regional and local authorities. The main challenge will lie with the market, namely to organise seamless and customer-oriented door-to-door transport services which draw on the strengths of all modes and which make use of all transport infrastructure and capacities.

110. The role of the Commission and the Member States is to define the framework in which the market can operate. The rules and conditions must be such that they create a level playing field for all operators and that they foster innovation. Limiting new Community legislation to where it is most cost-effective, the Commission rather advocates a co-operative approach with all relevant interests. It therefore intends to act as a catalyst in these areas where the market does not easily solve problems on its own and where a Commission action can bring clear benefits.

111. The Commission will undertake activities to promote the opportunities for intermodal transport and raise the awareness of the relevant bottlenecks to be eliminated. It will increase its support to the development of competitive intermodal transport solutions through positive actions such as the financing of research and demonstration projects.

## Annex I

European Strategic Intermodal Transport System - The Action Programme						
Actions	Actors involved					
	Commission	Community (Legal acts)	Member States	Regional/ Local authorities	Industry	Research & Development
<b>Integrated infrastructure and transport means</b>						
* Revision of the trans-European transport networks	X	X				
* Identification of opportunities and elimination of bottlenecks for adding value to logistics	X					X
* Steering the process of harmonisation of loading units	X	X			X	
<b>Interoperable and interconnected operations</b>						
* Market analysis aiming at further integration of transport and logistics	X				X	X
* Revision of Regulation 1107/70 with regard to aid in combined transport	X	X				
* Electronic forum for coordination of timetables	X				X	
<b>Mode-independent services and regulations</b>						
* Intermodal real-time electronic information and transaction systems	X				X	X
* Promotion of voluntary intermodal liability regime	X				X	X
* Information Society technologies to the benefit of intermodal transport	X	X	X		X	X
* Paperless transport: Harmonisation of message and document standards	X	X			X	
<b>Horizontal activities</b>						
* Additional Call for Proposals for demonstration projects	X				X	X
* Establishment of an intermodal freight transport research network	X					X
* Research on intermodal freight transport in the 5th Framework programme	X		X	X	X	X
* Development of methodologies for benchmarking in transport policy and intermodality	X		X	X	X	X
* Establishment of a European Intermodal Reference Center for freight transport	X				X	X
* Development of concepts for intermodal freight statistics	X	X	X		X	



<b>Europe's Future Intermodal Transport System - The Action Programme</b>						
<b>Ongoing Actions</b>	<i>Actors involved</i>					
	<i>Commission</i>	<i>Community (Legal acts)</i>	<i>Member States</i>	<i>Regional/ Local authorities</i>	<i>Industry</i>	<i>Research &amp; Development</i>
* Prolongation of PACT	X	X				
* Integration of rail freight freeways in an intermodal context	X		X		X	
* Application of competition rules to intermodal freight transport	X		X			
* Further development of Community rules for infrastructure charging and transport pricing	X	X				
* Transport Intermodality Task Force	X		X		X	X
* Research on intermodal freight transport in the Fourth Framework Programme	X		X	X	X	X

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