COUNCIL DECISION

of 15 December 1994

adopting a specific programme for research and technological development, including demonstration in the field of transport (1994 to 1998)

(94/914/EC)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130i (4) thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas, by Decision No 1110/94/EC (4), the European Parliament and the Council adopted a fourth framework programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994 to 1998 specifying *inter alia* the activities to be carried out in the area of transport; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130i (3) of the Treaty stipulates that the framework programme shall be implemented through specific programmes developed within each activity under the framework programme and that each specific programme shall define the detailed rules for its implementation, fix its duration and provide for the means deemed necessary;

Whereas the amount deemed necessary for carrying out this programme is ECU 240 million; whereas the appropriations for each financial year shall be laid down by the budgetary authority, subject to the availability of resources within the financial perspectives and the conditions set out in Article 1 (3) of Decision No 1110/94/EC;

Whereas this programme may make a significant contribution to the stimulation of growth, to the strengthening of competitiveness and to the development of employment in the Community, as indicated in the White Paper on 'Growth, competitivness and employment';

Whereas the development of trans-European transport networks facilitating network access, interconnection and interoperability will have a predominant role in creating an open, competitive market; whereas the research activities must be concentrated on the conditions necessary to network interoperability and interconnection, particularly as regards intermodality and access possibilities;

Whereas this programme should contribute to the development, integration and management of a more efficient and safer transport system that respects the environment and the quality of life, in order to promote sustainable mobility of people and goods;

Whereas, to ensure that an improved transport system is compatible with the aim of enhancing the quality of life, research into this sector may include reflexions on regional, housing and urban planning policies;

Whereas the research activities for a common transport policy must be focused at the strategic European level on modelling and transport scenarios with a view to gaining a better understanding of transport demand and of the impact of transport systems in Europe;

Whereas the RTD activities must be system-oriented and integrated, and take account of the strategic goals of common European transport policy and the results of research conducted within the other themes of the first activity, which will be disseminated for this purpose, in order to devise specific solutions applicable to the transport sector;

Whereas the research activities in this field will primarily concern the identification of needs calling for new technologies, and the evaluation, integration and global validation of technological innovations;

Whereas this research must also attach particular importance to ergonomics and human factors in an operational framework and to defining a new, harmonized set of methods for evaluating the global impact of European transport systems;

(1) OJ No C 228, 17. 8. 1994, p. 164
(2) OJ No C 341, 5. 12. 1994.
(3) Opinion delivered on 14 September 1994 (not yet published in the Official Journal).
(4) OJ No L 126, 18. 5. 1994, p. 1

Whereas the content of the fourth framework programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this specific programme specifies the content of the activities to be carried out in accordance with this principle in the area of transport;

Whereas Decision No 1110/94/EC lays down that a Community action is justified if, *inter alia*, research contributes to the strengthening of the economic and social cohesion of the Community and the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas the Community should only support RTD acitivities of high quality;

Whereas the rules for the participation of undertakings, research centres (including the Joint Research Centre (JRC)) and universities and the rules governing the dissemination of research results specified in the measures provided for in Article 130j of the Treaty apply to this specific programme;

Whereas provision should be made for measures to encourage the participation of small and medium-sized enterprises (SMEs) in this programme, in particular through technology stimulation measures;

Whereas the Commission's efforts to simplify and accelerate the application and selection procedures and make them more transparent must be continued in order to promote the implementation of the programme and to facilitate the action which firms, particularly SMEs, research centres and universities have to undertake in order to participate in a Community RTD activity;

Whereas this programme will help to strengthen synergy between the RTD activities carried out in the field of transport by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas synergy should be sought with the second activity of the framework programme;

Whereas it may be appropriate to engage in international cooperation activities with international organizations and third countries for the purpose of implementing this programme;

Whereas several concerted activities in the field of transport research are carried out in the framework of European cooperation in the field of scientific and technical research (COST); whereas some activities provided for in this programme may follow on from or supplement those concerted activities;

Whereas this programme should also comprise acitivities for the dissemination and exploitation of RTD results, in particular towards SMEs, notably those in the Member States and regions which participate least in the programme, and activities to stimulate the mobility and training of researchers within this programme to the extent necessary for proper implementation of the programme;

Whereas an analysis should be made of possible socio-economic consequences and technological risks associated with the programme;

Whereas progress with this programme should be continuously and systematically monitored with a view to adapting it, where appropriate, to scientific and technological developments in this area; whereas in due course there should be an independent evaluation of progress with the programme so as to provide all the background information needed in order to determine the objectives of the fifth RTD framework programme; whereas at the end of this programme there should be a final evaluation of the results obtained compared with the objectives set out in this Decision;

Whereas the JRC may participate in indirect actions covered by this programme;

Whereas the Scientific and Technical Research Committee (Crest) has been consulted,

HAS ADOPTED THIS DECISION:

Article 1

A specific programme for research and technological development, including demonstration, in the field of transport, as set out in Annex I, is hereby adopted for the period from the date of adoption of this Decision to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 240 million, including a maximum of 8,3 % for the Commission's staff and administrative expenditure.

2. An indicative breakdown of this amount is given in Annex II.

3. The budgetary authority shall lay down the appropriations for each financial year, subject to the availability of resources within the financial perspectives and in accordance with the conditions set out in Article 1 (3) of Decision No 1110/94/EC, taking into account the

principles of sound management referred to in Article 2 of the Financial Regulation applicable to the general budget of the European Communities.

Article 3

1. The general rules for the Community's financial contribution are laid down in Annex IV to Decision No 1110/94/EC.

2. The rules for the participation of undertakings, research centres and universities and for the dissemination of results are specified in the measures envisaged in Article 130j of the Treaty.

3. Annex III sets out the specific rules for implementing this programme, supplementary to those referred to in paragraphs 1 and 2.

Article 4

1. In order to help ensure, *inter alia*, the cost-effective implementation of this programme, the Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, progress within the programme in relation to the objectives set out in Annex I, as amplified in the work programme. It shall in particular examine whether the objectives, priorities and financial resources are still appropriate to the changing situation. It shall, if necessary, in the light of the results of this monitoring process, submit proposals to adapt or supplement this programme.

2. In order to contribute towards the evaluation of Community activities, as required by Article 4 (2) of Decision No 1110/94/EC and in compliance with the timetable laid down in that paragraph, the Commission shall have an external assessment conducted by independent qualified experts of the activities carried out within the areas covered by this programme and their management during the five years preceding this assessment.

3. At the end of this programme, the Commission shall have an independent final evaluation carried out of the results achieved compared with the objectives set out in Annex III to Decision No 1110/94/EC and Annex I to this Decision. The final evaluation report shall be forwarded to the European Parliament, the Council and the Economic and Social Committee.

Article 5

1. A work programme shall be drawn up by the Commission in accordance with the objectives set out in Annex I and the indicative financial breakdown set out in Annex II, and shall be updated where appropriate. It shall set out in detail:

— the scientific and technological objectives and research tasks,

— the implementation schedule, including dates for calls for proposals,

— the proposed financial and managerial arrangements, including specific modalities for implementing technology stimulation measures for SMEs and the general unies of other measures, including preparatory, accompanying and support measures,

— arrangements for coordination with other RTD activities carried out in this area, in particular under other specific programmes, and, where appropriate, for ensuring improved interaction with activities carried out in other frameworks, such as Eureka and COST,

— arrangements for the dissemination, protection and exploitation of the results of RTD activities carried out under the programme.

2. The Commission shall issue calls for proposals for projects on the basis of the work programme.

Article 6

1. The Commission shall be responsible for the implementation of the programme.

2. In the cases provided for in Article 7 (1), the Commission shall be assisted by a committee composed of representatives of the Member States and chaired by the representative of the Commission.

3. The representative of the Commission shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority laid down in Article 148 (2) of the Treaty in the case of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the committee shall be weighted in the manner set out in that Article. The chairman shall not vote.

4. The Commission shall adopt the measures envisaged if they are in accordance with the opinion of the committee.

5. If the measures envisaged are not in accordance with the opinion of the committee, or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

6. If, on the expiry of a period of three months from referral of the matter to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission.

Article 7

1. The procedure laid down in Article 6 (2) to 6 (6) shall apply to:

— the preparation and updating of the work programme referred to in Article 5 (1),

— the content of the calls for proposals and establishment of selection criteria,

— the assessment of the RTD activities proposed for Community funding and the estimated amount of the Community contribution for each activity where this is equal to or more than EU 0,4 million,

— any adjustment to the indicative breakdown of the amount as set out in Annex II,

— specific modalities for the financial participation of the Community in the different activities envisaged,

— the measures and terms of reference for programme evaluation,

— any departure from the rules set out in Annex III,

— participation in any project by legal entities from third countries and international organizations.

2. Where, pursuant to the third indent of paragraph 1, the amount of the Community contribution is less than ECU 0,4 million, the Commission shall inform the committee of the projects and of the outcome of their assessment.

3. The Commission shall regularly inform the committee of progress with the implementation of the programme as a whole.

Article 8

Participation in this programme may be open on a project-by-project basis, without financial support from the Community, to legal entities established in third countries, where such participation contributes effectively to the implementation of the programme taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 15 December 1994.

For the Council

The President

A. MERKEL

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the orientations of the fourth framework programme, in applying the selection criteria and in specifying its scientific and technological objectives. Section 6 of Annex III (first activity) of the framework programme is an integral part of this programme.

General considerations

(a) The development and implementation of the common transport policy calls for research to achieve efficient and cost-effective transport networks for goods and passengers under the best possible environmental social and energy consumption conditions (sustainable mobility).

This specific research programme is intended to improve the efficiency of the individual transport modes and speed up their integration into European transport networks and to support Community transport initiatives at both national and European levels.

The aim is to contribute to the optimization of trans-European transport networks, improved productivity of modes of transport and individual operators, the capacity of each mode of transport to be integrated with the others, accessibility for users and the development of a multi-modal transport system at urban, rural, regional and trans-European level.

The research will place emphasis on the optimization of transport systems, including from the point of view of users, the improvement of safety, the reduction of harmful emissions, and on achieving social acceptability.

In 1991 transport services in Europe, including own account transport and private transport, accounted for 5,6 million jobs and between 7 and 8 % of GNP, while the transport equipment industry accounted for 2,6 million jobs.

The demand for transport in particular road and air transport has risen in spectacular fashion (70 % since 1970) and this trend is continuing. The growth has resulted in increased congestion and inefficiency. The consequent costs to the European economy, including the costs of the safety problems inherent in transport operations, are estimated to be at least ECU 50 billion per year for road and ECU 4 billion for aviation growing to ECU 10 billion by 2000.

Transport is the second largest consumer of non-renewable energy and, unlike industrial and domestic users, its level of consumption is steadily increasing.

The results of transport research will therefore have a direct and indirect effect on the economy and quality of life in the Community.

(b) The general objective of research under this specific programme is to arrive at prenormative or prelegislative conclusions making it possible to incorporate into the transport shpere new policy options, among others the implementation of new generic technologies and further the development of the European Union by establishing the preconditions for an efficient trans-European transport system, which is compatible with the environment. A particular area will be the research work needed for the integration of EC networks to the ones of central and eastern Europe. This shall be carried out in synergy with the specific programme for research and technological development, including demonstration, in the field of cooperation with third countries and international organizations.

The aim of the research in question is to provide information for decisions and quantify the foreseeable impact of the various possible options.

It is necessary to acquire an understanding of mobility in order to analyse potential developments. In some cases, it is also necessary to set up experiments in order to confirm in practice the findings of more theoretical, technological studies and in particular the results of various other specific programmes. The methodologies for these experiments are part and parcel of this research activity. They should make it possible to establish in socio-economic terms the merits of introducing new technologies and carrying out any technical adjustments that may be necessary.

With this in mind two types of approach are needed:

— strategic research for a trans-European multi-modal transport system,

— specific research concerning the optimization of each mode.

This research covers passenger transport and goods transport. Special attention will be paid to the interrelationships between the management of these two types of flows.

The two approaches must take into account:

— general policy concerns, such as: quality of life, regional and housing planning, competitiveness, safety, environment, energy saving and traffic congestion (sustainable mobility),

— the different needs, frameworks of conditions and competences: at the European, national, regional and urban levels. Particular regard will be given to developing mechanisms for addressing, on the one hand problems of transport access to the peripheral regions of the Community; and on the other hand, problems of transit transport in the central regions of the Community.

(c) The opportunities provided by improved organizational and market arrangements, new technologies, economic development and environmental improvements should contribute to a breaking down of the barriers separating different modes of transport (and those between transport and information and communication systems).

The first approach will provide authorities, users and industry with the appropriate decision-making instruments based on research into: the methodology for establishing a European database and information system; the development of scenarios; the development of multicriteria models and methodologies; the economics of transport systems; the organization and regulation of transport systems; the integration and application of new technologies; and improvements in overall policy assessment. These tools will make it possible for public authorities to define the needs and constraints to orientate future actions which cater for the requirements of users, within the context of an overall land-use policy. They are essential considering that large amounts of public and private money are committed by the political authorities for long-term investments in infrastructure projects, and the application of new management and communication systems to transport services.

The second approach will ensure, on the one hand, the development of compatible management systems for the individual transport modes as these are crucial for network interoperability, interconnection and accessibility as well as, on the other hand, improving capacity, safety, reliability and quality of the transport services.

In line with the common transport policy, technological innovation shall be accompanied by research into the integration of such new technologies into the new operational and institutional situations (including those related to the new technical standards and guidelines for trans-European transport networks). A new, harmonized methodology will be necessary to assess the overall impact of transport systems so as to optimize the trans-European network.

The RTD activities will be conducted within a coherent and coordinated framework taking account of, and communicating requirements to, the activities under other specific programmes of the fourth framework programme: Telematics applications, Industrial and materials technologies, Non-nuclear energy and, where they relate to the objectives of the common transport policy, Standards, measurement and testing, Environment and climate and Targeted socio-economic research; and to ensure the internal coherence of the activities of this programme. Work focusing on generic technologies will be carried out under the relevant themes within the first activity, with the result that the demonstration activity will address the integration and systematic validation of the results via an integrated approach aimed at achieving the objectives of the common transport policy, taking also account of the needs of the less advanced regions.

Basic research will be undertaken where appropriate, directed in particular at understanding the demand for mobility, and for understanding human behaviour, of both passengers and operator.

Tangible results should become available in the short and medium term, in particular enabling a modular approach and phased implementation of transport systems in coordination with Eureka.

1. STRATEGIC RESEARCH FOR A TRANS-EUROPEAN MULTIMODAL NETWORK

The purpose of this research is to improve the efficiency of the European transport system regarded as a whole with different modal components.

The aim will be to maximize system synergies and compatibilities to develop the interoperability and interconnection of individual transport modes for their integration in the trans-European transport network through a full knowledge and understanding of the European transport system, its individual elements, their interrelationships, interdependencies, and through a definition of appropriate performance indicators. This research will help by providing the necessary elements for the development of multi-modal trans-European networks, through socio-economic and technological research to guide the development of the Common Transport Policy. As part of the socio-economic research, the legislative framework, aims and effects of the various national transport policies should be studied.

This knowledge includes exploring the new technological means for gathering and processing data on European transport, the comprehension of modelling techniques and techniques for developing scenarios of transport needs including the methodologies for assessing technological innovation and new transport concepts. Common criteria will be established for evaluating the capacity of each transport mode to contribute effectively to the trans-European transport networks and the effects and implications for future policy of the privatization of transport operations. In this context the research will produce common tools for validation parameters and economic instruments.

Finally, this work will establish experimental programmes including pilot projects making use of existing infrastructure and technological innovations.

The research is subdivided into six areas of investigation:

Understanding mobility

An understanding of mobility (of passengers and goods) and foreseeable developments in mobility at European level is a prerequisite for improving European transport policy. Research will be carried out into the methodology for establishing a European database and information system, which is as compatible as possible with the existing national, regional or local databases. This information system will exploit new technologies.

Attention will focus on defining the procedures for aggregating existing bases and using, for this purpose, byproducts of existing systems or systems being developed whose primary purpose is different (centralized reservations, road information, electronic tolls, logistics, car 'phones, etc.). The general aim is to achieve an adequate overall understanding, at the lowest possible cost, while respecting the privacy of individuals and allowing links with more detailed bases and less aggregated geographical levels. Special attention will be paid to flows into and out of the Community.

This database should make it possible to highlight links and types of flows for which modal switching can be considered, and should make it possible to provide information for a European flow forecasting model sensitive to policy alternatives. The database should include environmental and economic data in order to facilitate studies on the effectiveness and impact of future developments and policy measures. Inclusion of data on goods transport volumes by pipelines should also be considered.

Certain regions and transport links in the Community are affected by extremely acute congestion problems. By dealing with this matter on a European scale, with a common transport policy, it should be possible to make better overall use of the existing networks. An interesting avenue of approach would seem to be the diversification of entry and exit points for flows of goods and people: extra-Community optimization may facilitate intra-Community optimization, by reducing internal trips. In this connection, special attention will be paid to the consequences of the increasing opening up of the Community to eastern Europe; and to an evaluation of the implications for future transport

demand, and travel and distribution patterns of changes in society and in industry, of growing environmental and social constraints, and of the adoption of new technologies. In particular an analysis is required of the way in which the locality of the destination influences the choice of the optimal mode, particularly where destinations are far from urban centres. The above research concerning the present situation and medium-term developments should be supplemented by research aimed at establishing long-term forward planning scenarios.

Developing intermodality

The development of intermodality and complementarity between the different modes of transport is generally regarded as a promising way of improving the European transport system. The above research will, as a whole, seek to clarify the area of excellence of each mode and the technological and organizational conditions governing the achievement of complementarity. The desire to develop intermodality and complementarity is based on the (often implicit) observation that the comparative efficiency of modes is variable depending on the area in question and the type of flows involved. The research will aim to objectivize this observation by developing multicriteria models and methodologies making it possible to define the conditions under which each mode can be better employed. It will contribute towards helping to formulate a common European transport policy compatible with the sustainable development objective.

Economics of the transport system

The transport system does not have an intrinsic purpose in itself but is intended to enable other activities to take place (production, consumption, leisure, knowledge, etc.). It is increasingly becoming a burden for household budgets and for the society as a whole. The relationship between transport and such activities will be examined and, where appropriate, models and methodologies developed.

The choice of new infrastructures has major environmental and budgetary consequences and has a lasting effect on the modal split between flows. It is a virtually irreversible act necessitating solid guarantees. The system should be funded at the most efficient level of cost by spreading the burden between the direct and indirect beneficiaries so that, as far as possible, the sum total of individual choices approximates to the optimum. The development of infrastructure evaluation methods must take into account the regional accessibility factor, as well as the economic, social and environmental aspects.

Three possibilities should be explored as a matter of priority: new infrastructures, funding and methodologies for proper consideration of all direct and indirect costs of transport. As well as the development of price mechanisms and the effects of true costs on modal split, the socio-economic costs and benefits of mobility should be investigated, for example the effects and evaluation of travel time savings.

Studies must also be made of the impact of fiscal policy instruments.

System organization and interoperability

Implementing transport policy may result in organizational problems associated with technological developments and institutional changes. Efforts should be made to improve the existing organizational set-ups, while complying with the principle of subsidiarity and free competition.

Research into the interoperability of different national systems is needed in order to ensure continuity of services for users throughout the European network. The research will aim to define the conditions needed for such interoperability, with particular attention being paid to standarization.

The development of multi-modal systems in cities is changing mobility patterns. As a result, research will be promoted which aims to establish new criteria for the planning of public transport networks and ring roads to establish new criteria for the planning of public transport networks and ring roads to avoid congestion and harmful development on the outskirts of towns.

A final point is that the introduction of new technologies and the Europeanization of the market will bring about changes in working practices. Consequently, it will be necessary to provide training in line with the changing structures. There will need to be a degree of convergence in working conditions and training if network interoperability is to be achieved satisfactorily.

Integration of new technologies

Incorporating and applying new generic technologies in the transport sphere, for instance for using the global positioning systems by satellite, in order to improve network efficiency and safety, remain major concerns. Taking account of work in the technology programmes, the strategic research should encourage the adoption/transfer of successful technological solutions from one mode to another. Appropriate scientific and technical research should make it possible to find out which are the most promising technologies in terms of matching means and processes to the general objectives of European transport policy.

Policy assessment

This research is aimed at acquiring a better understanding of causality relations between policy goals and policy means taking into consideration potential conflicts between them. The investigation and evaluation of scenarios include evaluation of different effects and the development of models for the prediction of social (socio-economic), energy, environmental and safety impacts of changes in mobility and the transport system.

Lastly, a better understanding of the European transport system and its probable developments should make it possible to highlight the main dysfunctions. Research aimed at resolving them should be carried out, in particular concerning the application of economic and policy instruments, covering both the development of new technologies and institutional, organizational and socio-economic changes.

2. NETWORK OPTIMIZATION

In addition to the above research aimed at overall optimization of the European transport system, it is also necessary to carry out research into the internal optimization of each mode (air, rail, road, urban, inland waterways and maritime transport) and into the integration of these modes of transport (intermodality); in this context, full use will be made of the results of research undertaken as part of other specific programmes, which will be disseminated for this purpose. Of course, the specific optimizations must be compatible with the overall optimization which remains the priority objective. It will be necessary to iron out any contradiction between sectoral optimization and overall optimization in combined transport and rail transport, in particular so as to ensure the interoperability of transnational rail networks, both conventional and high speed networks (on existing routes), by gradually abolishing technical, legal and operational obstacles. The research should lead to the definition of functional requirements for the implementation of integrated intermodal transport chains which, in the case of regional links, need to be supplemented by major nodal points and more widespread link structures; it will also be necessary to draw up pilot schemes to integrate and assess the new technologies with regard to transfers (goods transport) and connections (passenger transport), management, supervision and information. In this sense RTD will build on and integrate existing or current technological developments from other RTD projects or programmes. Identification of technological requirements and the integration and validation of new technologies should be included.

The research in question will take into account areas of investigation common to all modes but which need to be specified in terms of the features of each individual mode. Research on transport of dangerous goods may be included under those transport modes where appropriate.

2.1 Railways

Four actions are foreseen for railway RTD: development of the European rail traffic management system; safety; interoperation; and economic, organizational and social matters. The research has to be set in the wider context of the needs and preferences of public transport users, taking account of the changing institutional arrangements in some Member States for the ownership and management of the rail system.

The work will be aimed at removing obstacles to the compatibility of the national rail systems and, to this end, should provide economic and technical solutions to the problem of the interoperability of the rail network as a subsystem and part of a European intermodal system. Likewise the access of every EC Member State to the European high-speed network will be procured by means of economic and

environmental studies related to the required new lines, in such a way that this access might be achieved with maximum economic benefit and minimal environmental impact.

Firstly, one of the priority issues is the compatibility of train traffic control systems, on which research was started in the framework of the Euret programme. This research has the objective of developing a European rail traffic management system and its principal functionalities through the integration of the results of research on generic technology developed in other programmes. It was developed with the collaboration of the railways and industry and will take into account user needs.

This work needs to be continued so as to develop a common architecture for the European rail traffic management system, and it is necessary to reach the stage of pilot projects to validate the technology through specific applications and demonstration programmes which guarantee the compatibility of the newly-defined systems, mainly by means of tests in railway tracks equipped with different control and traction options.

In this context it is necessary to develop the system specifications, study the ergonomic aspects and human factors, communications and equipment design. The interfaces between connected systems, i.e. communications, management, and information for the public and other services must be taken into account. Finally, in view of the importance of this common architecture for the development of the European rail network, including the high-speed train network, the research results will be validated in the context of the essential requirements and technical specifications being established at a Community level.

Secondly, rail safety is based on the principle of the intrinsic safety of equipment and systems and on the influence of human factors. For the new functionalities, it is necessary to use hardware and software components whose failure mode is not necessarily known or finite. No system is therefore ever totally safe and there is always a risk, however small, of failure. This risk will be quantified to allow harmonized criteria to be applied throughout the Community and ensure that investment decisions for safety equipment can be taken as a function of their added value and capacity to further improve human safety. The research work will, if possible, build on techniques developed for other industries, and adapt them to specific rail applications, if necessary by defining new concepts.

The capacity of a rail section is limited by the need to maintain sufficient distance between trains to enable each one to stop in complete safety in the remaining portion of available track. To be able to achieve this, the current safety systems often leave a gap which is much greater than necessary, in the absence of knowledge of train braking performance, communication systems and the specific approved spacing used. In high-density areas improved train flow is necessary; this requires recourse to innovations developed in other programmes and new techniques and safety systems. Research work is also needed to improve performance and reliability of safety systems, and other vital systems such as the electric traction system.

Thirdly, with regard to the interconnection and interoperability of rail networks, the work will deal with the elimination of obstacles to rail traffic, especially at frontiers, due to national equipment and requirements, and will recommend new common solutions to overcome them such as studies of new connection lines. The degree of interoperation which is appropriate will vary according to the type of rail service, the geographical location within the network, the extent to which national borders are crossed, and customer demand. Research is needed to establish a framework, including a method of evaluating costs and benefits, for longer-term decisions on the degree of interoperation which is appropriate, and to establish ways in which technological differences between different rail systems might be overcome where interoperation is justified.

This research using the results of other Community research activities, will result in the development of interoperability specifications. The essential requirements foreseen in Community drafts on the trans-European high-speed and conventional rail networks will be addressed, as will problems (concerning for example infrastructure; electrical power systems; electro-magnetic interfaces, compatibility and acoustic pollution; noise and vibration) related to the associated subsystems.

In order that strengths of the rail system can also be better used in border-crossing traffic, information systems are required so that information about wagons, containers and loading of goods is transmitted in advance and is made available for planning and control purposes. In order to make rail traffic, including the formation and dissolution of trains, more efficient and ergonomic, research is required into the community-wide introduction of automatic wagon couplings. Fourthly, research will be undertaken on economic, organizational and social matters regarding the cooperation of railway operators with each other and with other transport operators, arising from the fact that new community and national legislations sets new conditions and opens new opportunities for railway companies. The results will inform the research carried out in the other specific activities of the fourth framework programme. Work on the following will be of great interest: the elucidation of the lack of economic profitability of rail transport in comparison with other modes of transport; an assessment of the information required to evaluate measures which might increase the attractiveness of rail transport for both passengers and freight; the intermodal connection of high-speed lines; the economic and social profitability of connections from the peripheral parts of the Community to the European high-speed network; alternative routes for operational lines in order to increase their profitability; and alternative uses for non-operational lines.

2.2. Integrated transport chains

With the opening of the single market, the future extension of the European Community and the progress of the central and eastern European countries towards market economies, the international transfer of goods will inevitably grow strongly. It is generally expected that traffic will double in 20 years, with a substantial increase in road transport. Taking into consideration the significant external costs caused by road transport, multi-modal transport may be a promising solution. Its development could contribute to both a more efficient use of road transport and an improvement in the quality of the environment. Studies should therefore be conducted into the extent to which demand for road transport can be reduced, or transferred to other modes or more sustainable forms of transport such as rail freight and public transport with the aim of minimizing external and internal costs.

The main objective of this programme is to help solve those problems which impede the further growth and realization of optimum quality of integrated freight transport, consistent with the principle of sustainable mobility.

The work will be based on existing research in technological (particularly in telecommunications and informatic items), economic, social and environmental fields and analyse the costs/benefits of transfers between modes through an evaluation of effective transfer options (e.g. short sea shipping). A systematic approach will be followed, based on a conceptual and practical interdependency between individual research tasks, leading to demonstrations of pilot or prototype installations. Consequently all the main actors in this field will also be interconnected. The research will include:

— developing criteria for the improvement of interfaces between transport modes at transfer points to create preconditions for the rapid and reliable transfer of goods,

— improving the access to multimodal transport by small and medium-sized enterprises in both transport and other industries,

— studying the interrelationship between the transport infrastructure on the one hand, and multimodal loading units on the other, taking account of the needs of consignors of freight,

— addressing the criteria for modal interoperability using existing or planned infrastructure, in order to inform the decisions of the infrastructure providing authorities, and notably to ensure links with peripheral or isolated regions of the Community,

— in order to improve the economic efficiency of intermodal transport generally, developing information and implementation strategies, and analysing incentives, for the use of logistical tools throughout the whole logistic chain, with special regard to management, the use of telematic aids, and operations at the beginning and end of the chain,

— network development, including guidelines for the operational characteristics of terminals and linking between terminals,

— guidelines for automated systems of the documentation processing used in intermodal transport,

— guidelines for automatic identification of the loading units, whilst in transit as well as in transport centres,

— the methodological development of a study of cost-benefit and multi-criteria analysis including financial, economic, social and safety aspects concerning the implementation, in the different systems of operation — ongoing or to be developed — of transfer centres between different transport modes,

— a cost-benefit and multi-criteria analysis of the financial, economic, social and safety aspects of the application of the different possible techniques to be used in intermodal transport by rail, as well as its management at borders, loading unit transfer, change of wagon axles or axle gauge of variable width,

— technico-economic studies to improve the conditions of rail operation (speed, ability, to run on tracks of different gauge, maximum load etc.) and scope for commercial development (improvement of gauge, etc.).

2.3. **Air transport**

A systematic approach to the air transport sector is necessary in order, on the one hand, to define the objectives of European interest with regard to overcoming congestion in air space and at airports, improving safety and minimizing the impact on the environment and, on the other hand, to enable the results of research into generic technologies to be coordinated and assessed.

Firstly the work will address air traffic management (ATM). Within the general framework of Ecarda and the International Civil Aviation Organization's (ICAO) concepts (CNS/ATM) and consistent with the European Civil Aviation Conference (ECAC) strategy for the 1990's, the research will contribute to the definition of technical and operational solutions suited to European needs. Original contributions are expected to enhance the European role and competitiveness in the world. Building upon existing work defining a consolidated ATM concept, and in close cooperation with the Member States, ECAC and Eurocontrol (in particular the EATMS project), the research will evaluate and demonstrate the integrated elements, both operational and technological, for a future ATM system foreseen for 2006 onwards, having at least double the existing capacity, with maintained safety and at a minimum cost.

This work will also integrate the results of generic technology research developed under other programmes and identify the application-related technologies necessary to develop an effective system from the technological, operational and organizational viewpoint. Institutional questions which the possible use of satellites could provoke will also be examined.

Operational consideration will also address the specific aspects, such as the role of human intervention and communication by both pilot and air traffic controller, including for example selection and training; automation of the planning and executive control functions, architecture of new automated air traffic control (ATC) systems; the use of experimental systems of communication, navigation (including navigation by satellite) and automated surveillance, and in particular the use of an aeronautical telecommunications network (ATN) for integration of the Flight Management Systems (FMS) and the ATC systems; and the man/machine interface in ATC. Innovations developed in the context of other activities will be used, and adapted as necessary. The overall integration of these elements will be validated initially on experimental test benches to enable the improvement in capacity and safety of the overall ATM system to be quantified. To facilitate the integration and validation process a validation plan will be developed together with the methodology to be used in the process. Suitable certification methods will be developed and validated for such ATM systems and procedures (including a socio-economic evaluation of any future ATM system).

Secondly, the work will address air transport safety and environmental protection to complement the work of the joint aviation authorities and national aviation administrations.

In particular it will model and assess the airworthiness and operational factors that affect the safety of air transport and environmental issues, determine possible further enhancements in these fields and support future standardization and regulatory activities in the field of certification and inspection of airworthiness. Through strategic research, including modelling of the influence of

critical factors, the work will address: accident prevention and occupant survival criteria; external hazards (icing, collision with the ground, lightening, electromagnetic integrity, engine ingestion, etc.); as well as aircraft reliability and safety standards (airworthiness requirements) taking account of the role of ICAO in setting international noise and emissions standards, and of the work being carried out in Theme B (Industrial technologies) and Theme C (Environment) of the fourth framework programme with regard to future noise and emissions standards.

More precisely the inspection of airworthiness and flight operations, work will take account of the results of the Industrial and materials technologies programme concerning aircraft design and will address the feasibility and socio-economic and systematic evaluation of technologies design to improve crash and fire protection, passenger evacuation, integrity and reliability of crack-detection techniques, certification methods, human factor issues for aircraft which are highly automated as well as for long-range and high-workload operations, and take-off and landing criteria for runways rendered difficult because of atmospheric conditions.

Thirdly, the work will address airports. In order to meet the urgent need to increase airport capacity, in particular landings and take-offs, the research will address concepts of airport design, management issues such as the different kinds of traffic flows within airports and the interface between airport management and control systems on the one hand, and ATM on the other. Modelling and simulation techniques will be developed, where appropriate, in order to define the system requirement and high-level functional architecture. The research will include an examination of the impact of alternative operational strategies on the capacity and level of service of European airports; and a study of system for weather analysis and forecasting. Issues relating to the harmonization of the airport operations and the management of air-traffic flows at network level should also be covered.

2.4. Urban transport

Urban transport poses six types of problems, namely: the needs and preferences of users, their safety and that of pedestrians, energy efficiency and savings, passenger transport-system efficiency, efficient freight distribution and environmental protection. The technical responses to these problems are not necessarily the same but together they must contribute to resolving these six problems. To this end, the actions undertaken in the telematics, energy and transport spheres must be developed in a coherent fashion, and some of the work in this sub-theme will relate closely to work being undertaken in the 'Integrated transport chains' sub-theme.

The work will address solutions able to: improve the efficiency and capacity of urban transport systems especially by improving the attractiveness of public urban transport, to both users and those affected by it; and rationalize traffic management and transport demand by improving the conditions of urban life. In particular, the work will address:

— use of spatial planning policies,

— ecological traffic management (for example, priority to public transport in traffic control systems, favouring the circulation conditions compatible with the urban surrounding),

— safety management, especially for vulnerable users,

— optimization of road use including minimization of spatial mobility (for example by increasing safety, and increasing its capacity in terms of passengers and goods carried rather than of vehicles),

— measures and conditions to stimulate public transport as opposed to private transport,

— factors contributing to the effective integration of different modes and the development of an integrated urban transport strategy (including cycling and walking) to improve town accessibility, in particular the design criteria for the organization and operation of transfer points between local and long-distance traffic, and other efficient measures such as car-pools and car-sharing,

— demand management and an examination of modal split in situations of multiple modal choice,

— goods distribution (city logistics), and the impact of traffic regulations on the retail trade and on manufacturing industry,

— the obtaining of better knowledge of the operating conditions of the transport system and its foreseeable evolution (measurement of congestion, prospective studies of the evolution of mobility rules, development of new procedures for obtaining and analysing data, etc.),

— the practical problems arising from the increasing restrictions on private vehicles. It would be especially necessary to deepen knowledge about the daily behaviour of drivers in face of the existing rules, dependency on the private vehicle in everyday habits, etc.,

— measures to encourage cyclist and pedestrian networks, and to improve the safety of cyclists.

In addition, it will also analyse on the one hand the financing and charging systems for urban transport and in particular public transport as advocated in the White Paper on a common transport policy, and on the other hand the external costs entailed by the different modes of transport in built-up areas (public/private, level of responsibility). In particular, the effects of different systems of financing public transport, including pricing policies and the use of funds raised by congestion charging, will be looked at. With the coming of the internal market, all Member States are today looking for new forms of organization and new financing modes for urban transport systems. Consolidating the better application of existing measures with new technologies (including transport telematics), with new transport means (electric and hybrid vehicles, bimodal bus, trolley bus, light rail), and with traffic control, trip planning, parking management, emergency services, integrated ticketing systems and other low-technology approaches such as bus and high-occupancy vehicle lanes, requires specific solutions which have to be developed taking account of the particular condition of urban areas and of the necessary interface with inter-urban systems. A large scale evaluation of this integration through pilot projects will be required.

The influence of the transport system on the distribution of activities and the growth of the cities, although being unanimously accepted, has received up to now a very poor analysis. The new forms of organization and financing of the urban transport system will have, without any doubt, an important impact on the urban development rules in the short and medium term. On the other hand, with the general aim of looking for a sustainable development, the different kinds of organization and the corresponding transport systems are fulfilling a crucial role which deserves a special research effort.

Most built-up areas may have to consider introducing a range of measures (for example road pricing, traffic regulation systems which give priority to public transport, promotion of car pools, promotion of cycling and walking). Little is known about the complex interactions which will arise in these different combinations and their interfaces with interurban systems. In particular the safety of cyclists and pedestrians must be improved in the explicit context of a multimodal environment. A progressive introduction of selected measures could be carried out in towns, chosen for the purposes of research, to validate them and ensure their gradual implementation. Validation through simulation and demonstration is necessary to assess the cost effectiveness and environmental and socio-economic effects of introducing new technologies or concepts and to identify further the key factors (the relationship between transport and land use, industrial or telematic innovations, regulatory measures or new transport concepts) which need to be addressed by research for attaining the benefits of sustainable mobility for the travelling public.

Multi-modal and inter-urban passenger transport

The efficiency of passenger transport systems will be considered in a multi-modal context. Passenger multi-modality includes the traditional long-distance modes with special reference to high speed rail, but also new short distance concepts (people movers). The design, location and organization of the land-land, land-air and land-sea interfaces must allow an easy, quick and safe change between modes of transport. Special attention must be given to the possible transferability of concepts developed in the area of multi-modal freight transport. Passenger multi-modality also occurs in situations where the passenger may choose among several modes of transport for the continuation of the journey. The

research activities should examine modal split in situations of multiple modal choice, e.g. the implementation and assessment of multi-modal passenger information systems linked to automatic debiting services for the purchase of tickets, seat reservation, etc.

2.5. Maritime transport and inland waterways

Maritime transport

An important starting point for all research activities in the maritime transport field is the assessment of available technologies and the forecasting of required developments. The results will provide the framework for the specific research with the objectives of increasing quality and efficiency, improving safety and protecting the environment of maritime transport through the identification and development of common solutions to the major problems, not only strategic but also technological, for the development of operational systems which integrate new generic technologies, standard procedures, organizational factors and human resources. Particular emphasis will be placed on the issues of interconnectivity and interoperability for maritime traffic elements, such as Vessel Traffic Management and Information Systems (VTMIS), to provide solutions and support the need to integrate locally distributed systems to form a trans-European network.

Firstly, the work will address, amongst other things, the evaluation and modelling of maritime transport supply and demand and flows of goods, at both world and intra-European levels. In particular, the role of short-sea shipping (including ferries) will be analysed within the framework of the logistics chain and the need for harmonization of procedures. This will include the development, integration and evaluation of sea/inland waterway systems and analysis of competitiveness between operators (both Community and non-Community) for the whole operation (land and maritime), management structures, the chain of human resources and the quality of service (total quality control, etc.). The need for the introduction of high-speed short-sea transportation units will also be addressed, in the light of the Common Transport Policy, of market demand, and of the research into the technological cost-effectiveness of fast ships (construction, propulsion and safety) being carried out in the Industrial and materials technologies programme.

Secondly, the work will simulate, evaluate and demonstrate the contribution of new technologies, notably those developed under other specific programmes, to the improvement of maritime traffic management. Aspects related to port facilities and the land/sea interface will be particularly addressed; information exchange between ports and port communities will help the flow of goods, improve safety and the interface role of ports. It is also necessary to analyse and develop new techniques for the whole operation (ships and ports), notably taking into account the necessity of promoting across Community ports the harmonized use of cargo handling methods adapted to the state of technological development achieved in Europe.

It is also necessary to analyse the options for improving the provision of maritime transport through the application of new technologies, notably new rapid transfer systems for goods and passengers and, of their reliance on good port design, management and operation; on professional qualifications and on infrastructure capacity. This will address the definition of a new generation of operating systems and higher-performance ships, able to ensure more efficient, safer and environmentally friendly operations (e.g. higher speed, reduced emissions and fuel consumption). The use of alternative, more environmentally friendly energy sources will also be examined, as will improvements in maritime operating conditions; and improvements in ships' maintenance.

Thirdly, bearing in mind that failure to implement sound safety procedures may cause death or injury to people, damage the environment, and affect the competitiveness of operators, the work will also evaluate the factors having an influence on maritime safety. It will cover both the safety of traffic and the safety of on-board operations. The risks and safety of maritime operations will be analysed, with particular reference to structural failure; mechanical and electrical failures; navigational errors; operations in restricted and sensitive areas, or under extreme weather conditions; the management and monitoring of dangerous goods and the control of pollution, with particular regard to the disposal and treatment of ships' waste in ports. The impacts of the whole chain of human factors on the safety and efficiency of the maritime transport system will be assessed (e.g. ship operation, traffic management and control, shore-based operations), with a view to preventing accidents. Common

criteria for establishing the level of training of crews, as well as procedures for the whole operation (ship and shore-based), communications and traffic management will be developed. Simulation methods for traffic scenarios will be developed.

The application of integrated telematic tools will be evaluated, including the development of common methodologies to support management and ensure interoperability of the maritime navigation and safety systems, e.g. GMDSS, by the European maritime administrations.

Inland waterways

The work will address the integration of new generic technologies together with organizational factors and human resources for inland waterways.

It will analyse in particular the role of this transport mode in the whole chain and will define evaluation criteria for scenarios which are able, as a whole, to reflect the importance and potential of inland waterways and in particular, the obstacles which could hamper the development and transfer of goods transport demand to inland waterways.

In particular, the work will enable the transfer of the results of generic technology research to inland waterways with respect to cost-benefit, safety and environmental impact criteria, notably to improve the whole operation of ships and ports. This will include the development of the sea-river link, the basis for the waterborne transport concept. The strategic aspects of operating a comprehensive and integrated system of inland waterway transport for example on the Rhine-Main-Danube axis must be thoroughly researched, with particular reference to the transport of dangerous goods. It will also be necessary to examine the evolution of barge construction and characteristics as a function of increased speed, reduced emissions and energy consumption. Similarly, human factors with regard to safety on barges and inland infrastructure need to be analysed, particularly the requirements for certification, training and the operational use of information and communication means. Finally, the work will address restrictions to navigation, low-depth hydrodynamics, infrastructure, ports, traffic management and organization, and goods information flows.

2.6. Road transport

Research should contribute to the provision and improvement of the road infrastructure to the efficiency of operation, to the reduction of land use and pollution, devising measures to improve safety of the European road transport (including determining whether the increase in road haulage has affected road safety), and in the management of demand for road transport. It will inform decisions about the need for legislation in support of the Community's transport policy. It will be set in the context of the wider policy goals of enabling the road transport system to play a full part in the creation of an open and competitive market in Europe; and of ensuring the exploitation of research results through the introduction of innovative products and systems. Road Transport includes passengers and goods with cars, trucks, buses, bicycles, pedestrians and other road vehicles. RTD should contribute to the following areas:

— traffic demand management (long term),

— traffic, transport and information management (TTIM) (short and medium term),

— traffic safety,

— road infrastructure.

Experience suggests — not only in the field of road transport — that research findings are often not implemented for technical, economic, legal, political or social reasons. The implementation process must be improved if value is to be obtained for the money spent on research. Ways of overcoming such barriers in the road transport sector will be investigated. Implementation issues should be addressed on the basis of a coherent approach to the evaluation of various types of projects and programmes within the road transport sector. In particular, the implementation problems that might

arise from a variety of procedures and technologies for collecting charges from road users must be assessed. The institutional and legal problems of developing information services for road users will be studied; as will the problems of enforcement of laws and regulations.

Management of demand

On the road network, demand can sometimes outstrip supply. The aim of the research is to help sustain mobility and accessibility by matching the demand with the available supply of roads, while taking account of increasing environmental constraints. Transport demand management is defined as the implementation of policies and strategies designed to optimize the use of roads by both cars and heavy goods vehicles. This definition allows a wide range of potential shifts in behaviour, including multimodal transport and changes in time-period.

The questions of management of demand are generally dealt with in Area 1 of this programme. Specific research for the use of road transport will be carried out in addition to Area 1 and Urban Transport and in coordination with them. A wide range of policy instruments and technological innovations should be examined e.g. alternative fiscal measures, road pricing. Alternative scenarios will be developed, using modelling and simulation techniques where appropriate. Modelling techniques for land use, transport and modal split using GIS technology should be examined by full scale demonstration projects.

Traffic, transport and information management (TTIM)

TTIM covers all road users, including cyclists, pedestrians and those with mobility problems. It aims at best use of the existing infrastructure in European conditions by using real-time information for the effective management and control of the road network whilst taking account of the needs for improved safety and environmental protection. Problems related to the management and control of recurring and non-recurring congestion, and the facilitation of the urban/inter-urban interface, should be studied. The practical experience in implementation, and the results from existing TTIM systems and TTIM pilot projects, achieved in the Community programmes and in the Member States should be investigated. The results from this investigation should serve as a base for further research in the field of TTIM. Solutions should be capable of rapid implementation and will form an integrated part of the transport system.

Safety

Road accidents cause some 50 000 deaths each year in the Community, and considerably more injuries, with enormous economic consequences. The aim of the research is to increase the safety of all road users. Areas for research are:

— analysis of risk on the road and the causes of accidents (particularly the effects of speed), together with the construction of common definitions to enable data to be used on a comparable basis throughout the Community,

— the safety of road infrastructure (design geometry, signs, control signals, lighting, surface properties etc.) and of temporary road works,

— road user behaviour, taking account of the age factor, and ways in which it can be affected, e.g. changes in legislation/regulation, training, enforcement measures, information and publicity,

— the use of standards and development of the necessary methodologies as a means of improving both primary safety (accident reduction) and secondary safety (injury to vehicle occupants and other vulnerable road users such as pedestrians, cyclists and the disabled),

— risk analysis of the movement of dangerous goods, and management strategies for incidents involving such goods.

Road infrastructure

This research will contribute to the optimizations of the European network by reducing the construction and maintenance costs, taking into account the operating conditions over the lifetime of the pavement or structure without reducing the corresponding quality, by minimizing delays and accidents to road users, and by reducing the environmental impact of road construction and use. It will pay attention to the particular needs of the peripheral regions and islands, and of sparsely populated areas; consider alternative means of upgrading roads in these areas when such action becomes appropriate; and consider the problems of transit regions.

The research will secure a sound basis for the future development of Eurocodes and Euronorms by evaluating, in broad terms, prospective scenarios for design, common standards and performance criteria in fields such as 'intelligent roads'. All network infrastructure management strategies for construction as well as for maintenance need to take account of the wider network effects resulting from user costs through accidents, delays or diversions (congestion, road works) intelligent use of the network, and change in mobility of persons and goods.

Areas of particular interest will include the potential costs and benefits of harmonizing techniques (e.g. cost-benefit analysis) and geometric design standards of new road construction. Research should also refer to improved technologies and management systems for pavement and construction maintenance. Improvement in pavement design would allow maximum advantage to be taken of advances in the development of new and recycled materials. A wider issue for road design is the need to reduce the impact on the environment (including noise and vibration) arising from roads.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	(ECU million)
1. Strategic research for a trans-European multimodal network (definition, demonstration and validation)	48
2. Network optimization	192
2.1. Railways	38,5
2.2. Integrated transport chains	16,5
2.3. Air transport	38,5
2.4. Urban transport	26,5
2.5. Maritime transport and inland waterways	45,5
2.6. Road transport	26,5
Total	240 (1)

(1) Of which:
— a maximum of 4,65 % for staff expenditure and 3,65 % for administrative expenditure,
— ECU 2 million for the dissemination and optimization of results;
— up to 5 % for specific measures in respect of SMEs.

The breakdown between different areas does not exclude the possibility that projects may come under several areas.

ANNEX III

SPECIFIC RULES FOR IMPLEMENTING THE PROGRAMME

The programme will be executed through indirect action, whereby the Community makes a financial contribution to RTD activities carried out by third parties or by JRC institutes in association with third parties:

1. Shared-cost actions of the following types:

   (a) RTD projects carried out by undertakings, research centres and universities.

   Community funding will normally not exceed 50 % of the cost of the project, with progressively lower participation the nearer the project is to the market place. Those universities and other institutions which do not have analytical budget accountancy will be reimbursed on the basis of 100 % of the additional costs.

   (b) Technology stimulation to encourage and facilitate participation of SMEs in RTD activities:

   (i) by granting awards for carrying out the exploratory phase of a collaborative RTD activity, including the search for partners, during a period of up to 12 months. The award will be granted following the selection of an outline proposal to be submitted normally by at least two non-affiliated SMEs from two different Member States. The award will cover up to 75 % of the cost of the exploratory phase, without exceeding ECU 22 500 per successful applicant SME; and

   (ii) by supporting cooperative research projects, whereby SMEs having similar technical problems but not having adequate own research facilities, engage other legal entities to carry out RTD on their behalf. Community funding for cooperative research projects, involving normally at least four non-affiliated SME's from at least two different Member States, will normally cover 50 % of the cost of the research.

   Following an initial call, in both cases proposals may be submitted at any time during the period covered by the work programme being implemented.

2. Measures appropriate for this specific programme

   — measures in support of standardization, and measures aimed at the establishment of tools of general value to the objectives of the programme,

   — financial support for field tests aimed at assessing the cost-effectiveness and environmental and socio-economic effects of introducing new technologies or concepts, and for reinforced coordination actions.

   The Community participation may cover up to 100 % of the costs of these measures.

3. Preparatory, accompanying and support measures, such as:

   — studies in support of this programme, and preliminary actions in preparation of future activities,

   — publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out within the third action; the factors liable to encourage use of results will be taken into account from the outset and throughout the duration of RTD projects, the partners in which will constitute a key network for diffusion and exploitation of results,

   — analysis of possible socio-economic consequences associated with the programme, which will also contribute to the programme 'Targeted socio-economic research',

   — training actions for researchers and users in the area of transport in order to stimulate technology transfer and enhance employment skills,

   — measures in support of the operation of networks for increasing awareness and providing decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD.

   The Community participation may cover up to 100 % of the costs of these measures.

4. Concerted actions consisting of the coordination, notably through 'concertation networks', of RTD projects in the programme and those already financed by public authorities or private bodies. Concerted actions may also serve as the necessary coordination for the operation of common interest groups which, through shared-cost RTD projects (See 1 (a)), bring together around the same objective, manufacturers, network operators, service providers, users, universities and research centres.

   The Community participation may cover up to 100 % of the costs of the concertation.