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COUNCIL

COUNCIL DECISION

of 23 November 1994

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

(94/801/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 telematics applications of common interest; 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 843 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, competitiveness and employment'; whereas the European Council of Brussels on 10 and 11 December 1993 decided, on the basis of that White Paper, to implement an action plan consisting of concrete measures at both European Union and Member States level, notably with respect to information infrastructures and new telematics applications;

Whereas the development and introduction of new generations of telematics systems and services is essential to the implementation of Community policies, in particular to the consolidation of the internal market, to the efficiency of cooperation among researchers in Europe and to increased competitiveness of European industry;

(1) OJ No C 228, 17. 8. 1994, p. 1 and OJ No C 262, 20. 9. 1994, p. 1.
(2) OJ No C 205, 25. 7. 1994.
(3) Opinion delivered on 2 June 1994 (not yet published in the Official Journal).
(4) OJ No L 126, 18. 5. 1994, p. 1.

Whereas telematics applications shall contribute to improving the quality and the efficiency of services of public interest, the access to knowledge sources and the conditions of life of citizens; whereas they shall stimulate the creation and exchange of electronic information in all languages of the European Union;

Whereas it is essential to involve users in all phases of RTD projects so that they can express their needs and be trained in using the results;

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 telematics applications of common interest;

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 support only RTD activities of high quality;

Whereas the rules for the participation of undertakings, research centres (including the Joint Research Centre (JRD)) 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 provison 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 effort 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 telematics applications of common interest by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas, in view of the increasing convergence between information technologies, telecommunications technologies and telematics, the programme should be implemented in close coordination with research programmes in the field of information technologies and advanced communications technologies and services, so as to reinforce the synergetic effects thereof;

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 this programme should also comprise activities 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 there is also a need to carry out research, in liaison with the targeted socio-economic research programme, firstly into the social impact of telematics applications on the organization of production and labour and secondly into the interaction between the European citizen and the information infrastructure;

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 the 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 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 telematics applications of common interest, 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 843 million, including a maximum of 9,8 % 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 pursuant to 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 domains 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 the fourth framework programme 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 lines 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 acitvities 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 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 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) above shall apply to:

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

— the content of the calls for proposals,

— 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, ECU 1 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 1 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

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

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 1.A of Annex III, first activity of the framework programme, is an integral part of this programme.

Introduction

The new focus of RTD in the specific programme on telematics applications is the use of the emerging information and communications infrastructure, which will provide the basis of the information society of the future. The RTD areas proposed are those most vital to the development of the information and communications infrastructure, taking into account the need for selectivity and concentration of effort, and with the objective of improving the competitiveness of all industry and the employment situation in the European Union, and of enhancing the quality of life for citizens, in particular by facilitating their access to the information infrastructure.

Information and communication technologies (ICT) are rapidly and continually developing. They can be used in often complex set-ups to offer all sorts of users, particularly those in public services and private individuals, new ranges of products and services to meet basic economic and social needs. The term 'telematics applications' is used to refer to all the systems (hardware and software) and services (distance training, teleworking telemedicine, remote management of road or air traffic etc.) which use combinations of these technologies.

RTD in telematics applications makes it possible to establish a link between progress in ICT and user needs. It also enables telematics systems and services to develop in parallel with technological progress, making them easier to use. The impact of research of this kind is considerable, provided that the telematics solutions developed are well suited to user requirements and that account is taken of the need for European-level interworking.

The successful introduction of telematics throughout Europe could lead to an improvement in the quality of life and working conditions, better organization of work within businesses and administrations, a new impetus to economic growth which will boost employment — being based on new products and services — consolidation of the internal market and the strengthening of the economic and social cohesion of the European Union.

In addition, by drawing on the results of other ICT research programmes, Community RTD on new telematics applications of common interest (Telematics Programme), will also help to capitalize upon the financial investments already made in programmes such as Esprit or RACE.

Finally, the European Council of Brussels, 10 and 11 December 1993, emphasized the importance of new telematics applications for investment and employment, in the areas of teleworking and teleservices for education and training, for health care or for transport, on the basis of the 'White Paper on the medium-term strategy for growth, competitiveness and employment'.

I. THE CONTEXT

The Telematics Programme has two aims. One is further to promote the competitiveness of European industry and the efficiency of services of public interest and to stimulate job creation through the development of new telematics systems and services in such areas as telework and teleservices. The other, which is a new feature contained in the Treaty on European Union, is to promote research activities necessary for other common policies.

The RTD will be based on the experience gained under the third framework programme but will be directed in three new ways. Firstly, the emphasis will shift from data telematics to the new 'multimedia telematics'.

Secondly, more importance will be attached to user requirements. Finally, particular attention will be put on finding affordable solutions.

Guidelines for project management

As a rule, each project could be implemented in five phases, with close involvement of the concerned users at every stage.

First, priority will be given to identifying specific user needs, either latent or explicit. The users comprise a very wide range of bodies, for example administrations or businesses which need to make use of teleworking, and several categories of individuals, such as researchers, librarians, members of the medical profession, air-traffic controllers or handicapped persons who need to use networked multimedia work stations.

Secondly, translating these needs into telematics terms will lead to the definition of a set of functional specifications based on the common requirements of the users concerned, including the issue of data security, confidentiality and personal privacy. These specifications will also have to ensure that the telematics equipment and services can inter-work at a European level.

Thirdly, the specifications will be used as a basis for pre-competitive, pre-normative and pre-legislative demonstrators, following RTD work which seeks to integrate four elements.

The first three elements are generic: generic networks (e. g. high-capacity optical fibre or satellite communications networks), generic equipment (multimedia work stations, portable data storage and processing devices etc.), and generic services (e. g. multimedia electronic mail, remote access to data or knowledge, possibilities for interactive simulation and virtual environments).

The fourth family of elements will cover specific hardware and software. These will be the object of specific research by the individual project so that the resulting application closely meets user requirements. However in order to ensure the economic efficiency of this systems integration, maximum use must be made of the generic elements resulting from other research programmes — particularly RACE and Esprit. In this way, there will be close interaction between the first three specific programmes of the framework programme (1994 to 1998). In addition, close links will be established with public and private telecommunications network operators, service providers, and the electronics and computer industries.

Fourthly, the demonstrators developed in this way will be validated in working situations by user groups. Involvement of the appropriate public and private institutions will be even wider than in previous programmes, to help the subsequent dissemination of the new telematics applications. These validation tests could include iterations, whether to review the functional specifications previously adopted or to complete other RTD work on specific components, and even to make use of the other ICT research programmes further upstream.

Finally, after this feedback process, the applications which are successfully validated will be accompanied by a plan for the exploitation of the results obtained, recommendations to standards institutes and to legislators, and a reference manual for their successful implementation.

The RTD work carried out in the projects will have to anticipate, as fully as possible, the usage requirements of handicapped and elderly people, who represent about one-quarter of the European Union's population. To this end, RTD work will need to ensure that the applications developed can be upgraded so as to address, in the most cost-effective way, the needs of these categories of users.

Guidelines for the management of the overall Telematics Programme

The management of the programme as a whole will endeavour to ensure that research will take better account of user requirements and aim to achieve greater economic efficiency. This will particularly involve avoiding costly duplication of effort between projects and ensuring that similar applications from different

RTD fields use a maximum of common elements. Consistency and economic efficiency will be the guiding principles for a specific programme of research on telematics which covers many sectors.

During the third framework programme the approach taken was largely empirical. In all the sectors covered, frequent meetings between people working in the same area but on different projects (vertical 'concertation') stimulated exchange of information, and aimed to avoid wasteful duplication of effort in the development of demonstration projects. In addition, the exchange of experience at the validation stage between projects and representative user groups made it easier to formulate practical recommendations on how organizations could themselves introduce the new telematics applications.

This pragmatic approach will be continued and improved. Inter-disciplinary or 'horizontal' meetings will be organized. These will bring together people working on projects in a variety of sectors but dealing with similar subjects, such as the development of tele-working (for researchers, doctors or officials in either a rural or urban context), human-machine interfaces and ergonomic aspects, or the improvement of trans-European telematics networks and services (where the users may be researchers, administrations, organ banks or air traffic controllers).

In addition, this empirical approach will be backed up by research on telematics engineering as part of the horizontal RTD work under the programme.

Finally, particular attention will be given to the coordination of this Community research action with similar activities at both national and European levels (Eureka, ESA, Eurocontrol etc.).

In conclusion, by promoting the development of telematics systems and services which are well suited to user needs and that are technically and economically efficient, the Telematics programme will help strengthen the competitiveness of the European economy. It will also stimulate the investment necessary to provide Europe with an effective information and communication infrastructure and help ensure that this investment bears fruit.

The activities will concern nine vertical application sectors regrouped around three major areas:

— telematics for services of public interest: administrations, transport,

— telematics for knowledge: researchers, education and training, libraries,

— telematics for improving employment and the quality of life: urban and rural areas, health care, elderly and disabled people, environmental protection.

A fourth area will address three RTD activities of a horizontal nature: telematics engineering, language engineering and information engineering, which will support and reinforce the sectoral activities.

This set of activities will be complemented by a fifth area, consisting of a series of horizontal actions, such as the dissemination of results and other preparatory, accompanying and supporting measures, including international cooperation, and the training of researchers and users.

Measures for technology use stimulation, based on feasibility grants, will be implemented to encourage and facilitate the participation of SMEs, taking account of the needs of those from less advanced regions.

II. RESEARCH AREAS

AREA A - TELEMATICS FOR SERVICES OF PUBLIC INTEREST

1. Administrations

Systems for processing and exchange of information between administrations will be implemented under the TNA/IDA programme (Telematics Network for Administration/Interchange of Data between Administrations). A set of guidelines has been drawn up for TNA and will be used as a basis for feasibility studies and pilot projects as part of the IDA multiannual Community action. As a consequence, research, development and demonstration activities will need to be carried out upstream to support the TNA/IDA programme in order to ensure that technological advances in the area of multimedia telematics can subsequently be made available for use by administrations.

Aim

The aim is to enable the implementation by administrations of the relevant results of telematics research as they become available, thus bringing about a swift improvement in the economics and efficiency of public services at a European level. As a result of the improved effectiveness and efficiency, administrative costs of European businesses can be substantially reduced, thus contributing to the strengthening of the competitiveness of European industry. Administrations will be able to introduce new telematics systems and services, while rationalizing existing infrastructures and capitalizing on investments already made with a view to improving the public service. These RTD actions will equally promote and define open standards, which can be used in specifications for procurement contracts in connection with telematics applications.

Nature of the work

Two aspects will be covered. The first will involve the development of telematics applications facilitating the exchange of information between administrations and between administrations and businesses required to provide those administrations with information. This work will make the new technologies available for use by the administrations which have become vital for the operation of the single market and the implementation of the Treaty on European Union. It could concern subjects such as image transfer (e. g. the rapid update of hydrographical or geographical maps required for the remote management of sea and road traffic), the use of multimedia and video-conferencing systems between administrations (e. g. for teleworking between national and Community administrations and thus avoiding translation and interpretation resources becoming over-concentrated in Brussels), or the development of multimedia information servers for public procurement and regulations. Validation and development at a trans-European level should be done before 1998.

Secondly, great importance will also be attached to the methodology for implementing telematics applications. In order to ensure a maximum level of efficiency and security in the links between administrations, research will take account of previous work on security within public telematics networks (notably with respect to financial, economic and social statistics), on language differences, on the use of electronic signatures and on the legal implications of data transfer between countries. The work must also involve the development of appropriate tools and methods for analyzing the quality and performance of the services offered to administrations.

Validation tests and pilot projects

In order to help administrations introduce new telematics systems rapidly and, where appropriate adapt their internal structures accordingly, the validation tests will be based on advanced telematics services, which will be made available to the administrations as the need arises. Businesses in the computer and telecommunications sector and the administrations concerned will be closely and actively involved in this work. By making a direct contribution to the validation of the solutions envisaged by the programme, they will help clear the way for swift dissemination of the results obtained within the administrations and the subsequent adoption of technological advances.

2. **Transport**

The third framework programme showed, via a series of tests and pilot projects, that telematics systems and services could help reduce road congestion, increase the mobility of persons and goods, improve road safety, reduce pollution and protect the environment — in other words they could contribute towards achieving the general objectives of the common transport policy.

Aims

The Telematics programme will continue and consolidate the research on telematics in road transport and Community RTD should be extended to other modes of transport, and air transport in particular, in order better to contribute to the achievement of the aims of the common transport policy, while strengthening the competitiveness of European industry and allowing a significant deployment of Transport Telematics systems and services before the year 2000. Close coordination will be assured with those research activities related to transport which are carried out in other specific programmes: 'Industrial technologies', 'Clean and efficient energy technologies', and 'Transport', including the legal and organizational problems which have to be overcome if Transport Telematics applications are to be implemented successfully throughout the Community.

Nature of the work

The RTD work will cover the entire telematics set-up in the transport sector, from data capture and processing to transmission and reception. The RTD should ensure an industrial coherence between all the different elements concerned, draw up compatible specifications and interfaces as well as common recommendations for use which will guarantee the interconnection of networks and the interoperability of equipment and services. Those aspects relating to the implementation of these telematics applications will also be taken into account.

The RTD work will pay particular attention in taking the needs of users into account. In addition, emphasis will be placed on research on telematics tools common to various modes of transport, and on the development of advanced telematics applications likely to lead to significant progress as regards transport efficiency and safety. These applications could call as much on terrestrial telematics networks as on communications and navigation satellites. The effects of telematics applications on travel patterns and transport demand will also be examined. Finally, transitional strategies will be devised for the implementation of different generations of telematics systems.

As far as road transport is concerned, work will address the development and integration of advanced telematics systems and services for traffic control, for the management and operation of passenger and goods transport, both urban and intercity. It will be necessary to have pilot and demonstration projects building on the results of the third framework programme. They will be undertaken in cooperation with other relevant specific programmes and with national or European programmes.

Other actions will aim to complete and improve tools for assisted driving: advanced communication and navigation equipment and services, systems for enhancing vision, tools for monitoring the behaviour of the vehicle, driver-alert systems and collision-avoidance systems. The integration of these elements should provide a telematics solution for computer-assisted motorway driving which, among others, will particularly benefit commercial vehicles. Some of these telematics applications may also be adapted for urban traffic.

This work will be mindful of the economic constraints.

The research work will also cover telematics applications which aim to help road users (traffic information to assist in the choice of transport means, itinerary, etc.), to increase the safety and security of users and to help manage demand on the tranport infrastructure.

These research activities will continue to be closely coordinated with the specific programme on 'Transport', with ' Eureka' and with related national research programmes.

In the field of air transport, in order to improve the quality of service offered to the end-user, the emphasis will be on the development of telematics applications to establish a harmonized and, ultimately, unified air traffic management system for Europe.

In the first place, telematics applications using satellites and advanced communications networks will be developed to improve the location, monitoring and navigation of aircraft and to perfect in-flight or ground anti-collision systems and aids for all-weather landing.

In the second place, work will contribute to the modernization of existing air traffic management systems by developing the trans-European telematics aeronautics network and easing the task of air traffic controllers and pilots by means of multimedia telematics tools which integrate aids for decision making. Recent progress on virtual environments will also be exploited.

All these activities will be coordinated with existing work by other specific programmes on transport research, by European organizations such as Eurocontrol or ESA and by national civil aviation bodies.

In the area of sea transport, research activities will concentrate on using Telematics applications to enhance ship-to-ship, ship-to-port and ship-to-land communications. Specific Telematics applications will be developed to improve both security, traffic control and management, particularly on harbour approaches, in order to improve traffic flow, as well as to protect the environment and optimize the logistic resources in the transport chain.

With a view to extending the use of telematics tools common to the various modes of transport and thus reducing costs, research work will also cover inland waterways and railways. Work on telematics

for railways will cover, on the one hand, a new generation of control and communication systems with a view to increasing the capacity of the infrastructure and, on the other hand, passenger access to multimedia services.

As regards multimodal transport, of merchandise and of passengers, new telematics systems and services will be developed to improve the integration and running of the transport systems as a whole, to provide travel information and to facilitate the optimal choice of transport modes. As far as passenger transport is concerned, the emphasis will be placed on the use of public transport systems. Telematics applications will also be developed to optimize the use and management of multimodal transport, which will also require research into means of direct communication with the appropriate administrations.

Attention will be paid to controlling the impact of transport on the environment: This will involve the development of telematics applications which will allow the implementation of strategies aimed at reducing pollution produced by the various means of transport and to minimize the risks resulting from the movement of hazardous substances.

Finally, work is foreseen on activities to integrate, within the telematics applications themselves, Geographic Information Systems (GIS), adapted to the various modes of transport. This will be based on the results of the Community Programme on the development of the information market (Impact) and will be coordinated with work carried out under the specific programme for 'Transport'. In addition, before the launch of pilot projects for real-life validation, it could be useful to undertake laboratory-based simulations with the aid of models to be developed in the framework of the present specific programme.

Validation tests and pilot projects

These actions will be conducted with the active participation of the appropriate local or national authorities. They will take place in close coordination with the validation activities of other specific programmes dealing with research on transport. They will make it possible to verify the technical performance, operation and user acceptance of the resulting telematics solutions for optimizing air traffic control, the integrated management of urban and motorway traffic, 'intelligent' motorway driving, automatic control of railways and the management of maritime and multimodal transport.

AREA B - TELEMATICS FOR KNOWLEDGE

3. Telematics for research

Research workers in Europe increasingly need efficient channels for exchanging information. They also need remote access to experimental installations, scientific data banks or high-performance computers in various parts of the European Union or in other corners of the globe.

Aim

The aim is to develop advanced telematics applications which will, on the one hand, enable European researchers to cooperate and work together regardless of where they are in the European Union and, on the other hand, will facilitate access of users to research results. National or specialized networks already exist, but we must now enable them to take advantage of the progress which has been achieved in high-performance networks and, above all, to interconnect them with high-capacity European links. This European research infrastructure will be one of the most important means for coordinating national RTD efforts in the European Union. In addition, the results obtained will also benefit the areas covered by the other telematics applications. Close collaboration will be assured with the appropriate related themes in the IT (High Performance Computer Networking) and the ACTS (High Speed Networks) Programmes.

Nature of the work

Solutions must be found to the problems arising from the conduct of complex research experiments, possibly between remote sites, and from the use of large computer networks which have to operate in an open environment, with a range of different systems and high-capacity communication services. The questions to be dealt with will particularly concern the inter-working of these systems, the quality of services available on the networks, and their reliability, availability and security. The research will cover the architecture and protocols for computer networks and the management, monitoring and protection of these networks. Three aspects will be covered.

Firstly, particular attention will be paid to validating the improved interconnections of national and multinational networks at European level, and particularly to increasing the bandwidth rate needed for applications proposed by network users. Over the period 1994 to 1998, it should be possible to increase this rate to 34 megabits and subsequently to 155 megabits per second. This type of interconnection is vital if Community research is to maintain its position in the world; it will also have a decisive effect on the future of European industry.

Secondly, the work will concern the advanced distributed multimedia services that support cooperative research, as much academic as industrial. It will particularly involve the development of telematics tools to permit, on the one hand, access to knowledge on the large scientific computer networks of the future and, on the other hand, cooperative work at a distance, particularly through remote monitoring of experiments, teleworking or video-conferencing in scientific circles.

Finally, work will need to address ways of selecting, searching and presenting scientific information or results of research in progress to make them easily accessible to those users who wish to exploit them, whilst taking account of intellectual property rights.

Validation tests and pilot projects

With its 700 000 scientists and engineers, a large proportion of whom work in the physical and natural sciences, the research community is an ideal population of leading-edge users for validating advanced telematics applications. This will ultimately be to the benefit of other categories of users. Standardization activities will also be stimulated through this process. These validation tests will use the national broadband networks and interconnections at European level. They will be of particular benefit to the user community involved in the first action under the fourth framework programme (RTD on industrial technologies, the environment, life sciences and technologies, energy, and information and communication technologies). These activities will be carried out in close coordination with initiatives in other parts of the world, particularly central and eastern Europe, so as to strengthen the links between scientists in the European Union and beyond.

4. Education and training

In a world undergoing major changes, effective education and training systems can contribute to the competitiveness of the European economy and to the personal development of citizens throughout their lives. All businesses, particularly SMEs, now face the challenge continuously to adapt the skills of their staff. At the same time, an increasing number of students and employees — particularly of the younger, computer-literate generations — are calling for new types of initial and continuing training which are suitable for their individual needs and limitations, and which corresponds to developments in knowledge and know-how. The work carried out under the third framework programme has shown that telematics can greatly help educational establishments, training bodies, training departments of businesses and individuals and training departments of businesses in taking up the challenges facing them.

Aim

The aim of this action is to extend this research to keep up with the advances of other developed countries by making use of the continuous progress in multimedia communications via broad-band networks or satellites, and advances in interactive simulation or virtual environments. This would aim to make the services on offer more interactive. It would facilitate remote access to multimedia documents and services, and personalize education and training programmes. There will be close coordination with the new specific programme on 'Targeted socio-economic research' and the fourth action in the framework programme on the training of researchers, as well as with the other Community activities in connection with eduation and training, including those addressing more specifically SMEs.

Nature of the work

Two fields will be covered. In each field, emphasis will be placed on research on low-cost telematics solutions. Firstly, following up the work under the third framework programme, work will continue on developing and validating telematics services using the most appropriate combination of existing communication networks (satellites, ISDN, interactive cable networks). This will be done following an in-depth pedagogic, technical and economic study, carried out in a real operational environment, of each type of service and each type of user (university and college, large industry, SMEs, individuals). This action must see that the European networks of libraries can provide access to large knowledge-bases for users of distance training.

Secondly, a new generation of telematics applications will be developed to permit distance teaching and group training by means of video-conferencing, computer assisted conference networks and multimedia electronic message systems. These applications will be particularly based on 'telewriting', group work via networks, and access to distributed course banks, multimedia libraries and 'virtual laboratories', which permit experiments to be carried out remotely. This will necessitate research on multimedia telematics applications for distance training using existing broadband networks and satellites.

There will also be work on personalized training and new types of learning. In particular, training systems will need to be integrated into individual work stations — either stand-alone or networked — for *in situ* vocational training. Methods for designing personalized interactive teaching programmes will also be investigated, for example those used for producing electronic books. Attention will also be given to finding personalized telematics methods for the training of researchers in Europe. Importance will be attached to language teaching, which is of vital interest for Europe, by using, *inter alia*, voice-recognition techniques and voice mail. Finally, research will also concern the new forms of education and training made possible by virtual-environment techniques.

Validation tests and pilot projects

The applications developed will be evaluated in a real-life situation, with particular attention being given to the technical feasibility and implementation process, with emphasis on user reactions, ergonomic aspects, pedagogical efficiency, economic viability and the implications for the organization of education or training. Local, regional and national authorities will be closely involved in these activities.

The validation tests will be based on university or professional training networks aimed at specialists, particularly researchers and engineers, who will receive individual or group training, as well as other categories of potential users affected by the research of the Telematics Programme, such as librarians or doctors. Attention will be paid to the validation of telematics applications geared to the needs of SMEs. The validation tests will also permit the networking of educational establishments and training centres so that they can share their resources. These different experiments will thus provide the basis for European supply of teleteaching and teletraining services.

5. Libraries

The future of our modern societies and economies depends more and more on the exploitation and dissemination of knowledge and information, yet the vast wealth contained in Europe's libraries remains under-used. The European Union is at a disadvantage in this respect. Most libraries do not yet take full advantage of the opportunities offered by new information and communication technologies and are not linked up with telematics networks. More and more libraries are now automating the internal management and exploitation of their documentary and bibliographical resources. However, it is not yet possible to access these resources easily through networks or to use the catalogues of more than one library at a time. Only a small core of libraries so far have solid experience in the development and use of telematics applications.

This rather unbalanced situation means that vital sources of information are not readily available to network users, despite the fact that libraries should be at the hub of the European knowledge infrastructure. In this respect, the research will contribute to the improvement and development of telematics links between libraries, publishers, researchers, universities, colleges and training centres.

Aim

The aim of this action is to contribute to the creation of a common European area for libraries by launching applications to increase the ready availability of library resources across Europe and by facilitating their interconnection with the European information and communications infrastructure.

Special attention will be paid to the telecommunications needs of the major libraries. To this end, the work will aim to demonstrate the possibility of advanced interconnections by 1998 at Community level between libraries which can act as network nodes at national level to promote the introduction of telematics applications in less technologically advanced libraries and to support the effort to increase the technological skills and awareness of library staff through exchange of experience and best practice.

Nature of the work

The RTD work will be based on the results of the exploratory action carried out under the third framework programme, which helped to create building blocks for the modernization and interconnection of libraries. The work will follow two main orientations.

The first concerns the development of advanced systems facilitating user access to library resources. This work will particularly involve perfecting methods for establishing and exchanging automated bibliographies and for making catalogues and other resources accessible on-line via existing networks. Work will also involve the development of methods for the electronic capture, storage and retrieval of documents in an extremely wide range of formats. Finally, electronic archiving techniques will be developed for the conservation and consultation of rare or fragile works.

Secondly, the RTD will concern the inter-connection of libraries, both with other libraries and with the European infrastructure. The main aim of this work will be to ensure interworking of applications designed for different types of library systems. They will also aim at establishing 'virtual libraries' which allow users to gain access to an array of networked library services and other sources of information from any point in the European Union. Finally, the work will aim to develop electronic links between libraries to achieve fast document delivery from different sources (databases, libraries, booksellers, publishers, etc.).

Validation tests and pilot projects

The validation of this work will involve different user groups such as researchers, students and companies, according to the types of services on offer by the libraries. It will also involve companies in the information and communications sectors, libraries, publishers, boooksellers and end-users. These validaton tests will be accompanied by measures aimed to promote standards for the exchange of library resources, to ensure the widest possible dissemination of the results and to support the efforts necessary for making library staff aware of the possibilities afforded by telematics systems and training them in their use.

AREA C — TELEMATICS FOR IMPROVING EMPLOYMENT AND THE QUALITY OF LIFE

6. Urban and rural areas

The ORA exploratory action under the third framework programme showed that rural areas could be made more attractive to the business world and the general public, by means of telematics systems and services. These would effectively improve service quality, make good use of the business environment, enhance living conditions for the population as a whole and create jobs through teleworking. In addition, urban areas in decline or the less-favoured areas of large cities suffering today from comparable handicaps, could also benefit from telematics solutions.

Aim

The aim of this action is to permit the establishment of new economic activities, the reinforcement of traditional activities and the improvement of living conditions in the interests of rural and urban areas with inadequate socio-economic and cultural infrastructures. Telematics solutions should permit, through teleworking, hosting new activities, providing remote access to basic services for enterprises — data banks, maintenance, assistance, vocational training — and offering indispensable services to people in these areas, with respect to medicine, training, culture and social services. These RTD activities should allow a significant deployment of teleworking and teleservices before 2000.

In the long term, the increased use of telematics could contribute to a reversal in the movement of population from rural to urban areas. This action will be closely coordinated with other Community activities and programmes on structural policy, particularly in respect of vocational training, as well as with the specific programme on 'Targeted socio-economic research' relating to social exclusion.

Nature of the work

The RTD work will concern the development and adaptation of telematics applications for two major purposes.

The first is teleworking, which can be implemented through home-workers, tele-service providers, subcontracting or collaborative business networks. Work will concentrate on the use of generic technologies such as multimedia work stations, tools for managing cooperative work across networks (groupware), audio- and video-conferencing, and the use of any or all available networks — public switched network, ISDN and the future broadband networks. The main objective is to increase the competitiveness and productivity of local enterprises, particularly SMEs, whose economic efficiency is a determining factor for employment.

The second area of activity is publicly available teleservices. The emerging technologies such as mobile digital telephones, interactive compact disks, very small aperture satellite terminals (VSAT) and interactive television will be the tools used to provide access to speech, data and video information. Private individuals, businesses, local authorities and administrations will be able to use these networks to search remote databases and specialized libraries, to consult voice mail, and to access services such as telemedicine, audio-visual services, teletraining and tourism and social services.

In order to tackle the problem of areas which are inadequately covered by cable or radio relay networks, work will also involve the development of systems using wireless communication to provide universal access to information and services. Special attention must be paid to interconnection and interoperability between local networks and national or international networks, particularly the emerging European infrastructure.

Validation tests and pilot projects

Areas for validation tests will include networks of partners already set up under the ORA project and other existing networks for cooperation between European cities (Eurocities, Telecities, etc.). These activities will be coordinated with the pilot projects implemented under the land-development plans of certain Member States or Community regional programmes. More attention should be paid to validation projects incorporating several telematics applications on the same rural or urban site. The exchange of experience between the various sites at national and European level will be encouraged and particular emphasis will be placed on ease of use and user acceptability of telematics applications.

7. **Health care**

Work under the third framework programme has shown that Telematics could help the public health systems in Europe to meet the challenges they are faced with in their effort to provide all their citizens with a high quality and cost-effective service. Likewise, the development of Telematics, including mobile communications applications, could help the medical professions to cope with the rapid advances in knowledge and the increasing complexity of their tasks.

Aim

The aim of this action is to continue the research in this area, enabling the entire health sector to benefit from access to telematics services at European level and allowing Europe to match the capabilities of other leading competitor countries. The action will encourage the introduction of new applications based on the whole range of both available and emerging technologies, with emphasis on multimedia tools.

Particular attention will be paid to the relevance, quality, confidentiality, consistency and security of medical data. There will be close coordination with the specific programme of research on bio-medicine and health and with Community activities on public health, particularly the 'Europe against cancer' and 'Europe against AIDS' programmes.

Nature of the work

Four fields will be covered. The first area concerns multimedia medical records of patients, particularly the 'medical image' component, its computerization and transmission, in a structured and standardized form, between the various health-care institutions and centres concerned (hospitals, specialists, general practitioners, medical analysis laboratories, social security sevices etc.). The definition, at a European level, of a portable and standardized medical record which comprises both data as well as images will also be covered through concertation between the actors involved and potential users. In this way, the

work will contribute to the establishment of a uniform and reliable health system for the entire population as much at a local and regional level as at a national or European level.

Secondly, work will concern increasing the resources available to the medical professions for diagnosis and treatment and improving health service management through the development of telematics applications. In this way, medical professionals will be able to communicate and exchange information concerning a patient or to consult a colleague. The RTD work will be aimed on the one hand at automating and screening certain diagnostic or detection procedures, the results of which can be directly communicated, with comments, via the telematics networks and, on the other hand, at integrating the hospitals' information systems, diagnostic equipment, expert systems and specialized systems for transmission of medical images. The equipment will be interoperable, compatible and modular, and emphasis will be placed on an open systems architecture, transferability of data and harmonized methods of connection to the telematics networks.

The rapid progress made in interactive simulation and virtual environments will also be used in order to develop 'virtual organs' for training surgeons or preparing for operations. Research will also cover remote medical assistance for surgeons by means of virtual environment technology ('telepresence').

Finally, telematics applications will also be developed to facilitate the management of medical resources, quality control for health care, processing and communication of epidemiological data and the implementation of monitoring and early-warning programmes.

Thirdly, the RTD work will cover telemedicine with a view to providing isolated patients with an adequate level of care and to permit remote consultation between doctors on difficult cases. New telematics services, based on interactive multimedia communication, will make the diagnostic and therapeutic competency of appropriate centres available to patients in peripheral areas or at sea. This will require the development of telematics applications guaranteeing total security in the exchange of biological signals and animated images via broad-band land networks or satellites. It should also be possible to carry out remote diagnosis e. g. the interpretation of medical examinations, or to provide remote supervision of treatment, such as renal dialysis, while maintaining total safety. These telematics applications will also be extended and adapted for monitoring patients at home or the victims of serious accidents at the actual site of the catastrophe.

Finally, telematics applications will be developed, on the basis of Community activities concerning the prevention of diseases, in order to provide health workers and citizens with appropriate information concerning tried and tested rules for the prevention and identification of major serious diseases.

Validation tests and pilot projects

The validation tests will be conducted in close cooperation with the health care sector. Particular emphasis will be placed on the integration of local health-care actions into the regional, national and trans-European telematics systems. This networking will primarily involve the interconnection of European centres of reference and excellence.

8. Elderly and disabled people

The TIDE exploratory action has shown that information and communication technologies could provide appropriate solutions to the specific needs of elderly and disabled people.

Aim

The aim of this RTD activity is to use information and communication technology in order to improve the autonomy and quality of life of disabled and elderly people and to facilitate their integration in the society and to match the capabilities of other leading competitor countries in this area. Attention will be paid to the identification of the needs and the validation by users of the applications developed. Finally, close coordination will be established with other specific research programmes in this field, such as 'Biomedicine and health' and 'Industrial and materials technologies', which also aim at using generic technologies, including biotechnologies or new materials technologies, for the benefit of disabled and elderly persons, as well as with the specific programme on 'Targeted socio-economic research'.

There will also be a close link with the Community social programme in favour of handicapped people (Helios).

Nature of the work

The research work will concern two main topics: access to telematics services and compensation for functional disability. In the first case, it must be made possible for disabled and elderly people, particularly those with cognitive and sensory impairments, to play a full part in economic and social life. The work will concern developing equipment — particularly audio-visual aids — and interfaces which will permit these categories of people to use telematics systems and services, both existing and under development, to facilitate their access to teleworking, information and distance training, or to cultural programmes. The work will also involve the development of 'intelligent' systems, such as remote control, alarm systems or systems for guidance outside the home, for managing working or private environments. Finally, appropriate systems will be developed for training these people in the use of the technical aids developed.

As regards compensation for functional disabilities, the work will involve developing applications using information and communication technologies with a view to restoring all or part of the functional capacities of disabled and elderly people. Particular emphasis will be placed on systems for improving mobility, interpersonal communication and the ability to cope with the immediate environment. This work will also be based on recent progress in virtual environments and remote control ('telepresence').

Validation tests and pilot projects

There will be a demonstration, in a real-life situation, of the technical feasibility and functional suitability of the systems and services developed under this action. Rehabilitation technology centre networks will be involved in the validation of the results.

9. **Exploratory action: telematics for the environment**

Exploratory actions to assess the potential for telematics solutions in other areas will also be conducted. The environment is the first topic to be addressed.

Aim

The aim of this action is to investigate to what extent telematics solutions are appropriate for protecting and improving the environment, in close association with the corresponding Community policy and the specific programme of RTD on the environment and with a view to stimulating the diffusion of telematics solutions as fast as in other developed countries.

Nature of the work

The research work will concentrate firstly on Community actions on the environment already being tackled in other specific programmes of research and which can draw on telematics solutions. This will particularly concern the European Agency for the Environment and the future Centre for Earth observation.

Also, the research work in this field will concentrate on automatic warning and monitoring systems concerning pollution levels in the atmosphere, rivers or seas. Applications will be developed to monitor nuclear power stations and industrial plants and to manage natural risks such as desertification, earthquakes, hydro-geological emergencies and forest fires. Research will also concern the development and interconnection of information networks and centres for the prevention of of these risks. The centres will have remote access to automatically updated databases and to systems for aid in decision-making. The extension of these networks to cover central and eastern Europe and the Mediterranean basin as a whole will also be considered.

Validation tests and pilot projects

The validation tests will be conducted in the most exposed urban areas, industrial and port areas, coastal areas, and river basins, in close collaboration with the appropriate local or national authorities.

10. **Other exploratory actions**

Proposals for other exploratory actions to assess the potential of telematic solutions in areas not covered in the Programme as well as other needs for telematics services which may be developed usefully during the course of the Programme can be submitted under the activities in the area of support actions. If considered appropriate, these other exploratory actions could be launched

from 1996 onwards in the context of a possible adaptation of the programme as provided for in Article 4 (1).

AREA D — HORIZONTAL RTD ACTIVITIES

The overall aim of these activities is not only to develop and validate applications that will support and reinforce the vertical activities but also to allow Europe to keep up with the major competitors in these areas.

11. Telematics engineering

Aim

The studies and research under this heading have three ends in view. First of all, work will involve devising tools and methods to enable researchers and engineers to develop telematics applications as efficiently as possible through the optimal integration of generic equipment, networks and services with specific equipment or software (applications engineering). The next task will be to identify and analyse changes to be made to the user environment so that a new telematics application can be successfully introduced (process engineering). Finally, cross-sectoral issues, such as data protection or intellectual property rights, will be tackled. These activities will be carried out in close collaboration with the specific programmes on information technologies and on communication technologies.

Nature of the work

The work on the process engineering in user sectors covered by the programme (hospitals, universities, administrations, etc.) will involve an evaluation of the impact and user acceptance of old or new telematics applications, such as teleworking, telemedicine or distance training. Comparative studies and research will be undertaken in the domains covered by the Telematics Programme (administrations, hospitals, research centres or companies introducing teleworking etc.) In particular, this work will take stock of the efficiency of administrative procedures, management practice and work organization in these various, public or private, bodies both before and after the implementation of telematics systems with a view to deriving practical recommendations which are as generic as possible and which respect the principle of subsidiarity. It should thus be possible to identify general methods which will permit, on the one hand, to re-engineer processes employed in the user sectors concerned under optimal conditions as regards economic efficiency and social acceptability and, on the other hand, an analysis of the advantages and savings resulting from the new telematics systems. Particular attention will be paid to ergonomic aspects so that the systems can contribute to the improvement of working conditions.

The RTD work on application engineering will concentrate on ways of integrating generic and specific elements, either hardware or software, so that the telematics applications developed in the various fields covered by the programme may have fundamental characteristics such as adequate functionality and reliability, greater flexibility of use, exploitation and management, and the possibility of incorporating subsequent technological progress. Special attention will be given to the search for modular and generic solutions as well as to inter-operability (protocols, interfaces etc.). This work will be based on the results and on-going activities of programmes such as those addressing informations technology and telecommunications or similar initiatives, and on the experience gained in the course of the previous phase of the Telematics programme.

Finally, studies will be carried out on projects in order to tackle issues of data security, confidentiality and personal privacy, intellectual property rights and standards, in the most efficient way possible.

This work on telematics engineering will progressively lead to a set of methods, techniques, tools and recommendations which is as coherent and unified as possible. The recommendations will be disseminated widely in a specific action aimed at all the participants in the Telematics programme and to researchers and users of telematics applications in general.

12. Language engineering

Language is the main vehicle for scientific and technical knowledge, the basis of our culture and an essential tool for communication in administration and commerce. Telematics systems use a simplified language which is often far removed from the language normally employed by users. The integration of language engineering techniques into information and communications systems is becoming vital for making them user-friendly and more widely available. In addition, modern tools for processing spoken

and written language may help overcome the language barriers hampering the use of telematics systems at a European level. This action will extend the field of research covered by the third framework programme by emphasizing the integration of language technologies into concrete applications (for example in the areas of administration, health or training) and by continuously improving evaluation techniques. It will build upon other Community actions in generic RTD and will be conducted in coordination with linguistic research actions in Member States and under Eureka.

Aim

The aim is to facilitate the use of telematics applications in Europe and to increase the possibilities for communication in European languages by integrating new spoken and written language-processing methods.

Priority assistance will go to research work which is geared to the possiblility of quickly translating findings into industrial or commercial applications. To this end, the research and development work will address broad telematics applications areas, such as information services, including document processing and management, transaction-based teleservices (such as telebanking or electronic directories) and person-to-person communications, including electronic mail and teleconferencing.

Nature of the work

The RTD work will fall into three sections.

Firstly, the results of previous research, including that already carried out in Esprit, will be used to develop systems facilitating the integration of language technologies into multi-sector domains where language processing is important.

The work will first concern the development of language tools to improve the creation and management of electronic documents in a variety of languages. These tools will comprise advanced multi-lingual aids for authors, improved techniques for indexing and searching free-style documents, and automated methods for extracting and combining information from different document archives and databases. The work will then concern spoken- and written-language interfaces which will make it possible to adapt transaction services aimed at business, the professions and the general public to fit in with the requirements of users in different Member States. In addition, with a view to improving the linguistic aspects of teleworking and of electronic mail, techniques will be developed for converting speech to text and vice versa, for automatic routing of messages and for real-time access to machine translation and other linguistic facilities.

The work will also concern improving tools, methods and systems for machine and computer-assisted translation with a view to integrating them into the user's working environment.

Lastly, linguistic methods and tools will be developed to facilitate language learning.

Secondly, the work will involve developing and harmonizing reusable language resources such as electronic grammars, corpora and dictionaries with a view to facilitating the portability of these resources from one computer system to another so that more use can be made of them.

Thirdly, the work will concern linguistic research which might lead to applications in the medium and long term. Work of this kind is necessary if progress is to be made in mastering the complexities of different languages and in improving methods for automated language analysis. Three sectors will be given priority: the representation of concepts in different languages with a view to facilitating computer analysis of texts and man-machine dialogue, the use of advanced information technology for natural language processing and advanced methods for the processing of written and spoken language, such as processing of free text, advanced speech recognition systems and simultaneous machine interpretation.

Validation tests and pilot projects

Pilot projects, particularly covering telematics applications developed under other parts of the programme, will be launched in order to verify the technical feasibility, operation and applicability of the linguistic solutions developed. In addition, comparative test methods and objective criteria will be drawn up for evaluating language tools. Finally, quality control processes will be elaborated for language systems and services and recommendations will be addressed to standards bodies.

13. **Information engineering**

The volume of information stored in electronic form and disseminated via telematics systems is increasing substantially. Access to these resources is still difficult, however, because of the number, geographical spread and heterogeneity of information services. This means that telematics systems are under-used and there is less choice of information sources for different categories of users. In order to tackle this problem, it is necessary to accelerate the use of information services by applying advanced telematics to electronic publishing and information retrieval. Work will exploit, wherever appropriate, the results of other Community programmes (e. g. in the area of information technologies) and will be based on existing or emerging technological advances.

Aim

The aim of the action is to permit easier and more selective access and better usability of electronic information in all its forms, through the application of ICT-based methods and systems.

Nature of the work

The RTD work will cover the principal links in the value-added electronic information chain (production, dissemination, retrieval etc.).

As regards electronic publishing, work will address applications on the creation of information 'products' (for example data banks and electronic manuscripts). In order to meet the requirements of different user groups, these applications should run on any type of hardware platform, with any kind of software and for any type of publication. To this end, advanced applications will enable authors and publishers to structure and to format information content in a generic fashion, regardless of the technology base used. These applications will need to be integrated smoothly into the existing environment of information producers.

As regards the dissemination of electronic information, new ways to present information will be developed so that the user can find the information required, without having to know anything about the structure or the contents of the data banks in question. Also, research will address the integration of different kinds of information (text, images, sound) and of distributed information into one service. It will aim at increasing the modularity of separate items of information within long texts, by applying the most recent database methodologies, so as to improve the transactional and economic basis for information transfer.

Advanced information retrieval techniques will be developed in order to improve user access to the increasing number of heterogeneous and dispersed information sources. These methods will help the user to locate the right information source by means of on-line navigation aids, to make the same search in different databases without duplication, to browse through information records in an intuitive way, to extract information and to integrate it seamlessly into his own applications.

Validation tests and pilot projects

Validations will take account by means of pilot applications, of the requirements of all the parties concerned in the information-production chain, from novices to computer-literate users. It will include the development of quality control and system performance measurement and will lead to the promotion of standards for information exchange formats.

AREA E — SUPPORT ACTIONS

These actions address issues common to several areas of the programme. In order to maintain the strategic coherence of the Telematics Programme and to reinforce its cohesiveness and coordination, the proposed actions, including those addressed at SMEs, that arise from the different areas or at the programme level as a whole, will be examined at the programme level but implemented in the relevant areas. These actions at programme level will be subsidiary to the actions being undertaken at area level, and take due account of the specific need for such action in each area.

They will address issues such as:

'Telematics watch' and consensus development

A special action of 'telematics watch' will be launched to evaluate user needs, assess technology and market trends and identify mechanisms to stimulate innovations on the user side. Horizontal concertation and consensus activities will intensify the exchange of experience across the areas of the programme.

Consensus building across fields and projects will concern standards and common telematics infrastructures which could help to accelerate the deployment of new telematics services. In this context, coordination will be developed both between the Commission services and with other Community actions, such as those funded under the European Regional Development Fund (ERDF), the European Investment Bank (EIB) and the European Investment Fund (EIF).

Dissemination of results and promotion of telematics

The activitis on dissemination and exploitation of research results take on considerable importance for this programme, which is geared towards users and which aims, through pilot projects and validation trials, to develop innovative, job-creating telematics applications for users, particularly in areas highlighted by the White Paper (teleworking and teleservices for education and training, health care or transport). The cooperation which will evolve through the work of the programme is principally aimed at encouraging the investment necessary for the dissemination and large-scale take-up of the new applications. With this in mind, demonstration projects will be supported, especially when they involve several telematics applications, and the exchange of experience between different demonstration sites will be encouraged. Furthermore, the organization in the Member States of workshops, seminars, conferences and exhibitions will be supported with the aid of the Community network of relay centres for the exploitation and dissemination of research results. The research teams working on the various projects will be asked to specify, right at the outset of their work, how they plan to take part in activities for the dissemination and utilization of the results of their research throughout the European Union.

International cooperation

International activities (conferences, study visits, demonstration of exploitable results) will be undertaken in most of the research areas whenever mutual and equitable interest for the European Union has been clearly identified, in particular in the areas covered by the White Paper. Great importance will be attached to cooperation with the countries of Latin America, central and eastern Europe and the new independent states of the former Soviet Union: exchanges of research workers could be envisaged in connection with certain projects and links will be established with telematics activities under the Phare and Tacis programmes or with initiatives funded by the EBRD.

Coordination and where appropriate, collaboration will also be undertaken with COST and Eureka activities, as well as with similar RTD programmes under other European frameworks (notably ESA, CERN and Eurocontrol), in the whole of the telematics domain.

Training

Exchanges of researchers working on telematics applications and the networking of existing research centres will be encouraged. Moreover, Community support may also be granted for the training of users as well as for the exchange of experience.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	ECU million	
A. *Telematics for Services of Public interest*	*255*	
1. Administrations		50
2. Transport		205
B. *Telematics for Knowledge*	*146*	
3. Telematics for research		50
4. Education and training		66
5. Libraries		30
C. *Telematics for Improving Employment and the Quality of Life*	*268*	
6. Urban and rural areas		48
7. Health care		135
8. Elderly and disabled people		65
9. Exploratory action (telematics for the environment)		20
10. Other exploratory actions		p.m.
D. *Horizontal RTD Activities*	*133*	
11. Telematics engineering		15
12. Language engineering		81
13. Information engineering		37
E. *Support actions*	*41* (1)	
Total	*843* (2)	

(1) Of which:
— ECU 18 million for the dissemination and optimization of results,
— ECU 23 million for other preparatory, accompanying and supporting measures.

(2) Of which:
— a maximum of 6,1 % for staff expenditure and 3,7 % for administrative expenditure,
— up to 5 % for specific measures in respect of SMEs.

This breakdown does not exclude the possibility that a project could relate to several areas.

ANNEX III

SPECIFIC RULES FOR IMPLEMENTING THE PROGRAMME

1. The programme will be implemented in the context of validation and demonstration of telematics applications which will best contribute to reinforcement of competitiveness, to the development of employment in the Community and to the efficiency of services of public interest. The work programme for research and technology development will be adapted in the light of the specific requirements of the validation and demonstration activities.

2. 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:

   (a) Shared-cost actions:

   RTD projects carried out by undertakings, research centres and universities; creation of consortia for integrated projects with a common objective will be stimulated.

   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) Measures appropriate for this specific programme:

   — technology stimulation to encourage and facilitate participation of SMEs in RTD acitvities by granting awards for carrying out the exploratory phase 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.

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

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

   — financial support for interconnection of infrastructures and installations necessary for demonstrations and coordinated actions (reinforced coordination actions), and as identified by the participants in projects.

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

   (c) Preparatory, accompanying and support measures, such as:

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

   — measures aimed at facilitating participation of undertakings, research and user organizations in the programme as well as facilitating their access to research results on telematics applications,

   — 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 cosequences 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 telematics applications 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 100 % of the costs of these measures.

(d) 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 2 (a)), bring together around the same technological or industrial objective, manufacturers, network operators, software houses, service providers, users, universities and research centres.

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

3. Participation in this programme of international organizations may be financed, in exceptional cases, on the same basis as that of legal entities established in the Community.

COUNCIL DECISION

of 23 November 1994

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

(94/802/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 [1], the European Parliament and the Council have adopted a fourth framework programame 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 field of information technologies; 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 1 911 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 information technologies increasingly underpin the competitiveness of all industry and services and, in addition, they are becoming the vehicle for an increasing number of social activities; whereas they could help to enhance the quality of life and improve working conditions; whereas they therefore require major efforts in research, the dissemination and optimization of results and training;

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, competitiveness and employment'; whereas this should be accompanied by new ways of organizing production and work so as to facilitate the acquisition of these new technologies by the greatest number of people;

Whereas the European Council of Brussels on 10 and 11 December 1993 decided, on the basis of the White Paper on 'Growth, competitiveness and employment', to implement an action plan to develop information infrastructures at European Union and Member State level; whereas information technology research provides the essential technological basis for the development of these emerging information infrastructures;

Whereas it is important that there be maximum user involvement in the various stages of RTD projects, so that their requirements are taken into account, and that they be trained to make use of the results thereof;

Whereas software, component and subsystem technologies, multimedia systems, open microprocessor systems, high-performance computing and networking, technologies for business processes, integration in manufacturing and the corresponding long-term research were considered as priorities in Decision No 1110/94/EC;

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 field of information technologies;

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

(1) OJ No C 228, 17. 8. 1994, p. 34, and OJ No C 262, 20. 9. 1994, p. 6.
(2) OJ No C 205, 25. 7. 1994.
(3) Opinion delivered on 14 and 15 September 1994 (not yet published in the Official Journal).
(4) OJ No L 126, 18. 5. 1994, p. 1.

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 activities 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 involvement 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, and 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 information technologies by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas, in view of the increasing convergence between information technologies, telecommunications technologies and telematics, the programme should be implemented in close coordination with research programmes in the field of advanced communications technologies and services and telematic applications of common interest, so as to reinforce the synergetic effects thereof;

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 this programme should also comprise activities 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 there is also a need to carry out research, in liaison with the targeted socio-economic research programme, firstly into the social impact of information technologies (particularly on regional planning and the organization of production and labour) and secondly into the interaction between the European citizen and the information infrastructure;

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 the progress with the said 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 information technologies, 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 1 911 million, including a maximum of 6,9 % 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 1, 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 lines 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 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 proprosal 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 when 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 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,

— 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 ECU 2 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 2 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 and taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

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 1.C of Annex III, first activity of the fourth framework programme, is an integral part of this programme.

Introduction

The new focus of RTD in the specific programme on information technologies is the emerging information infrastructure, which will provide the basis of the information society of the future. The RTD areas proposed are those most vital to the development of the infrastructure, taking into account the need for selectivity and concentration of effort, and with the objective of improving the competitiveness of industry and the employment situation in the European Union, and of enhancing the quality of life for citizens, in particular by facilitating their access to the information infrastructure.

CONTEXT

Since the emergence of digital computing in the late 1940s, the use of information technologies has been extending ever further into economic and social life. For the first three decades this was largely a matter of individual computers with limited local networking, installed in companies and administrations to do specific tasks. They were small islands of information technology, difficult to use and expensive to run. In the last 10 years, with the emergence of the personal computer, digital communications networks, international standards, and open systems, all driven by the sometimes astonishing pace of technological advance, the islands have grown and are beginning to merge.

Information technologies now increasingly underpin all production and service industries, and are also the vehicle for a growing number of societal services such as health, education, transport and entertainment and culture. In addition to professional workstations, servers, and mainframes, there are an estimated 140 million personal computers in the world today. But around three times as many embedded computers bring competitive advantage to conventional products like telephones, televisions, toys, cameras, cars and washing machines as well as to high technology equipment and enterprise processes.

We are at the beginning of the transition to a new information infrastructure of society and industry, a point which marks the onset of a qualitative transformation in the impact of information technologies after 40 years of quantitative growth. The information infrastructure is the set of services and technologies providing easy access to usable information to any citizen or enterprise, at any time, in any place. For the citizen it is the long-anticipated 'global village', for the enterprise it is the 'global workbench'. The infrastructure brings together information processing, information storage and retrieval, information transmission and the information content itself. The most crucial aspect of the infrastructure will be the usability and manageability of information: information technology (IT) has enabled us to make very large amounts of information available — the next challenge is to enable us to make sense of it. Social issues are also at stake. The question of the European citizen's acquisition of these new information technologies is becoming a major political challenge. In future, therefore, special attention should be paid to the relationship between the citizen-user and the new information society. Three aspects are particulary important. In tomorrow's increasingly complex society, the individual will have a greater need for information and interactive services giving him access to information.

'Universal' access to this information environment must become a political priority, failing which the differences between social strata within a country, and between countries and regions, could widen. Consideration should then be given to the vast potential for creativity and for the enrichment of social life, over and above the mere utilitarian and professional aspects, as a result of the interaction between the individual citizen and the information society. Lastly, the information infrastructure will play an increasingly important role in the implementation of public policies in respect of the European citizen's needs. Interaction between individuals and various forms of information and communication will become a determining issue in questions of public interest such as education and training, indvidual freedom of movement, and the ageing of society.

This new stage in the growth of the information society compares in some of its aspects with the transition in the 1930s to a new industrial-economic system based on cheap oil and mass production, and before that

in the 1880s from craft production to cheap iron and bulk production. As on those two previous occasions, the transition is accompanied by economic downturn, unemployment, and drastic restructuring in industry.

The information technology industries themselves find margins squeezed and profits falling at the same time as the application of information technologies becomes ever more widespread. Boundaries are being eroded, between supplier and users, between the professional and the consumer markets, and between the IT industries and other industrial sectors. A new 'digital industry' is growing up.

The return to a strong economy and fuller employment, not just in the information technology sector but in all industries, will be heavily influenced by the speed and success with which structural transformation can be completed and the new information infrastructure can be put into place. The development of new services and new jobs will be heavily influenced by prompt action to put the new information infrastructure into place and by the pace of structural change within the economy, in particular with regard to reorganizing production methods and working time.

The creation of new activities will also depend, however, on the ease with which the greatest number of users can gain access to the new information infrastructure.

Behind the growth of information technologies, and of the information infrastructure of the future, lies a massive research and development effort. As technological development accelerates and competitive pressures increase, as the complexity and cost of RTD grow, enterprises and institutions need to look more widely to find the expertise and critical mass they need. The Community programme for RTD in IT, Esprit, has since 1984 helped address these needs at a European level.

Under the fourth framework programme the IT programme proposes new approaches and orientations in order to meet the new requirements of the 1990s, while building on the past achievements of Esprit.

In the 1980s the programme followed a technology-push policy aimed at a growing IT industry. In the 1990s, with the new focus on the development of the information infrastructure and the emphasis on access and usability, the programme is to a greater extent to be led by the needs of users and the market. The overall objective is to contribute to the healthy growth of the information infrastructure so as to improve the competitiveness of all industry in Europe and to help enhance the quality of life for all citizens, in particular by facilitating IT acquisition and use by the greatest number and by promoting as wide as possible access to the information infrastructure.

The IT programme needs to be focused and selective in order to ensure the cost-effective use of resources and to avoid dispersal of effort. Focus comes not only from a careful selection of technical content, but also from the way in which RTD is carried out. In terms of content the RTD areas chosen must be those which give most leverage in building up the information infrastructure, which emphasize access, usability and best practice, and which foster Europe's command of generic technologies. At the same time the programme must give the right stimulus to the European IT industries.

The new technologies, processes and techniques to be developed within the proposed IT programme are selected on the basis of their potential for contributing to competitiveness by helping increase the productivity of European industry. They have an indirect effect on productivity through their capacity for improving the working environment and so creating a more effective work force. They provide the basis for the transition to new business processes and new modes of industrial operation — a transition that European enterprises must master to remain globally competitive. The technologies and processes are an essential element in the creation of the high value-added economy. In addition, by stimulating technology transfer and the training of engineers the programme helps generate the skills and human resources needed for the emerging information society, and prepare Europe's work force for the jobs of the future. In cooperation with the programme on targeted socio-economic research, multidisciplinary research will be conducted not only into the complex interaction between the citizen-user and the emerging 'information space', but also into the impact of the new information technologies on the organization of production and of work.

Activities concerned with the analysis of technological and industrial evolution and of the socio-economic impact of IT RTD will be reinforced. They will provide a general framework of understanding permitting a better articulation of the relationship between RTD policy and industrial objectives and strategy.

The programme will have to be responsive enough to keep pace with rapidly evolving user needs and with the accelerating rate of technological development. It is difficult to predict in detail all RTD needs several years ahead, and consequently there has to be the flexibility to adjust and adapt.

To add the maximum value to its RTD activities, the programme proposes where appropriate to pursue coordination with Eureka, offering the scope to bring results closer to market, as well as with relevant initiatives in Member States.

ORGANIZATIONAL APPROACH

To meet these changing requirements the IT programme proposes new orientations both in technical content and in implementation. Turning first to implementation, the programme proposes to put a greater emphasis on networks of excellence, and to make use of supplier-user collaborations and streamlined management procedures. It will introduce a number of focused clusters, a new way of organizing RTD which builds on the experience of the Open Microprocessor Systems Initiative (OMI). In all RTD activities a strong commitment on the part of industry to exploit the results of collaboration will be expected. On the other side if calls are going to be more selective at least a short- and medium-term implementation scheme should be provided by the Commission.

A number of networks of excellence was launched as part of Esprit in the third framework programme. A network of excellence brings together industry, users, universities and research centres with a common research objective. A network combines the critical mass of centres of excellence with the benefits for training and technology transfer deriving from geographical spread. Networks of excellence can be particularly beneficial for groups in outlying regions through the channel they provide for training, technology transfer, and access to expertise and resources.

Supplier-user collaborations supplement joint research projects. Supplier enterprises and users between them form a consortium to pursue demonstrably new RTD, with the users having a particular interest in taking up and exploiting the results of the collaboration. This can help circumvent the problems high technology companies with innovative products face in reaching customers.

Participation in the programme will be further facilitated by the introduction of streamlined procedures in accordance with proposals under discussion within the Commission. The aims will be to simplify the call and evaluation process, and reduce the cost of preparing proposals.

Focused clusters aim at achieving a maximum of synergies in this specific programme and are building on the experience of the OMI, which provides in effect an early prototype. A focused cluster is a set of R&D projects and related activities such as networks of excellence, associations of suppliers and users, cooperation with Eureka, coordination with national activities, international cooperation, dissemination of results, or training initiatives. It covers a number of technology areas bound together by a single well-defined industrial goal. The different activities, while maintaining their independence, are combined in a complementary and interdisciplinary way, contributing to the common goal of the cluster. Clusters will seek industrial guidance on their development and coordinaton of activities through advisory panels. The clusters will be managed and coordinated by the Commission in a flexible way to favour openness and allow for responsiveness to change, including entry of qualified newcomers.

Individual activities within a cluster may have a duration shorter than the life span of the whole cluster. Activities initiated at the outset will terminate while the cluster is still active, and new activities will be started up. Flexibility will be provided, giving participants, industry, governments and the Community the opportunity to refine or redefine options in response to changing needs or a new understanding of needs.

The infrastructure and best practice approach that characterizes the new programme provides SMEs with readier and more open access to RTD activities. To make effective use of this improved access, specific procedures will be put in place to stimulate SME participation in the programme, taking account of the needs of those from less advanced regions and taking into account the complexity and cost of forming consortia and preparing proposals. Networks of excellence, supplier-user collaborations and focused clusters provide further stimulus for SME participation.

RTD ACTIVITIES

The technical content of the programme focuses on the areas which are most important for the development of the information infrastructure, and where, taking account of the principle of subsidiarity, Community action will make the best use of the resources available. The work of the programme is directed both at the more basic or underpinning technologies, and at selected topics which integrate technologies into systems. In addition long-term research is proposed where effort at a European level has the potential to lead to future breakthroughs.

Software is a major element in the information infrastructure, and already represents over half the value of computers and embedded systems. The programme concentrates on techniques and best practice in a limited number of software technologies enabling the production of reliable, correct, efficient and usable software. Electronic components and subsystems are the physical building blocks of the information infrastructure needed for systems and applications across all industrial sectors. The programme concentrates on RTD into microelectronics in areas where European industry needs the capability and can be competitive, with a particular emphasis on advanced integrated circuits for specific applications; peripherals, and in particular the flat panel displays and compact memory systems; and the emerging field of microsystems.

Multimedia technologies will provide the human interface to the information infrastructure. The programme concentrates on the development and integration of technologies needed for the creation, manipulation, display and storage of multimedia information. Multimedia data transmission and applications will be covered in the telecommunications and telematics programmes. Integration of these technologies in multimedia systems and prototypes will be demonstrated and validated. Generic multimedia data transmission and applications will be covered in the advanced communications and telematics programmes.

The focused cluster technologies for business processes addresses the integration of enterprises into the information infrastructure, and the effective use of IT in business. This is an area where major gains in competitiveness are just beginning to be seen. RTD in ICT for integration in manufacturing and microsystems has as its objective the development of new ICT solutions for the support of advanced and innovative manufacturing and engineering processes. It draws upon and integrates basic IT technologies in software engineering, open systems, computer-aided design, data modelling, database design, and microelectronics. RTD in the Industrial Technologies programme draws upon information technologies as well as other generic technologies in an effort directed towards innovation and concrete application in specific manufacturing domains, and, in turn, provides inputs, knowledge and expertise for future RTD in information technologies. For the complementarity between the two programmes to be operationally assured, coordination and an active interface will be maintained throughout their execution.

The open microprocessor systems initiative continues the work begun under the third framework programme on the development of standards and technologies for open microprocessor systems and related software, an area also of major importance for embedded systems. The high performance computing and networking focused cluster aims at the enhancement of Europe's capability to exploit computing technologies offering the highest performance, a capability which is indispensable both for embedded systems in the infrastructure as well as for maintaining competitiveness in a growing range of industries.

The rationale and content for each sector is described in what follows.

SOFTWARE TECHNOLOGIES

The objective of work in this sector is to enhance Europe's software production capability, by stimulating the spread of software best practice and software quality with a view to improving productivity, quality and reliability, and by fostering European capabilities in emerging software technologies and in distributed information processing.

Software is increasingly becoming the major cost component in IT systems, a trend further emphasized by IT users, who produce 70 % of all software and exert a growing influence in this area. The demand for the development and monitoring of software intensive systems is growing much faster than the supply. In consequence all industrial countries are facing the need for improved productivity and higher quality. Methods and tools for the production of adaptable and evolving software intensive systems at an affordable price are now an essential requirement for all enterprises. Specified skills and well established industrial

approaches are furthermore needed. New applications introduce a continuing stream of new technical challenges for the professional software producer.

Modern information processing systems exhibit an increasing tendency towards the distribution of function and information, so as better to match the nature of the organizations that the systems serve. This evolution is evident not only in business data processing but also in industrial control and embedded systems. Most mass-market electronic products contain an increasing proportion of embedded software. The variety, functionality and complexity of such products is increasing considerably. User interfaces are becoming very important. However the development of dependable, extensible and usable systems with these characteristics present a special challenge. Such systems are already radically reducing the cost of computing for users. For hardware and software vendors and service suppliers, this segment of the IT market is now forecast to become a key battleground by the mid-1990s. It is an arena in which, at this stage, no company dominates and in which Europe has strongly developed capabilities. Action in this area will help position European industry in this highly competitive and strategic market, as well as providing essential elements of the European information infrastructure. It will contribute to bringing the benefits that can be offered by the progressive 'digitalization' of the social infrastructure to the individual citizen and to the less-favoured regions of the Community.

To address these issues work will concentrate on a number of areas: technology transfer and dissemination of software best practice; methods and tools for best practice; emerging software technologies; open distributed computing platforms; technologies for distributed and object-oriented database systems; and advanced techniques for human-computer interaction. There will be close coordination with related work in other specific prorammes.

According to needs work will be reinforced by accompanying measures to accelerate the take-up of new technologies, to maintain awareness of new potentialities, to develop synergies with other European and national initiatives, to promote participation in the standardization process including an international context.

Technology transfer initiatives will be deployed to promote the take-up of new software production technologies and to increase skill levels on a broad scale. Industrial experiments will be targeted at improving and upgrading software development practice through incorporation of new processes, methods and support tooling. Dissemination actions aimed at raising awareness of best practice by establishing communities of common interest across industrial sectors and national boundaries will also be put in place as will training for the introduction of new practice aimed, in particular, at the management level. The activities will be closely coordinated with, and complementary to, existing dissemination mechanisms, wherever possible, taking into account *inter alia* the experience of ESSI.

In the area of methods and tools RTD will be undertaken to improve integration techniques for open and distributed systems, paying particular attention to quality, reliability and safety of software intensive systems. Techniques and tools will be addressed to support process modelling and rapid evolution of requirements and technologies. Work on emerging development paradigms such as concurrent engineering and cooperative development will be carried out to provide packaged methods and tools for enterprise-wide software support. In addition work will be carried out on the organization of the software development process.

A third area will aim to develop and experiment with emerging software technologies in particular those for incorporating digital signal processing techniques into embedded software. These technologies are at the heart of new developments in the progressive 'digitalization' of the societal infrastructure. As generic technologies they will also contribute to focused clusters involving high-performance computing and networking. This area also includes emerging software technologies, providing reasoning capabilities, allowing intelligence, flexibility and adaptation, and supporting modelling, reuse, and sharing of various levels of knowledge. Frameworks and integration techniques to build cooperating or distributed intelligent systems and to model enterprise-wide or application sector knowledge assets will be addressed. This RTD mid-term work will be driven by generic needs such as the development and demonstration of complex, distributed decision intensive applications which are present in every sector of human activities and which will have a positive impact on European competitiveness as well as on integration and cohesion.

Work on open distributed computing platforms will address the architecture of open distributed systems with particular reference to issues of portability, dependability, interoperability and standards; the

development of key components, in particular, middleware components for the management of information, access, and distribution of function. Special attention will be paid to the development and promotion of packaged software. To complement the RTD activities, actions will be initiated to establish dialogues with key user and standards groups concerned with open systems, including X/Open and EWOS.

Major applications demonstrators will be developed and improvements in the practice of building open, distributed systems will be achieved via specific themes in the software best practice activity. The open systems movement is global and will be based on the establishment of internationally accepted standards. Links will be made with the key activities in both the USA and Japan. Cooperation with developing countries and those of central and eastern Europe will be promoted.

A further area is concerned with advanced technologies for distributed database systems. Activities will cover technologies for large scale object based repositories; techniques for knowledge embedding in and extraction from such repositories; interoperability, resilience and recovery of distributed systems; and methods and tools for supporting and applying these advances.

Work will be carried out on tools for the management of distributed statistical data and on the way in which advanced technologies could benefit the collection, analysis, diffusion and representation of data.

The final area addresses technologies that will offer increased human comfort and security in dealing with information technology systems. An essential factor in the acquisition of these new technologies is the user-system interface. Dialogue with machines should become easier and more easily absorbed, including for non-professional users. This issue must be examined equally from both the user's and the supplier's standpoint. Human behaviour, in particular cognitive aspects, and artistic/creative ability constitute essential research topics. These research areas will also be important in terms of acceptance and acquisition of future multimedia systems. In achieving this, new opportunities are opened up with the promise of increased and wider markets for IT based products. RTD work will be carried out to better understand the user-system interaction, such as *inter alia* cognitive modelling, interaction models, media and metaphors, and cooperative work. The development and consolidation of emerging technologies will be pursued. These activities will be closely related to upstream research, and will build on and contribute to standards and help maintain awareness of the potentialities of the new technologies.

TECHNOLOGIES FOR IT COMPONENTS AND SUBSYSTEMS

The objective of this sector is to provide European industry with the state-of-the-art technologies and capabilities to design and produce components and subsystems in three key areas: microelectronics, microsystems and peripherals. The approach to be taken is system oriented and takes account of the added value which microelectronics, microsystems and peripherals will generate in systems. Growth opportunities and European strength in areas like telecommunications, automotive, consumer electronics, medical and other industrial applications determine the priorities.

The on-time availability of low cost, high performance and high reliability integrated microelectronics components and subsystems represents an essential requirement for system houses to develop competitive electronic systems in markets such as consumer electronics, data processing, and the automotive and telecommunications industries. In addition to providing the technology foundation for traditional electronic and electrical sectors, microelectronics is increasingly extending its impact to a wider range of processes, products and services in virtually all other industrial sectors, with important consequences for industrial innovation and competitiveness overall in the Community. The maintenance of European expertise is particularly important in the field of advanced integrated circuits for specific applications, where local sources of supply are vital for ensuring short design and production time scales and for protection of the applications know-how which gives competitive advantage.

The potential economic impact of integrated microsystems technologies rests both on the direct market segment it addresses and on the leveraging effect it creates on other industrial sectors. Products incorporating microsystems will range from hearing aids, analytical and medical instruments to consumer electronic products and automotive subsystems, and will cover both mass produced goods and a wide variety of specialized microsystems for high added value applications where the combination of performance, size, flexibility and robustness are critical factors of success. Medical diagnostic and delivery systems, artificial organs, new sensors for medical applications, environmental and industrial monitoring and control, safety and security issues, and reduced energy consumption requirements are the main systems application fields where the impact will translate into improved quality of life. Flat-panel displays have wide application in portable and high definition projection television sets, in graphic and multimedia systems, and in interactive CD. In the semi-professional field, flat-panel displays will be found in video phones,

automotive applications and electronic workstations. They will become a fully integrated part of new products, requiring a close cooperation between components and device manufacturers: as microelectronics, display technologies play a substantial role for the competitiveness of all industries. A European competence is therefore essential to be developed. Actions to catch up the necessary know-how and production technologies are needed and should therefore be strengthened.

Memory subsystems represent a second field of peripherals technology which is crucial for the whole of the electronics industry. They are associated with all the applications mentioned above. High resolution displays, graphics systems and multimedia systems in particular demand very high capacity high speed memories. Digital memory subsystems are currently used for audio, image and video information including in portable applications. In addition there will be selected activities in the field of home system peripherals, addressing the integration of home automation devices and appliances into a unified system, so for example helping to rationalize energy consumption. Specific work in these areas will be taken up, if there are commitments from the European players involved.

Work on microelectronics will concentrate on those technologies likely to be in major use towards the end of the decade and to have a major impact on applications. These include silicon-based technologies and the most promising compound semiconductor technologies, in particular gallium arsenide. All aspects of the process, including design, packaging and interconnection testing, manufacturing and equipment as well as the development of new manufacturing and testing equipment and materials, will be covered. Some work may be undertaken in conjunction with Eureka initiatives, including the one on silicon based technologies. This aims at a qualified integrated 0,35 micron CMOS process by 1996. Integration of advanced components into advanced integrated circuits for specific applications will be emphasized.

RTD tasks will focus on the following areas:

— generic technologies aimed at lower size, lower cost, higher functionality and complexity, as well as higher speed, lower power millimetric and microwave integrated circuits for high frequency applications,

— generic system integration technologies with an emphasis on electrical and optical interconnectivity and packaging at all levels of interconnection,

— systems consisting of active and passive components including opto-silicon hybrids, research into passive and power components will be directed towards integration and interconnection with other components and technologies,

— advanced system design methodologies, tools and tests, for digital, analogue and mixed applications,

— electronic and photonic device technologies and system integration, in particular for advanced peripheral and storage systems, communication networks, optical information processing, and microsystems,

— effective manufacturability of next generation ICs for small and large volume production, including advanced and effective manufacturing equipment and materials,

— concepts and technologies for flexible fast turn around manufacturing facilities for advanced integrated circuits for specific applications, in particular providing easy and cheap access for SMEs,

— integration of design and technology capabilities in pilot demonstrations aimed at specific applications of significant economic and social impact, or at extending the impact of microelectronics to more traditional industrial sectors,

— microelectronics aspects of sensors and microsystems; and multifunction system applications.

Technology transfer and dissemination activities will be directed at the reinforcement of links between equipment/materials and IC manufacturers, through working groups, industrial associations or networks; and at the establishment of closer relationships between IC manufacturers and users, through a network of centres of competence in circuit/system design, manufacture and testing. In support of training, networks of enterprises, research institutes and universities will be established, providing qualified personnel to industry, for the fabrication and use of innovative manufacturing tools and methods, and in circuit and system design and testing. Training initiatives will also be established to increase the awareness of potential users of advanced integrated circuits for specific applications, notably SMEs, and to provide them with expertise in particular in the translation of their system requirements into hardware specifications. International

collaboration will be established in specific fields, and there will be appropriate coordination with national initiatives in Member States.

Work on integrated microsystems will focus on the multidisciplinary design, manufacture and test of microsystems, and integration and packaging methods, in coordination with the progamme on industrial and materials technologies and with other specific programmes concerned. RTD will be directed primarily towards the technological needs of major application fields: such as automotive, where microsystems will have a key role in the realization of the clean safe car of the future; medical engineering, where microsystems are needed for portable intelligent medical diagnostic and delivery systems; and the monitoring and control of industrial processes especially with attention to those influencing the cleanness of the environment.

Work will address all phases of the realization of microsystems, from conceptual and detailed microsystems design, through the integration of existing basic technologies, to the demonstration of industrial prototypes. Small- and large-scale manufacturing aspects will also be addressed. Activities of special importance will include: design of microsystems; integration of components such as optical, biochemical, sensors, and actuators, with microelectronics subsystems and components; packaging and interconnection of integrated microsystems; interfacing to other micro- and macrosystems and to the physical world; software integration (system and application); communication systems between microsystems; specific equipment requirements; manufacturing requirements and routes; and testing and quality assurance. Know-how and experience obtained in the course of the focused RTD will be used as the basis for other application spin-offs.

To support work directed towards the three application fields, additional activities will be carried out on the integration of a wide range of technologies which form the basis of microsystem production, among them microelectronics, micro-optics, micromechanics and microchemistry, drawing on results developed elsewhere in the framework programme.

The potentially wide applicabilitiy of microsystems and the inherent difficulties in mastering microsystems technologies necessitate the creation of efficient Community-wide mechanisms for dissemination and technology tranfer. Of particular importance is the stimulation of conditions for SMEs to develop innovative microsystems at low cost and to incorporate them into their products. These needs will be addressed by the dissemination and transfer of technology through technical interest groups and networks of excellence. Access to low cost manufacturing and other assistance, particularly for SMEs, will be provided through the creation or enhancement of specialized mini-fabrication facilities combined with appropriate service mechanisms.

Interdisciplinary training for the development and utilization of microsystems is of key importance. Use will be made both of existing mechanisms in some of the contributing basic technologies (for example the VLSI design training action) and of new mechanisms. Industrial training schemes will be organized through the existing industrial and trade associations with the help of centres of excellence.

Work in the area of flat-panel displays will build on results achieved in the third framework programme, in particular in the field of Active Matrix LCD for applications needing large full-colour high-resolution displays. Activities will be directed towards the development of low-cost high-resolution thin-screen display components, emphasizing improvement in visual quality of displays, especially for portable equipment, and increased screen size and flatness. Size targets for volume production up to 1997 are 2,8″ to 5,8″ for electronic definition TV/extended graphic area projection displays, and up to 15″ for full-colour interactive displays for electronic work stations. Active matrix LCD technology is of particular importance, exhibiting the most attractive features in term of colour and resolution, but other display technologies may also be addressed, such as Field Effect Displays, Electro-Luminescent Displays and Ferro Electric Displays for very low-cost and low-power applications. Requirements will be defined through cooperation betweeen the user and supplier industry. In the field of memory subsystems work could cover increased capacity, compactness and read/write performance to support multimedia systems and real-time high definition video. Technologies to be addressed include magneto-optic and magnetic disks. Work on home systems peripherals could concentrate on technologies for the devices required to link home appliances into a domestic system and for the peripherals needed to support user interactivity.

Supporting activities will include an industrial training programme in the field of display and memory subsystem design, special interest groups involving industrial and consumer representatives, and a special action to encourage European production of strategic materials and components for the peripheral industry. Coordination with national initiatives will be established to increase the overall value to the Community. International cooperation will be particularly important in the field of display technologies, where joint ventures bringing together the interests of several industrial partners are essential for success.

MULTIMEDIA SYSTMS

The objective of this sector is to support strategic R&D to develop and integrate information and communications technologies which underpin multimedia end-user systems and applications with a view to offering users new services based on information technologies. Specific work will be undertaken on technologies for integrated personal systems, which will give the individual citizen personal access, whatever the location to information infrastructure services and local information processing and, for this reason, represent one of the main market opportunities in the area of multimedia systems. This work shall contribute to establish a significant market position of the European industry.

The emergence of a market for multimedia systems, allowing the seamless integration of voice, video, text, sound, animation and graphics, has been predicted for a decade. The electronic networks emerging in Europe will strongly stimulate these services by rapidly broadening their content and geographical distribution. Only now have advances in microelectronics performance, software techniques, standards and digital communications allowed multimedia systems to become a reality. It is expected that multimedia systems will be taken up first in customized applications in business and the home, in education, manufacturing, financial services, medicine, transport, insurance, retail, tourism and entertainment, including games, films and television. New levels of productivity are expected to be achieved in business and education as a result of multimedia techniques.

The market for personal systems is just beginning to emerge and offers considerable scope for expansion. There are as yet no clear market winners. Europe is already strong in the technologies needed, such as smart card technology and CD-Rom, secure protocols, embedded systems and application-specific software, and has the lead in low power components and in secure, smart encryption devices. This new market offers an opportunity for Europe to cover most of the production cycle, from micro-components through systems to applications development, providing a basis for boosting competitiveness in other application fields.

Activities in the sector will be coordinated with work in other specific programmes. Whereas the IT programme is concerned with work on tools and standards for basic multimedia processing, the advanced communications programme covers technologies for multimedia transmission and service management, and those relating to digital video services, and the telematics programme addresses the issue of integrating such research results into multimedia systems and services for selected applications areas. It is expected that over the period of the programme there wil be considerable convergence of the IT, communications, consumer electronics, information publishing and entertainment industries, a trend which will be fully taken into account.

The sector will develop and integrate generic technologies to allow the creation, manipulation, editing, display, storage of multimedia information and integration of multimedia technologies through validation projects involving user-supplier collaboration. RTD includes the specification of algorithms and of appropriate components, for example video compression/decompression chips, high capacity optical memory and processors, liquid crystal displays, information appliances (including multimedia terminals) and their integration into advanced multimedia systems; standards for multimedia storage, representation, and compression/decompression; and generic multimedia software including tools supporting man-machine interfaces. The area of software includes multimedia extensions to existing system software and tools; creative tools providing software objects in the various media video, audio, animation, painting and drawing; and authoring tools which allow multimedia user-friendly custom applications to be built from the individual media objects. The integration of hardware and software elements will be demonstrated in systems for a variety of end-user applications. This will be complemented by projects demonstrating the integration capabilities of multimedia technologies and best practice. Software technologies which afford enhanced human convenience and security with regard to multimedia systems and which will therefore play an important role, are an essential factor in the acceptance of multimedia systems.

Work in the sector will build on strong European results already developed under the previous framework programmes, including CD-I, MPEG video standards, and multimedia systems and tools. Challenges are presented by intellectual property issues, including copyright of the media objects, ease of use, current network limitations, and the integration of technologies for multimedia applications, particularly with existing hardware and software.

Work on integrated personal systems will concentrate on two topics: the development of technologies for multi-function, integrated user, access devices capable of handling multimedia data, including the electronic wallet and personal and group communicators as well as mobile communications in offices; and the application of technological advances in the information provider industry to enable them to satisfy the ever

increasing user demand for efficient services. These two aspects cover the application sides of the complete system solution that, for its full deployment, will rely on existing wireless network and telecommunication infrastructures, and will take into account new development activities in these areas which are covered in the telecommunications and telematics programmes.

Supporting activities include the training of designers and authors of multimedia applications. Technology suppliers and the authorizing industry will provide information dissemination to support industrial cooperation to pave the way for standards. Close links will be established with other generic technology initiatives, particularly those on peripherals, microelectronics, software engineering and microprocessors.

LONG-TERM RESEARCH

The intensive RTD effort needed to increase the turnover from the laboratory to the market, in a rapidly changing technological scene, engenders the risk of 'short-termism'.

A long-term industrial vision providing a frame of reference for shorter-term research is essential but difficult to achieve when the pressure is great to bring the next product to market immediately. At the same time, concentration on shorter-term research risks depriving industry of those human resources which are needed to make the next wave of innovation possible and to respond to specific industrial needs for advanced research. A Community investment in advanced and long-term research will promote strong and targeted industry/academia cooperation and will ensure that by improving our competitiveness in the short term we do not mortgage our medium- and long-term technological future. Activities will thus be aimed at ensuring that at any one time:

— the potential for the 'next wave of innovation' is maintained, compatibly with the shorter-term views dictated by rapid technological change,

— scarce expertise underpinning European information technology RTD is replenished in those areas where it is most needed.

These goals can be achieved through networks of excellence and upstream RTD projects.

Thematic networks of excellence will provide frameworks for coordinating RTD, technology transfer, training, as well as a common infrastructure. They are dynamically maintained by the technological community itself (suppliers, users and researchers). These coordination frameworks, in which the vision of industry will be an important consideration, are expected to play a central role.

Upstream RTD projects will fall into two categories:

— Advanced projects involving a high but assessable technological risk whose success would have a direct impact on industrial competitiveness. Projects in this category would often contribute to the solution of specific problems identified in a framework of coordination with other parts of the programme — a short-term action can provide an important contribution to a long-term goal. A project does not in itself need to result directly in a product or service if it can contribute to such products or services being generated in several projects downstream.

— Projects characterized by their potential to produce breakthroughs with long-term industrial implications and, therefore, by definition unconstrained by the downstream work carried out at any one time.

Projects in both categories will also be selected on their ability to induce the generation of human resources in fields with identifiable shortages, as well as on the complementarity of the skills brought together, especially in interdisciplinary fields.

The technological areas to be addressed will not be circumscribed because proposals will be expected to respond to opportunities and to needs as they arise. It is expected that many activities would be related to upstream aspects of RTD activities undertaken in other parts of the programme, ensuring their maintenance and expansion in time.

Focused cluster

Open microprocessor systems initiative (OMI)

The objective of OMI is to provide Europe with a recognized capability in microprocessor systems, and to promote their broad acceptance in applications systems, both within Europe and world-wide.

Microprocessors with their associated software form the intelligence of electronic systems. Their application ranges from sophisticated control systems for aerospace, robotics, industrial control and telecommunications, to mobile telephones, consumer electronics, automobiles, and general-purpose computer systems from supercomputers to notebook PCs. The microprocessor market is currently dominated by US suppliers, who provide microprocessors based on CISC technology (complex instruction-set computing) used in more than 80 % of current systems and in almost all computers. However new markets are emerging in embedded systems, that is, systems not programmable by the end-user. Strength in advanced RISC (reduced instruction-set computing) microprocessing, the leading edge technology, represents a significant opportunity for European industry to improve its competitive position and provide new employment by the end of the decade, not only in the microprocessor and systems software business but in a broad range of user industries, and particularly in embedded systems.

OMI will build on work started under the third framework programme, which itself draws on activities supported by a number of Member States, and on results in microelectronics, software, applications systems integration, and standards from all parts of Esprit and elsewhere. Its aim is to concentrate and coordinate efforts in microprocessor systems RTD throughout the Community in order to provide the critical mass which will enable European industry to compete effectively worldwide.

OMI aims to succeed by providing components for use in embedded systems applications, but with the intention also of eventually supporting the computer industry. The whole range of microprocessor systems, from very high performance to very low power, is addressed. OMI concentrates on an intercept strategy with existing non-European technology, as well as on the next generation of technology beyond (to year 2000). Given the major use of microprocessors by European companies a smooth European migration path from currently avaialble to new technology should be provided.

OMI will make use of results from all parts of the Community's framework programme and elsewhere. Within OMI longer-term generic RTD will address work in advanced microprocessor systems components and tools. This includes the use and adaptation of high-performance microprocessors including a range of architectures, digital signal processors, fuzzy logic, analogue to digital converters and other on-chip functions; advanced technologies for new kinds of processors; design, debug and test environments for on-chip systems; systems software including software portability mechanisms; and standards.

Additional activities will integrate the results of the previous generation of projects started under the third framework programme, aiming to speed uptake of OMI results through applications pilots of on-chip systems in user industries. The work will concentrate on the electronic and software subsystems needed for the application, and not normally on the entire application system. The latter may be supported by Eureka, ESA and other European research frameworks, Member State initiatives and other Community programmes. Applications pilots will be selected based on committed industrial interest and broad social and economic benefits.

Potential fields of application include automotive control systems for pollution and energy control, for communications and for geographic vehicle positioning; communications systems ranging from advanced switching to portable telephony; customized systems for process control and robotics in manufacturing; advanced multimedia systems; aerospace and other high-performance embedded applications. User industry participation will be an integral part of all RTD work, so as to make user requirements known to technology suppliers, and to seed early uptake of the results in industry. The aim is to speed up the systems integration process, through 'vertical integration' (microprocessor producer, software supplier, systems integrator, all working together), leading both to stronger systems supplier and user industries and to more high technology employment.

Efficient mechanisms will be provided to disseminate and transfer results throughout the Community and world-wide. This will be achieved by conferences, technical interest groups and networks of excellence; by regional design and conformance testing centres to assist particularly SMEs in the exploitation of OMI

technology; and by an OMI portability action, which will promote on-chip microprocessor systems standards as well as the virtual binary interface standard, demonstrating value in portability experiments. Activities will be coordinated as appropriate with initiatives in Member States.

Both industrial training schemes and training through the universities and centres of excellence, for example by enhancing existing mechanisms such as the VLSI training action, will be supported. International cooperation is envisaged, both in the USA and Japan, particularly in the field of open standards for spercell libraries and systems software.

Focused cluster

High-performance computing and networking (HPCN)

The objective of this focused cluster is to exploit the opportunities provided by high-performance computing and networking, to expand its application potential, and so to speed the pace of innovation and serve the economy as a whole.

Recent technological developments in computing and networking promise revolutionary qualitative and quantitative changes in the use of the new generation of computing and communications systems. Shorter time to market and better product quality will be the main motivation for uptake by industrial users. A thousand-fold improvement in the cost/performance ratio for computing and networking systems will make feasible an increasing number of new applications, previously impossible, and will emerge as major demand driver. Experiments will be substituted by computer simulation in an increasing number of industries, including traditional ones. Moreover, the use of HPCN systems for commercial applications is expected to be taken up vigorously in the second half of the decade. High-speed networking at affordable cost will allow distributed image-based applications and bring multimedia systems to full fruition. Existing scalar/vector systems will be complemented with parallel systems in the shorter term, and parallel systems and clustered workstation technologies are expected to converge to provide scalable heterogeneous multi-computer networks by the year 2000.

The priorities of the cluster are as follows:

— to overcome barriers to the exploitation of the underlying technologies, notably in the field of HPCN applications and software, by improving programmability, ease of use, and portability. Standardization will play a key role for market acceptance of these new applications.

— to stimulate the development of the underlying information and communication systems technologies towards the provision of flexible heterogeneous multi-computer networks satisfying a broad range of user requirements, on the basis of the principles of scalability and interoperability,

— to build on existing European strengths in terms of application focus, human resources, and scientific and technological capability; to take advantage of existing infrastructures and programmes, and, where appropriate, to provide Community added value through catalytic action.

The work of the cluster will be organized around five coordinated sets of activities, where possible drawing together and building upon other activities in the framework programme, in the initiatives of Member States, and elsewhere. The fist three sets address applications of major industrial relevance. The underlying generic systems and software technologies will be addressed in a fourth coordinated set. The fifth addresses complementary concerted actions. Cooperation between users and suppliers of systems and services will help to specify evolving user requirements for future generation HPCN systems. The essential RTD on communications and on network management is addressed in the telecommunications specific programme.

The first set of activities concerns simulation and design applications. The objective is to demonstrate new applications which need HPCN capabilities for cost-effective solution, and which have a clear impact on industrial performance, shorter time to market and better product quality. The emphasis will be on computational fluid dynamics, signal processing, system simulations, materials dynamics, electromagnetics, molecular modelling and other chemical-pharmaceutical applications.

The rapidly increasing flow of skilled personnel able to use HPCN systems will make possible distributed applications in accordance with user requirements. A longer-term objective is to address advanced complex, and ultimately complete, simulation systems combining several disciplines.

Activities in information management applications aim to demonstrate the economic viability of HPCN techniques in the fields of complex decision support and high-performance online transaction. The focus of activities is determined by the need for complex multi-functional adaptable, highly reliable and safe solutions. Activities include the application of HPCN to complex data analysis, storage and retrieval of information in large and distributed bases and the application of image-based human-computer interfaces. Leading edge applications in suitable sectors such as banking, insurance, power distributing and other piloting sectors will be addressed. Sensitivity to new solutions and approaches at management level need to be developed through specific actions.

The third set aims to promote the use of generic HPCN technologies for embedded systems applications of particular economic relevance, such as quality control, advance surveillance, complex control and intelligent machinery. Activities include complex signal processing, pattern recognition, image processing and understanding and applications with specific real-time requirements. Emphasis will be placed on the use of commodity components and subsystems and on the specification of architectures suitable for standarization.

A fourth set on software and systems technology will support the development of new generations of users oriented HPCN systems. Work will draw upon activities in software, semiconductor and multimedia technologies. It will ease the use of a wide range of applications, user environments for the use of parallel, distributed and embedded systems, advanced systems architectures, and subsystems such as computation and information servers and advanced human-computer interfaces, generic system aspects of distributed database management and distributed processing. Proof of concept and of the economic viability of new ways of computing, including optical computing and neural networks, will also be addresed. The emergence of heterogeneous multi-computer networks will be stimulated by the development of computer-to-computer and computer-to-network interfaces, including their operational protocols, and associated demonstration and validation activities. Standardization and common practices amongst a widespread group of users and vendors will be encouraged.

Supporting activities will complement the work to support the development of a pan-European HPCN environment and infrastructure by achieving appropriate coordination with complementary activities and programmes. In this context, concerted actions will be organized in the form of networks which aim at spurring training by research and technology transfer to industrial users. Applications experiments normally building on existing infrastructures and institutions requiring a Community dimension will be supported and will help users to evaluate the opportunities, facilitate the accelerated uptake of HPCN technologies and give guidance to create a market for European system suppliers. Those experiments would also facilitate user-supplier relations in Europe.

RTD activities will be coordinated with relevant Eureka projects, and national and regional programmes. To accelerate the emergence of widely accepted HPCN products and technologies, links and, where appropriate, specific international cooperation will be established.

Focused cluster

Technologies for business processes

To increase productivity and quality and to ensure competitiveness many enterprises are re-engineering their business processes, resulting in new work arrangements. A major feature of this re-engineering is the integration of business processes across the business functions such as sales, product development and finance. Another feature is more group working, often across departments. A third feature is a move from the high level of division of labour that has been common up to the 1980s, to an integration of tasks, with several of the tasks being carried out by the same individual. Information technology is an essential underpinning for most of these new arrangements, which are otherwise either not feasible or uneconomic.

The new business processes often involve complex decisions, are knowledge intensive, require rapid response, and are related to work flow. Many of the new processes need to be supported by new technologies or new combinations of technologies; integration of technologies is the central support required. Tools to support cooperative working and document management are of particular importance. Considerable scope exists for improvement in the efficiency of document management services in particular.

The objective of the focused cluster is substantially to increase the contribution of IT to the effectiveness of organizations by, first, improving and demonstrating the level of understanding of best practice in the use of IT in business processes, and second, developing the underlying technologies that will support the new organizational developments. The cluster will be application-driven, and will use this focus to integrate technologies from several areas of the specific programme, as well as developing complementary new technologies. Users will have a key role in the cluster, providing the orientation for the effective use of IT. Working environment aspects will also be included. The cluster builds on the work done on IT support for business processes in previous Esprit phases. There will be close coordination with work carried out in the telematics and telecommunications programmes.

Research into IT for business processes is multidisciplinary, and includes modelling of business processes, organization 'engineering', architecture of information and communication processes in the enterprise, integrating software components for business requirements, and integrating document management into multilingual organizations and administrations. Differences between countries in business organization and business practices will also be incorporated into the research. The integration of mobile personal systems will also be addressed.

RTD on technologies supporting business processes will have an application-driven approach, which will result in the integration of several technologies. Methods of integration with companies' existing applications and data will also be pursued. Complementary research will be done on computer-supported cooperative work and document management.

New approaches to methods for integrating and developing software are required to support the new forms of business process automation, including the integration of object-orientation, knowledge-based systems, graphical user interfaces, and distributed computing. The integration with other technologies of teleconferencing, of spatial information systems such as geographical information systems, and of mobile technologies, is also required. This necessitates a strong relationship to the work on methods and tools and on knowledge-based systems in other parts of the IT programme. Work will also be done as appropriate on standards.

In the area of computer-supported cooperative work (CSCW), research aims to apply IT to the enhancement of interpersonal interaction and collaboration in the business enterprise. CSCW applications support users working jointly on projects in a distributed environment, on heterogeneous hardware and software systems, simultaneously or sequentially. The RTD covers tools, standards, and object libraries for the generation and tailoring of CSCW applications, taking into account user mobility, flexible forms of working, and the use of existing information systems. Specific fields of research include collaborative authoring, group decision support, electronic meetings, and shared distributed work.

A number of research activities will be undertaken in the area of document management. Work on document creation will address the creation of multimedia documents in a cooperative and distributed manner, using disparate tools and systems, incorporating existing documents including conversion of old paper documents to electronic form, and building composite documents. Aspects of software development techniques are relevant for version control, consistency management and concurrent engineering. Work will also address flexible and just-in-time document production and printing, and the relationship between documents and distribution mechanisms such as electronic mail and fax services. In the area of document storage and retrieval, new more user-friendly forms of access will be developed, along with new ways of organizing the storage, archiving and clustering of documents, and techniques for the retrieval of parts of documents, such as illustrations, citations, subparagraphs, and annotations.

A reasonable limited number of pilot experiments will be undertaken, together with activities in the field of best practice and of transnational European businesses. The work will aim at speeding up learning on the optimal forms of integration of the various technologies in business processes. Learning both by users and by technology providers is envisaged, with the users playing the leading role. Methods of minimizing the user's perceived risk in adopting and deploying the new technologies will be investigated.

Focused cluster

Integration in manufactering

For a high-wage economy, employment in the productive sector relies on the rapid shift towards technology-based products of high engineering content or added-value, and on the ability of manufacturers

to operate in an optimal way in a dynamically changing global network of business partners, suppliers, customers, and researchers. The profound restructuring which is taking place thoughout industry creates both the climate and the opportunity for change. New manufacturing paradigms are emerging to support a more lean and agile approach; collaborative supply chains, intelligent manufacturing, collaborative working and total quality management. All are predicated on the availability of advanced IT and communications.

Previous work was based on the concept of the integration of traditional engineering functions. These 'computer integrated' technologies of the 1980s are now sufficiently mature to be able to be exploited downstream in an industrial environment. A new culture of work is emerging which pervades all business processes including manufacturing and engineering; this needs advanced ICT and, correspondingly, determines new upstream ICT developments. Advanced ICT developments must be influenced at their inception, so that European industrial competitiveness and the quality of life for the industrial worker are well-served.

The objective of activities in this domain is, through the development of advanced information technologies, to act as a catalyst in these changes and, in coordination with the programme on industrial and materials technologies, to contribute to increasing competitiveness in the manufacturing, engineering and process industries through improvements in product quality, cost and time-to-market, while meeting the environmental challenges of the 21st century.

Basic generic technologies in the field of ICT are evolving separately at high speed and their uptake will be limited by the speed with which they can be integrated in a business environment. The architecture of future systems must be continuously redrawn in order to enable users to reap the benefits of advanced ICT developments while at the same time migration paths must be defined in order to protect the investment already made up to the present. Work will draw on and integrate basic technologies in software engineering, open systems, computer aided design, data modelling and database design, software quality management, microelectronics, microsystems and selectively mechatronics.

For individual companies, implementation of business strategies based on new manufacturing paradigms requires a redefinition of the building blocks used to develop ICT support systems for the manufacturing and process industries. Cross-sectorial and multi-disciplinary initiatives will be supported in order to tackle generic problems, while at the same time taking account of specific industrial requirements and the quality of life. These will result in benefits across the full spectrum of industry.

Work will concentrate on new ICT solutions in three technical areas supported by prenormative and cooperative activities.

Work on the enterprise integration framework will concentrate on the provision of methods and tools to support modular system design for the ICT systems supporting manufacturing and production enterprises. Design and implementation of integrated quality management systems will also be supported by this advanced information technologies. Users and vendors will be encouraged in their efforts to reach consensus on requirements and functional specifications for the components for such systems, and support will be given to advanced implementations aimed at validating, quality assessment and testing the results.

Work in the field of integrated product data modelling will concentrate on formalizing and standardizing the data structures used to describe products and their components, thus extending the functionality of product data modelling systems to a higher level of semantics, including knowledge representation and sharing.

Information interfaces have to be defined and have to be implemented to ensure quality standards. This will enable the engineering functions of the entire life-cycle of products and processes to be supported from a common platform.

Both the productivity of manufacturing and production systems and their ability to operate safely and without hazard to human life or the environment depend on the quality of their control systems. Work on intelligent control will concentrate on the development and integration of distributed hierarchical control systems, beginning at the level of sensors and actuators, extending through the control of the production process, and at a higher level dealing with the flow of goods and orders through complete factories or plants and also through the entire logistics supply chain.

The rate of uptake of the technology developed in the three areas above is largely dependent on the speed with which agreement can be reached on standards for the use of emerging technologies. Harmonization of quality management systems is necessary to obtain comparable assessments of supplier industries within Europe. Measures will be taken to enable experimentation with emerging standards, and a close linkage between users and vendors will be established to accelerate this process. Measures to support the diffusion of best practice to all regions of the Community will be undertaken in order to support European enterprises collaborating and competing internationally. Coordination and collaboration with Member State and international initiatives will be established as appropriate.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	ECU million
1. Software technologies	268
2. Technologies for components and subsystems	487
3. Multimedia systems	153
4. Long-term research	191
5. Open microprocessor systems initiative	172
6. High performance computing and networking	244
7. Technologies for business processes	167
8. Integration in manufacturing	229
Total	1 911 (1) (2)

(1) Of which:
- a maximum of 3,9 % for staff expenditure and 3 % for administrative expenditure,
- at least 2 % for training activities forming part of the programme,
- ECU 18 million for the dissemination and optimization of results,
- up to 12 % for specific measures in respect of SMEs.

(2) A sum of ECU 21 million, the difference between the amount deemed necessary for this programme and the amount foreseen in the fourth RTD framework programme for information technologies, is earmarked for the specific RTD programme 'to be carried out on the one hand by means of direct action (JRC), and on the other by means of activities within the framework of a competitive approach and intended for S/T support to Community policies (1995 to 1998)'.

This breakdown does not exclude the possibility that a project could relate to 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, including, where appropriate, basic research of an industrial relevance.

   As a general rule, projects should involve at least two non-affiliated industrial firms from two different Member States.

   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 SME's 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 SME's from two different Member States. The award will cover up to 75 % of the cost of the exploratory phase, without exceeding ECU 45 000 or ECU 22 500 in the exceptional case of a single applicant SME; and

   (ii) by supporting cooperative research projects, whereby SME's 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.

   These activities will be complemented by specific preparatory, accompanying and support measures.

2. Measures appropriate for this specific programme:

   — measures in support of standardization and measures aimed at the establishment of usage protocols of general value to the objectives of the programme.

   The Community's contribution may cover up to 100 % of the cost of the measures.

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

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

   — support for exchange of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

   — use of external expertise, including access to scientific databases,

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out under the third activity; 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 and technological risks associated with the programme, which will also contribute to the programme 'targeted socio-economic research',

— training actions related to research covered by this programme in order to stimulate technology transfer and enhance employment skills,

— independent evaluation of the management and execution of the programme and of the implementation of the activities,

— assessment of the environmental impact of activities in the programme,

— preparatory studies and pilot activities to study the interaction between user-citizens and the information infrastructure and to experiment with new ways of using information technologies (in close collaboration with the programmes on advanced communication technologies and services and on telematics application of common interest and with the programme on targeted socio-economic research),

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

Community funding 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 (networks of excellence) which, through shared-cost RTD projects (see 1 (a)) bring together around the same technological or industrial objective manufacturers, service providers, users, universities and research centres.

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

COUNCIL DECISION

of 23 November 1994

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

(94/803/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 field of standards, measurements and testing; 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 173 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 the fourth framework programme;

Whereas developments in the field of measurement and testing contribute to the growth of industrial competitivity by facilitating scientific research and technical innovation;

Whereas the operation and consolidation of the single market requires continuous development of harmonized measurement systems, test methods and written standards and the mutual recognition certificates of conformity;

Whereas the uniform application of the Community legislation in fields such as the common agricultural policy, health and safety, the environment, consumer protection and protection of the Community's external frontiers can be achieved only by using improved methods of measurement and testing;

Whereas this programme may make a signifcant 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, competitiveness and employment';

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 field of standards, measurements and testing;

Whereas Decision No 1110/94/EC (fourth framework programme) 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 support only RTD activities of high quality;

Whereas research activities related to standardization, measurement and testing for the iron and steel industry can be taken into consideration in this specific programme, if they are of a pre-competitive and multi-sectoral nature;

Whereas the rules for the participation of undertakings, research centres (including the JRC) and universities and the rules governing the dissemination of research results

(1) OJ No C 228, 17. 8. 1994, p. 68 and OJ No C 262, 20. 9. 1994, p. 14.
(2) OJ No C 205, 25. 7. 1994.
(3) Opinion delivered on 14 and 15 September 1994 (not yet published in the Official Journal).
(4) OJ No L 126, 18. 5. 1994, p. 1.

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 involvement 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 candidature and selection procedures and make them more transparent must be continued in order to support the implementation of the programme and to facilitate the action which firms, and 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 standards, measurement and testing by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities; whereas coordination between research projects with a common theme should be improved; whereas the establishment of thematic networks will permit greater synergy between fundamental research and industrial research and coordination with other European initiatives and frameworks, in particular Eureka;

Whereas the nature of the activities to be undertaken in this programme requires close coordination with activities undertaken under other specific programmes.

Whereas fundamental research in the field of measurements must be encouraged with the objective of promoting a European metrology infrastructure;

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 this programme should also comprise support activities and activities for the dissemination and exploitation of RTD results, in particular towards SMEs, notably those in the Member States or 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 JRC will also contribute, through its own programme, to the attainment of the Community RTD objectives in the areas 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 standards, measurements and testing, 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 173 million, including a maximum of 10,9 % for 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 on the fourth framework programme, 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 experts of the activities carried out within the domains 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 the fourth framework programme 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 other measures, including preparatory, accompanying and support measures,

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

— 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 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) above shall apply to:

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

— the content of the calls for proposals,

— the assessment of the RTD acitivites proposed for Community funding and the estimated amount of the Community contribution for each activity where this is equal to or more than ECU 0,25 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 form 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 0,25 million, the Commission shall inform the Committee of the activities 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 and taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

1. General

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 2.D of Annex III (first activity) of the framework programme is an integral part of this programme.

2. Scientific and technological objectives of the research programme in the field of standards, measurements and testing

Sound, reliable measurements, be they physical, chemical or biological in nature, are essential to the functioning of modern society. Without them, industries, particularly high technology ones, cannot operate, trade is impaired by disputes, health care becomes empirical and legislation ranging from environmental and worker protection to the operation of the common agricultural policy and the single market, cannot be successfully implemented. For these reasons, advanced industrial nations spend up to 6 % of their gross national product on measurements and measurement-related operations. Community action directed towards the establishment of harmonized systems of measurements, reference materials and written standards is thus fully in line with the principles of subsidiarity and cohesion and supports the aims of the Comission's White Paper on Growth, competitivenes and employment. This need is particularly acute in Member States which have less well developed infrastructures for measurements and testing.

With access to accurate measurements, and their associated uncertainty statements, industry, particularly in high technology fields, gains the tools it needs to develop new products and processes effectively or to implement the in-process controls and quality assurance procedures necessary for them to be competitive. As few products are assembled from components manufactured within a single company, the existence of a common measurement and testing infrastructure, backed by mutual recognition of results and technically sound written standards, is a pre-requisite for a growing industrial base.

Recognizing that disputes over measurement results, or their interpretation, affect trade, some directives are concerned with the harmonization of measurements within the Community. They specify in great detail both the techniques and procedures to be used in demonstrating conformity. The limitations of this approach, including unnecessary complexity, tend to stifle innovation. Directives used to establish the single market are therefore of the new approach type. These specify the essential requirements to be met and allow compliance to be demonstrated in a number of different ways, the most direct of which is by the use of written European standards. In support of this policy, short-and medium-term pre-normative Community research is required to develop the thousands of written standards to be prepared by CEN/Cenelec/ETSI under Commission mandates before the end of the decade. The urgency for such technical support and that to be given to accreditation bodies is highlighted by the 1993 survey on the operation of the single market, carried out by the Euro Info Centre (EIC) network.

Of the EICs who responded, 81 % had identified enterprises who found it necessary, for practical or marketing reasons, to have their goods certified in other Member States, whilst 47 % had encountered problems with recognition of national written standards and tests in other Member States.

The development of the single market and the entry into force of the Maastricht Treaty have also highlighted the need for harmonization of measurement and testing methods used by regulatory authorities themselves. For example, those used by customs laboratories in the protection of the external frontiers of the Community against the importation of illegal substances, sub-standard goods and counterfeits or fraudulently labelled materials. Similar actions are also required in support of the operation of the common agricultural policy.

Accurate measurements are, however, needed not only in manufacturing industries or for the purposes of trade. They are also vital in ensuring health care and the application of legislation on environmental and worker protection. Frequently such measurements require chemical or biological analyses whose traceability is far inferior to that developed over the last 100 years for the physical measurement field. Often, differences between the results of nominally identical analyses performed in different laboratories far exceed their estimated uncertainties, if indeed such estimates even exist. The consequences for human or animal health which could result, for example, from errors in bio-assays or the contamination of food by residues of toxic substances are self-evident. The development of measurements of known uncertainty must be backed up by a recognized reference system traceable to the basic measurement units defined by the Metre Convention. The importance of this activity to both the quality of life and the application of Community policies justifies coordinated action at the European level.

The objectives of the programme are, for all fields of measurement and testing:

— to improve the competitive position of all sectors of European industry (including in particular SMEs) by promoting better measurements at the research and development levels, better definiton and control of the quality of products, more efficient in-process measurements and technical assistance to the mutual recognition of certificates in accordance with the global approach to conformity assessment,

— to promote research and other technical support necessary for the development and implementation of other Community policies (e. g. single market, environment, agriculture and fisheries, health, transport and protection of the Community's external frontiers),

— to promote research in support of the activities of CEN, Cenelec, ETSI and other European bodies which seek to maintain or establish quality standards via either new and existing written standards or codes of practice,

— to support the further development of the European measurement infrastructure by facilitating the coordination of national activities, the development of measurement standards, of advanced methods and systems and the mutual recognition of results and accreditation systems,

— to promote the dissemination and application of good measurement practice throughout Europe, particularly in the less favoured regions (for example, by the organization of training courses and by the establishment of networks).

When attempting to meet the above objectives, the standardization, measurement and testing programme will carry out its activities in close collaboration with the other specific programmes. Similarly, activities aimed at strengthening the metrological infrastructure at the European level will be carried out in consultation with existing networks of national laboratories, such as Euromet, Eurachem, Eurolab, WECC and Welac. In view of the increased emphasis placed upon the resolution of unpredictable or short- to medium-term difficulties which arise during the development or implementation of a wide range of Community policies, it is also necessary to establish additional thematic networks of excellence. Such networks could serve not only to solve scientific and technical problems but also as reference points for enterprises (especially SMEs) producing goods and services, as centres for analysing national needs and disseminating and transferring information, and as advanced training centres.

In the domains which are within its competence, complementary actions will be performed by the JRD, in close collaboration with natinonal laboratories, especially on stanardization for the construction sector and the setting-up of new measurements and reference materials. The distribution of the reference materials produced by the standardization, measurement and testing programme will be assured by the JRC (IRMM).

SCIENTIFIC AND TECNOLOGICAL CONTENT

Activities under the programme can be classified under three objective based themes, namely:

Theme I — Measurements for quality European products

Theme II — Research related to written standards and technical support to trade

Theme III — Measurements related to the needs of society

In view of the diversity of the needs to be met, flexibility is essential and some topics may be dealt with under several headings. Measures for technology stimulation will be carried out to encourage and facilitate participation of SMEs, taking also into account the needs of those from less advanced regions.

Where necessary, all the following activities would include the development of new reference materials, the organization of scientific and technical intercomparison (round-robins) of different measurement or test methods and support to the establishment of laboratory networks.

Theme I — Measurements for quality european products

Background

When considering the conditions governing growth and competitiveness, the White Paper emphasized the importance of promoting the emergence of new generations of products by exploiting to the full all the technologies available and of encouraging the incorporation of innovation in manufacturing processes and products. The competitive position of industry depends upon its ability to undertake research, to develop the fruits of that research into products and to produce those products at the right time and price with the required quality. To discharge each of these functions requires the use of measurement and/or testing techniques with a known and appropriate resolution, repeatability and reproducibility combined with effective quality assurance procedures appropriate to the industry in question.

The proposed RTD activities are:

— the development of measurement methods and instrumentation required by researchers to investigate and utilize the physical, chemical and biological phenomena at the macro- and microscopic levels from which future products could be developed. Coordinated at the European level this activity would also include the production of the high quality reference data required to develop and validate scientific theories and model systems. Utilizing networks of laboratories with national responsibilities, improvements would be made in the realization and traceability of the measurement scales used throughout research laboratories, test houses, trade and industry. Research would also be undertaken to improve the analysis and utilization of data, including the development of expert systems for decision making,

— the development of generic measurement and test methods, reference materials and instrumentation required in the course of product development. Such measurements are needed in order to optimize the design and testing of products in respect of their functional, ergonomic, environmental, safety and other characteristics. By better characterization of raw materials, components and finished products, the waste associated with failure and poor design could be reduced. Similarly, improved measurements will contribute to a reduction of the environmental impact of industrial processes and product use or disposal (recycling, degradability). By giving technical support to the development of generic products, procedures or standards, the efficiency and hence competitive position of European industry will be enhanced,

— the development of generic measurement methods, standards and instrumentation required in production to improve product quality/production cost ratios. Emphasis will be placed upon the application of advanced methods of calibration, traceability, process control, quality assurance, etc. Activities will include measurements related to sensing, diagnostic monitoring, automated manufacturing and non-destructive testing under production conditions. Special efforts will be made to enable SMEs to adopt new measurement technologies and to establish measurement procedures appropriate to their needs. When necessary pre-normative research will be undertaken to enable industry to comply with Community legislation, particularly in terms of consumer safety and waste management for the protection of the environment.

Theme II — Research related to written standards and technical support to trade

Background

The White Papier states that it is essential to make the most of the benefits deriving from the single market. It also mentions that the Community should be an open and reliable partner, and recommends the establishment of more harmonious and stricter rules in the world economy. To this end, research and other technical activities in the field of measurements are necessary for the development and application of the common system of directives, regulations and written standards which, via the mutual recognition of results and certificates, form the basis of the trade in goods, products and services in the single market whilst at the same time affording protection to both consumers and the environment.

The proposed RTD activities are:

— support to legislation: research on measurement methods and instrumentation is required for legislative purposes when establishing the essential requirements of draft directives. In the case of 'New Approach' directives, pre-normative research will be necessary when no adequate scientific or technical base exists for the development of written standards. Support will also be needed to resolve problems which arise in the implementation and revision of directives or existing written standards, because current methods are either not sufficiently accurate or lead to conflicting results. Included in this category are measurements and standards necessary to detect fraud related to the application of Community policies, particularly in the agricultural sector, and pre-normative research to enable industry to comply with Community legislation,

— support to standards for industry: although not covered by Community legislation, a particular sector of European industry, in consultation with CEN, Cenelec and ETSI, may express the need to develop harmonized written standards to encourage innovation, integration, trade or the adoption of advanced manufacturing practices or materials. It is therefore important to develop the harmonized methods of measurement, analysis and testing necessary for the writing or implementation of such standards. In view of the dynamic nature of the international standardization scene, new priorities will continually emerge and therefore the situation will be reviewed periodically,

— promotion of a European measurement infrastructure: the full benefit of the single market can only be realized by the development of an efficient and reliable European measurement infrastructure based upon traceability to agreed physical, chemical and biological standards. This requires a coordinated approach to research and development of fundamental and derived measurements standards, reference materials and traceability in order to avoid unnecessary duplication of effort within the Member States. The creation of a structured system for metrology in chemistry via a coordinated European action, in association with Eurachem and Euromet, would enable such measurements to be traceable to internationally recognized standards, as is currently the case for physical measurements. The promotion of traceability between laboratories in Member States will be of particular benefit to the smaller ones whilst the provision of training in less-favoured regions will promote cohesion. Wider international collaboration, with bodies such as BIPM, WHO and NIST, could be undertaken where this would support European interests,

— technical support to mutual recognition and accreditation: technical support is required for the operation of the European calibration, testing and accreditation systems and networks (e. g. WECC, Welac and EOTC) which provide certification, conformity and proficiency testing and industrial quality assurance,

— measurements required by customs laboratories: the protection of the external frontiers of the Community against the importation of illegal substances, sub-standard goods, counterfeits or fraudulently labelled materials requires the development of new and improved harmonized methods of sampling and measurement. In particular, measurements will be promoted for checking that contents accord with labelling, for the general purposes of protecting consumers and the environment. In addition, measurements are required to determine duties to be levied or refunded.

Theme III — Measurements related to the needs of society

Background

The results of measurements and tests, other than for the purposes of trade and industry, have far-reaching effects on society. They are used to determine if substances, structures and situations are potentially hazardous or to follow subtle and dramatic changes in the environment. When tests are performed for medical diagnostic or criminal detection purposes errors can have profound consequences for the individual. There is a need both to improve the methods and instrumentation and to determine the uncertainties associated with the results via intercomparison between laboratories.

The proposed RTD activities are:

— health and safety: the implementation of Community legislation requires the measurement of the exposure of workers to certain physical, chemical and biological agents, together with the assessment of the associated hazards and the efficiency of measures taken to reduce them. Similarly, improvements are required in measurements and tests used to assess public and animal health, food hygiene, the safety of products and the safety of workers in the working place. When necessary, new or improved measurement methods and/or standards will be developed for the application of such legislation,

— monitoring of the environment: the implementation of environmental legislation and support to the activities of the European Environmental Agency require the development of new and improved measurement techniques for the determination of the quality of the environment (ambient air, fresh and sea water, soil and waste management, toxicity and microbiological action, etc.),

— justice system: coordinated activities are needed to develop and harmonize the specialist measurements used in forensic science and control, in particular, of narcotics in support of the newly established cooperation in the field of justice. Whilst relatively few laboratories are involved, the advanced nature of the measurements and the consequences of the results warrant coordinated action,

— support of Europe's cultural heritage: the preservation of Europe's cultural heritage depends upon the ability quantitatively to evaluate the conditions of physical objects, including the conservation state of buildings and other constructions, and the efficiency of the methods and of the products used to protect them against environmental pollution and the ravages of time.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

(in ECU million)

Theme I — Measurements for quality European products	69
Theme II — Research related to written standards and technical support to trade	61
Theme III — Measurement related to the needs of society	43
Total	173 (1) (2)

(1) Of which:
- a maximum of 8,7 % for staff expenditure and 2,2 % for administrative expenditure,
- a maximum of 5 % for preparatory, accompanying and support measures, including ECU 2 million for the dissemination and utilization of results,
- up to 10 % for specific measures in respect of SMEs.

(2) A sum of ECU 115 million, the difference between the amount deemed necessary for this programme and the amount envisaged in the fourth framework programme for standardization, measurements and testing, is earmarked for the specific (RDT) programme to be carried out, on the one hand, by means of direct action (JRC) and, on the other, by means of activities within the framework of a competitive approach and intended for S&T support to Community policies (1995 to 1998).

This breakdown between different themes does not exclude the possibility that projects may come under several themes.

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) Thematic networks, bringing together research carried out by manufacturers, end-users, universities and research centres in a particular field of measurement, analysis or testing, will be used to facilitate the transfer of technology or knowledge and the mobility of researchers and to ensure that greater account is taken of market needs. Community funding of networks will normally not exceed ECU 10 000, on average per partner and per year, covering up to 100 % of the additional costs for the coordination of the action. Members of a network could also apply for research projects under normal procedures.

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

      (i) by granting awards for carrying out the exploratory phase of an 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 45 000 or ECU 22 500 in the exceptional case of a single 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 SMEs 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.

   These activities will be complemented by specific preparatory, accompanying and support measures.

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

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

   — support for exchange of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

   — use of external expertise, including access to scientific databases,

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out under the third activity; 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 and technological risks associated with the programme, which will also contribute to the programme 'targeted socio-economic research',

   — training actions related to research covered by this programme in order to enhance employment skills and to facilitate technology transfer to industry,

— independent evaluation of the management and execution of the programme and of the implementation of the activities,

— 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.

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

3. Concerted actions, consisting of the coordination of RTD projects already funded by public authorities or private bodies.

The concerted action option may also be used unter the programme as a way of establishing the feasibility and defining the content of proposals for shared-cost research activities.

Community funding will cover 100 % of the costs of the concertation.

COUNCIL DECISION

of 23 November 1994

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

(94/804/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 of research, technology development and demonstration (RTD) for the period 1994 to 1998 specifying *inter alia* the activities to be carried out in the field of marine science and technology; 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 228 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 marine resources are economically significant for Europe;

Whereas it is necessary to promote knowledge of the marine environment and its interaction with the other components of the biosphere, with a view to understanding the fundamental processes governing global change and the climate, and to strengthen the technological basis of European industry with regard to the exploration, monitoring and sustainable expoitation of the oceans;

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, competitiveness and employment';

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 marine science and technology;

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 support only RTD activities of high quality;

Whereas the efficient use of capital facilities is important;

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 involvement of small and medium enterprises (SMEs) in this programme, in particular through technology stimulation measures;

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[1] OJ No C 228, 17. 8. 1994, p. 96 and OJ No C 262, 20. 9. 1994, p. 16.
[2] OJ No C 205, 25. 7. 1994.
[3] Opinion delivered on 19 September 1994 (not yet published in the Official Journal).
[4] OJ No L 126, 18. 5. 1994, p. 1.

Whereas the Commission's effort 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 marine sciences and technology by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

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 this programme should also comprise activities 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 the progress with the said 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 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 marine science and technology, 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 228 million, including a maximum of 6,9 % 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 lines 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 acitvities 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 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 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) above shall apply to:

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

— the content of the calls for proposals,

— 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 ECU 0,35 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 0,35 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 and taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

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 3.C of Annex III, first activity of the fourth framework programme, is an integral part of this programme.

Introduction

The MAST III programme extends, develops and refocuses the activities carried out under the first two MAST programmes, i.e. the pilot phase of 1989 to 1992 and the MAST II programme 1991 to 1994. For the period considered, it is a step in longer-term strategy which will enable Europe to make a full contribution to the knowledge and management of the oceans. The implementation of this programme will also help European scientists to maintain, where acquired, their leading position or to improve their position in the worldwide scientific efforts.

The programme comprises four areas of activity:

(1) marine science — while this topic generally covers all the seas surrounding the European Economic Area (EEA), much of the research will be organized in a multidisciplinary approach to problems which are specific to each regional sea and to some extreme marine environments;

(2) strategic marine research, with emphasis on the coastal zone, and on socio-economic impact;

(3) marine technology; and

(4) supporting initiatives.

OBJECTIVES OF THE PROGRAMME

The overall objective is to foster the scientific knowledge and technological development necessary to understand how marine systems function at basin scales, in order to prepare for sustainable use of the oceans consistent with the preservation of marine environmental quality and to determine their role in global change.

The programme implements various provisions of the Commission's working document COM(93)459 and the White Paper on 'Growth, competitiveness and employment' (COM(93)700).

1. It specifically addresses a number of problems, such as global change and coastal zone protection, which are considered to be priorities on a European scale. Close linkage with corresponding activities under the environment and climate programme and in the JRC should produce the necessary synergies and serve to highlight interactions between the major compartments of the biosphere (land, atmosphere and sea). In particular, synergy will be sought between the environment and climate programme and MAST III in the study of processes concerning the littoral environment. Where appropriate, common objectives could be formulated linking terrestrial environmental factors and marine processes in the two programmes.

2. In the section on marine technology, the programme acknowledges the importance of research into generic technologies and takes account of the gradual emergence of new needs, particularly in the sector of ocean and coastal observation and monitoring, with the aim of helping to promote growth in Europe. Enhanced synergy will be sought with Eureka, and especially with the umbrella project Euromar.

3. Through its coordination activities and supporting initiativs, the programme will help to enhance the profile and the cohesion of Europe's scientific community, streamline the integration of national activities with those undertaken at Union level and promote coordinated management of the infrastructures needed in research.

The research activities envisaged in the area of global change may be carried out within the framework of the European Network for Research in Global Change (Enrich) network, with a view to focusing the Community's research effort and giving it a higher profile in the context of world research in this area. Such activities will be pointed in a direction which ensures that the research effort will help meet the objectives of the IGBP (1), the WCRP (2) and the HDP (3), and certain aspects of the development of the GOOS (4). Appropriate collaboration will also be set up with other international bodies such as the IOC (5), the ICES (6) and the Icsem (7).

Whenever necessary, the programme will be implemented in close coordination with other actions listed in the framework programme i. e. the programmes and activities mentioned in point 1, and also the programmes on 'agriculture and fisheries', 'biotechnology', 'non-nuclear energy', 'measurement and testing' 'industrial and materials technologies', 'telematics', 'transport', and 'targeted socio-economic research'.

SCIENTIFIC AND TECHNOLOGICAL CONTENT

Research Area A: Marine science

Objective

To study the fundamental processes determining the dynamics of marine systems in the seas, oceans and estuaries around Europe with a view to a better understanding of the marine environment and improved capability to model processes and forecast change.

1. *Marine systems research*

Objective

Observational and experimental studies, leading to the modelling of the physical, chemical, biological and geological processes and their interactions at basin and sub-basin scales, with emphasis on scientific problems relevant at the European level.

Research tasks

(a) Circulation and exchange of water masses: formation and exchanges of ventilated and non-ventilated water masses on the continental slopes and in the deep basins of the eastern North Atlantic, its northern marginal seas and the Mediterranean; change of the physical, geochemical and biological properties of these water masses during spreading and mixing.

(b) Practical and theoretical integrated ecosystem studies to model and define the resilience of pelagic and benthic ecosystems of marginal seas and ocean basins: structure and functioning of their living communities; energy and element cycling through foodwebs; processes controlling biodiversity, including effects of biotic and abiotic factors and the role of biodiversity in biogeochemical fluxes; characterization of marine organisms able to produce bioactive substances.

(c) Biogeochemical and physical processes including the role of waves and currents and fluxes across the air/sea interface: linkage of water and atmospheric processes and quantification of fluxes of energy, organic matter, inorganic nutrients, gases and metals involved in air/sea exchange.

(d) Flux of heat and organic and inorganic matter across the water/sediment interface: influence on ocean dynamics, energy balance, diagenesis of sediments and benthic and pelagic ecosystems.

(1) International Geosphere-Biosphere Programme.
(2) World Climate Research Programme.
(3) Human Dimension of Global Environmental Change Programme.
(4) Global Ocean Observing System.
(5) Intergovernmental Oceanographic Commission Unesco.
(6) International Council for the Exploration of the Sea.
(7) International Commission for the Scientific Exploration of the Mediterranean.

(e) Sedimentary processes in the deep sea, on the continental slope and on the snelf edge: transport and deposition on various time scales; role of chemical, biological and hydrodynamic processes.

(f) Marine biodiversity issues (genetic, population, species and habitat) as a basis for understanding ecosystem structure, dynamics and resilience in the context of sustainable exploitation, biological conservation and marine habitat restoration.

2. *Extreme marine environments*

Objective

To understand the functioning of ecosystems in extreme marine environments and to determine their role in the global environment by studying their characteristic physical, chemical, biological and geological processes.

Research tasks

(a) The deep sea floor in the North Atlantic and the Mediterranean: interdisciplinary studies at the base of the water column, of the sea-floor-water interface and of the sub-sea floor: quantification and long-term investigation in the spatial and temporal variability of biological, chemical and biogeochemical processes and fluxes (including hydrothermalism); geological, geophysical, and biogeographic processes at active plate boundaries.

(b) The ice-covered seas in the northern hemisphere: physical dynamics of sea ice, including interaction with man-made structures; deep water formation; large-scale circulation, eddies and shelf processes in the Arctic; biological dynamics of sea-ice-systems and their particular role in the Arctic food webs, life cycle strategies of marine organisms in Arctic seas; energy and mass exchange between sea ice and both the watercolumn and atmosphere; vertical biogeochemical transfer processes and the impact of variability in pack ice coverage on the sea floor communities; sedimet formation in ice-covered regions and the geological record as indicator of long-term ice cover change.

(c) The surf and swash zone of European coasts: study of sub- and intertidal ecosystems, including special regional habitats, in relation to the dominating physical forcing factors; morphological, physiological and ontogenetic adaptations of organisms; interactions of biological with physical, chemical and sedimentological factors which are relevant for formation, stabilization and alteration processes of the immediate shore line.

3. ***Regional seas research***

Objective

To combine comprehensive, interdisciplinary large-scale process studies under a common objective in order to understand the functioning of entire inland seas or specific sub-areas of the eastern North-Atlantic. If there is need for more scientific understanding, regional seas other than the ones listed may be considered.

Research tasks

(a) The Mediterranean Sea:

Investigation of the physical, sedimentological, geochemical and biological processes which determine the evolution of the Mediterranean ecosystem; exchanges between the continental margin and the open sea as well as through straits and channels; contribution of various sources (e. g. atmosphere, rivers, upwellings) of organic and inorganic matter, transport in the water column and sediment record; modification of biogeochemical equilibria by anthropogenic influences; influence of physio-chemical environment on biological and microbiological processes.

(b) The Baltic Sea:

Quantification of contemporary fluxes of matter and energy including exchange with the North Sea, for a better understanding of the susceptibility of the Baltic Sea to global changes; assessment of evidence for past and present, natural and anthropogenic, changes of the Baltic in order to develop

adequate models to explain biotic and abiotic processes which control the system. Objectives should be to achieve a balance between exploitation of resources and sustainability and conservation of the entire system; development of general strategies and tools for integrated (i. e. scientific, technical and socio-economic) coastal zone management. These reasearch tasks will be carried out in close cooperation with the environment and climate programme.

(c) The Canary-Azores region and the Alboran Sea:

Analysis and simulation of the exchange of energy, water, particulate and dissolved matter and organisms between the North Atlantic and the Mediterranean and between coastal and ocean waters through the Eastern boundary current; work on the Strait of Gibraltar and adjacent seas will focus on analyses and simulations of energy-, water-, and particle fluxes including their climatic, geochemical and biological implications.

(d) The Northeastern Atlantic continental margin:

Determination of the principal processes controlling fluxes of water and particles in geomorphologically contrasting shelf edge systems; study of water masses, currents, productivity, sedimentation processes, sediment transport and biogases at the ocean margin; determination of the sensitivity of these processes in response to global climatic change and sea-level rise and vice versa.

Research Area B: Strategic marine research

Objective

To study the dynamics of marine systems for application in the management of the marine environment as a resource and as human living space; to study the dynamics of exploited marine systems for which there is a substantial body of basic scientific knowledge (such as the North Sea) to permit cooperative management of such systems by European coastal nations; with regard to the North Sea, to develop high-quality monitoring in line with the recommendations of North Sea task force. Consideration will be given to the impact of socio-economic factors on the marine environment in coordination with the environment and climate programme.

1. ***Coastal and shelf sea research***

Objective

To understand the complex interactions of the physical, geological, biological and chemical processes and human impacts in shelf seas and coastal environments; to enhance through increased sientific knowledge medium- and long-term predictive capacity of coastal zone evolution with a view to sustainable protection and use the coastal and shelf environments.

Research tasks

(a) Coastal physical processes and morphodynamics:

Processes and their interactions in the shelf sea and coastal zone mostly related to sediment (cohesive and non-cohesive) transport and morphodynamics; dynamics of estuaries and of inter-tidal zones and salt marshes in their role as shore protection mechanisms; development of robust, integrated models, supported and validated by *in situ* observations and databases, for predicting the effects of medium-, long-term and extreme events; design of large-scale experiments for model validation and calibration and risk asssessment.

(b) Structure and dynamics of shelf and coastal sea ecosystems:

Interactions between the shelf and the various components of the coastal zone (neritic zone, estuaries, inter-tidal zone, lagoons and salt marshes); relative importance of autochthonous and allochthonous sources of matter for different types of near-shore ecosystems; origin, transformation and fate of organic matter in the coastal sea; the role of coastal biogeochemical cycling in global change; integrated process modelling and experimental validation with a view to providing tools for management of shelf sea resources (research tasks will be coordinated with the activities in the environment and climate programme and with global initiatives).

(c) Methods for monitoring, forecasting and management of shelf seas and coastal zones, with particular attention to requirements of intergovernmental bodies:

Methods for the operation of forecasting and monitoring systems for physical and non-physical properties in coastal waters and shelf seas; methods for integrating subsystems and for evaluating information fluxes and management options, including assessment of risks.

2. *Coastal engineering*

Objective

To provide the scientific and technical basis which will enable the development of innovative design tools and will lead to laying down authoritative design guidelines regarding the various shore-protection measures.

Research tasks

(a) Design of man-made coastal structures and maintenance of natural coastal structures: Hydrodynamic processes affecting the dynamic behaviour and stability of coastal structures, especially 3-D effects. Numerical modelling of artificial and natural structures. Morphological impacts.

(b) Development of new remote sensing techniques, increased use of satallite imagery for the detection, monitoring and analysis of coastal processes; field studies to calibrate physical and numerical models, taking into account multi-directional aspects of swell (research in this area will be coordinated with the environment and climate programme).

Research Area C: Marine technology

Objective

To promote research on generic technologies (including underpinning methodologies and systems development) and on advanced systems (platforms and instruments), in order to improve or create new capabilities for observing, monitoring and managing the marine environment and for exploiting marine resources. A crucial objective of this research is to help make European industry more competitive.

1. *Generic technologies*

Objective

To provide the marine community with the generic technologies for the future by the development of innovative technologies, further development of existing technologies (for example in underwater acoustics hydrodynamics, resistant materials and robotics) or adaptation to the marine environment of technologies from other fields.

Research tasks

(a) Non-disturbing techniques:

Research on non-disturbing techniques for oceanographic observations (biological communities, three dimensional physical structure of the oceans), including sound signal modelling and analysis.

(b) Underwater communication and orientation:

Development of precise underwater positioning navigation and communication systems for large-scale research, surveying and monitoring (including the use of satellite systems), which are effective over distances large compared with water depth.

(c) Underwater viewing:

Development of advanced underwater imaging systems (optics acoustics, tomography) for biological, chemical, physical and geological/geophysical and archaeological research, and for inspection of marine structures, includuing antifouling provision.

(d) Exploitation of marine biological resources other than fisheries and aquaculture:

Development of techniques for the identification and cultivation of marine organisms capable of producing bioactive substances; extraction, purification, structural characterization and analysis of bioactive compounds; evaluation of the application potential of these substances for basic research in ecology, pollution, chemical manufacture, biological process monitoring, marine engineering, food technology and medicine.

(e) Submarine geotechnics:

Improvement of geotechnical knowledge of soils, slope stability, pipeline burial, anchorage of floating structures, and foundation of structures with alternative loadings, taking into account the aspects of risk-assessment.

2. *Advanced systems*

Objective

To design and develop advanced systems and subsystems for measuring oceanographic, (including geochemical) parameters and sea floor characteristics (geophysical and geological), taking samples, and implementing technologies used in support of exploration, monitoring and marine exploitation activities. These advanced systems will make it possible to monitor and model regional, global, seasonal and long-term changes in the seas and oceans.

Research tasks

(a) Unmanned platforms and autonomous systems:

Development of advanced equipment and subsystems for ships of opportunity and for unmanned platforms such as ROVs or autonomous vehicles, benthic landes, benthic laboratories and buoys; this includes research on advanced materials, power sources and propulsion systems research vessel based handling systems and ROV inspection of structures.

(b) Oceanographic measurement and sampling equipment:

Development of intelligent, controlled and reactive sensors, instruments and samplers, including for geotechnical and geophysical investigation of marine sediments. The research will take into account the needs of the future possible GOOS (Global Ocean Observing System) and of other major international programmes and the requirement to support deep sea exploration and exploitation activities. The transfer of existing sensors from other domains to the marine environment will be encouraged.

(c) Biosensors:

Development of underwater biosensors for monitoring pollution, chemical manufacture and biological process monitoring.

AREA D: Supporting initiatives

Objective

To improve coordination, cooperation and the exchange of information amongst European scientists and to help increase the effectiveness of national and international programmes through better use of research facilities and the transfer of expertise and knowledge.

Topics for action

1. Advanced training (fellowships, courses).

2. Standards for training and work in specialized fields of ocean sciences (e. g. scientific diving, marine technicians).

3. Coordination of modelling, promotion of common structures, compatibility and standardization, ocean data handling and management, ocean data exchange and quality control for research and operational applications: initiation of European activities in the fields of modelling marine systems, ocean data and information exchange and of quality control. To provide assistance so that specialized centres, national institutions and undertakings, in particular SMEs, can participate in a coordinated manner.

4. Coordinated use of capital facilities, including research vessels, and large computing facilities on a regional and European scale.

5. Design of components and systems for heavy advanced experimental and operational equipment.

6. Calibration techniques and standards for marine instrumentation and observation methods.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

	ECU million
Area A	
Marine science	91
Areae B	
Strategic marine research	51
Area C	
Marine technology	69
Area D	
Supporting initiatives	17
Total	228 (1) (2)

(1) Of which:
— a maximum of 3,3 % for staff expenditure and 3,6 % for administrative expenditure,
— 2 % for training,
— ECU 2 million for the dissemination and optimization of results.

(2) Community funding for operational costs of research ships and associated equipment will be approximately 5 % of the total budget.

This breakdown does not exclude the possibility that a project could relate to 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, including, where appropriate, basic research of an industrial relevance.

   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:

   (a) by granting awards for carrying out the exploratory phase of an 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 45 000 or ECU 22 500 in the exceptional case of a single applicant SME; and

   (b) 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 non-affiliated SMEs 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.

   These activities will be complemented by specific preparatory, accompanying and support measures.

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

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

   — support for exchanges of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

   — use of external expertise, including access to scientific databases,

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out under 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 and technological risks associated with the programme, which will also contribute to the programme 'targeted socio-economic research',

   — training actions related to research covered by this programme in order to facilitate technology transfer and enhance employment skills,

   — independent evaluation of the management and execution of the programme and of the implementation of the activities,

   — 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.

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

3. Concerted actions, consisting of the coordination of RTD projects already funded by public authorities or private bodies. The Member States will help the Commission to identify relevant laboratories or institutes, in order to ensure that no major activities are left out of this concertation process.

   The concerted action option can also be used under the programme as a way of establishing the feasibility and defining the content of proposals for shared-cost research activities.

   Community funding will cover up to 100 % of the costs of the concertation.

COUNCIL DECISION

of 23 November 1994

adopting a specific programme of research, technological development and demonstration in the field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development (1994 to 1998)

(94/805/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 field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development); 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 607 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, in order to attain the objectives and meet the challenges in the field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development), a programme of RTD should support:

— the competitiveness, efficiency and sustainable development of the agricultural sector (agriculture, horticulture, forestry and fisheries) and the agro-industrial sector (food and non-food),

— the evolution of Community policies (especially agriculture and fisheries),

— societal needs to provide a wide range of healthy and nutritional food products and non-food products compatible with the environment,

— sustainable development, the preservation and the improvement of rural and coastal environment;

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, competitiveness and employment';

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 field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development);

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 support only RTD activities of high quality;

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[1] OJ No C 228, 17. 8. 1994, p. 131 and OJ No C 262, 20. 9. 1994, p. 18.
[2] OJ No C 205, 25. 7. 1994.
[3] Opinion delivered on 14 and 15 September (not yet published in the Official Journal).
[4] OJ No L 126, 18. 5. 1994, p. 1.

Whereas the Community contribution to fisheries research can be more effective if specific final arrangements are made for the collection of data and the maintenance and development of appropriate data bases in cooperation with the corresponding authorities in the Member States;

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 involvement 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 support the implementation of the programme and to facilitate the action which firms, and 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 agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development) by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas the nature of the activities to be undertaken in this programme requires close coordination with activities undertaken under other specific programmes;

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 this programme should also comprise support activities 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 said 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 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 JRC will also contribute, through its won programme, to the attainment of the Community RTD objectives in the areas 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 agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development) 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 607 million, including a maximum of 7,3 % for 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 pursuant to 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 indepedent, external experts, the 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 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 acitvities 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 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 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) above 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 criteria and mechanisms for project approval and selection,

— 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, ECU 0,5 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 0,5 million, the Commission shall inform the Committee of the activities 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

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the orientations of the fourth framework programme, in applying the selection cirteria and in specifying its scientific and technological objectives.

Paragraph 4.C of Annex III, first activity of the fourth framework programme, is an integral part of this programme.

Introduction

The economic sectors encompassed by this programme can be divided into four groups: the primary sector (agriculture, horticulture, forestry, fisheries, aquaculture), the 'input' industries (e. g. seeds and juveniles, machinery, fishing technology, chemicals, fertilizers, feeds, biocides and medicines and the processing industries (food; sugar and starch; protein, fibre and other biological derivatives; wood and paper; pharmaceuticals; biomass for energy, etc.), together with the rural (including mountain and coastal) activities that are dependent on the activities of the primary, input and processing sectors, These large sectors include large comapanies and numerous SMEs developing and producing both niche and bulk products which would benefit from the programme as well as the cooperatives, the 10 million farmers and fishermen and 380 million consumers of the Community (1).

Activities in these sectors, including primary production, transformation industries and final product utilization are directly affected by the major Community policies on agriculture, rural development, and fisheries, as well as those on the environment, and the internal market.

A major challenge is to contribute to a better match between the production and utilization of biological raw materials in Europe. New markets and products of greater added value will have to be developed for raw materials produced by agriculture, forestry and fisheries which meet the demands and requirements of the end-users, in particular through the improvement of their original quality.

Models of rural development will be needed to help to integrate, at an enterprise level, the production of food and non-food materials, and the provision and utilization of services (ranging, for example, from landscape conservation, to water supplies and agri-tourism).

Research in this area will provide a strong scientific basis for a competitive, efficient and sustainable primary production and agro-industrial sector; to support the development, assessment and implementation of Community policies (including those concerning agriculture, rural development, fisheries, environment and the internal market); and to respond to societal needs for a good quality of life, including a wide range of healthy and nutritious food, the organoleptic properties of which shall be one of the criteria for determining quality, and new non-food products and modes of production which are compatible with the environment.

General objectives of the programme

The objectives of this programme are to increase competitiveness, efficiency and sustainability of the agricultural, fishery and related industry sectors, and to promote rural development. Research should help to remove bottlenecks which are hindering the wider use of agricultural, forestry and fishery raw materials for new and improved food and non-food products, and to stimulate the emergence of new products, outlets and processes within the agricultural, forestry, agro-industrial and fisheries sectors. Therefore research must respond to socio-economic issues of rural and coastal communities, to safety, quality and health and environmental implications of new food and non-food products for which it is clear that there is a demand from the public.

(1) In the rest of this text, 'agriculture' includes all on-farm activities including crop production, livestock production, horticulture and farm forestry; 'forestry' is also used in a broad sense to include all tree production and utilization activities, including agro-forestry; 'fisheries' covers all aquatic organisms and includes aquaculture, and 'rural' includes also mountain and coastal communities or activities.

Prenormative research will be initiated and supported in order to provide a sound scientific base for the setting of standards and regulations relating to production, transformation and use of biological resources.

Demonstration activities will have the objective to prove, in a phase consecutive to that of experimental research and small-scale technological development, the technical viability of systems and methods of production, of new technologies or products together with, as appropriate, their economic advantage. These projects will be pre-competitive, and should as such focus particularly on the application of new technologies and involve participation by both producers and users. Platforms or 'extended audiences' may be established if appropriate, to maximize technology transfer and uptake by the widest possible range of users. In order to reduce project costs, the scale of operations for demonstration projects will be the minimum scale required to obtain reliable practical information on the performance of new sytems and methods of production and of the particular new technologies. These demonstration operations can be implemented in any of the areas covered by this specific programme. A bottom-up approach will be applied to identify the best demonstration opportunities.

The association in interdisciplinary projects of technology producers, technology users, and producers and users of agricultural raw materials, will be pursued in order to ensure an efficient transfer of new technological knowledge for the benefit of potential users.

Measures of technological stimulation based on the experience of the Craft action and feasibility awards will be implemented in order to encourage and facilitate the participation of SMEs, taking account of the needs of those from less advanced regions.

An integrated approach in biomass-bioenergy could be used covering the whole bioenergy chain including production and combined processing of agricultural and forestry raw materials, conversion, and use of these materials for energy purposes. There are questions about the viability of bioenergy options in current economic conditions, so it is important that issues of energy efficiency and market orientation should be taken into account in close cooperation with the NNE programme.

In order to improve dialogue and understanding between the main national and socio-political bioethical view-points, whilst recognizing the cultural differences which exist in Member States, research will be undertaken to investigate factors affecting public response to ethical, legal and social aspects of the sectors included in this programme.

The agriculture and fisheries programme has important links with the other life sciences programmes, and to those on environment, marine science, non-nuclear energy, and industrial and materials technology, as well as actions under activity 4. It will be essential to ensure good means of coordination, including the development of projects that address the issues of more than one programme.

OBJECTIVES REQUIRING CONCENTRATED MEANS

Area 1: Integrated production and processing chains

There is potential in the agro-industrial (including small-scale regional processing units) and forestry/wood sectors to extend current opportunities or to create significant new markets which will utilize biological raw materials from Europe. These non-food biological products will often have to compete with established products and so the objective is to develop efficient, economic production chains and exploit economically feasible opportunities, to meet market quality requirements, and to optimize environmental compatibility.

To this end, all necessary skills and technologies, particularly biotechnologies, related to the individual links in the production chains will be combined in integrated food and non-food projects addressing those chains for which Europe has a competitive advantage. In terms of participants, strong emphasis will be put on the participation of producers and users of biological raw materials in joint projects, closely cooperating with scientists. The wood and biomass production and processing chains, where overall efficiency is most likely to generate significant impact on e. g. rural economies, will be addressed.

Considerable efforts will also be devoted to developing opportunities for higher value-added novel biobased intermediate and end-products. Synergistic effects of combining different food and non-food production will be sought, e.g. by optimizing the conversion of by-products to energy and other non-food products.

It is the intention to create large projects and networks to focus on complete production chains, These coordinated networks of projects will encompass primary production and processing to food and/or non-food end-use products. Integrating the projects into networks should bring together the necessary critical mass so as to create a significant impact, within the short- to medium-term, on the development and implementation of new technologies and products within each chain, including optimization of utilization of waste and by-products.

The greatest opportunities for early advance lie in the industrial use of agricultural products in the five lines of: Cereal crops, vegetable oil crops and leguminous crops; the forestry-wood-chain; and biomass for energy and non-food uses. The same approach may subsequently lend itself to other production chains, such as animal and fish production and other crops such as fibre, forage, and horticultural and speciality pharmaceutical crops.

In establishing projects, emphasis will be given to an integrated approach both in biomass-bioenergy and in industrial use of biomass for non-food products to ensure consistency and relevance of Community RTD activities covering the whole bioenergy chain in its technical and non-technical aspect (including e.g. energy balance, environmental impact analysis, the transport factor cost-effectiveness, macro-economic policy aspects, etc.): production and combined processing of agricultural and forestry raw materials, conversion and use of these materials for energy purposes and industrial use. Research in the area of wood and fibre biomass and processing chains should strengthen the scientific base relating to diversification and reorientation of production of quality products as well as development of environmentally-friendly, market-led and renewable products.

This strategic approach will be jointly elaborated by this programme and the energy programmes. Whereas this research programme will focus on raw material production, logistics and processing, the activities in the energy programme will focus on work linked to conversion and use of solid biomass.

Area 2: Scaling-up and processing methodologies

The transfer from laboratory to industrial scale is characterized by major problems and bottlenecks, such as homogeneity and quality of raw material supply, and understanding the basic physical and chemical characteristics, of the bio-materials, e.g. their fluid dynamics, heat transfer, flocculation, product recovery, equipment, etc. Carrying forward, amongst others, the fundamental advances derived from the Eclair and Biotechnology programmes, improved methodologies will be developed for designing and testing innovative agro-industrial processes and for the application of biotechnology, while taking account of the economic feasibility of investing in new technology, including small scale off- and on-farm technologies.

In multidisciplinary projects, scientists and engineers will be brought together in order to understand the specific problems directly resulting from increasing the scale from laboratory to industrial levels. Fundamental and strategic studies are necessary to unravel the basic physical and chemical characteristics of biological materials. In particular, the development and improvement of technologies (e.g. specialized instrumentation, robotics, structured models, and simulation methods) used for scale-up, design and testing of agro-industrial processes will be jointly undertaken. New process technologies and technology transfer from other industrial sectors will be considered.

The upstream 'green' biobased chemistry, and applied biotechnologies involving enzymatic and fermentative biosynthesis, and the downstream activities of fractionation, separation and product development, are typical examples of processes which pose technological difficulties in scaling up to the industrial operational scale, and where synergy between chemical engineering in design, instrumentation and equipment, and the life scientist will be most effective. Research on upgrading of products and by-products from fermentations and other processing industries will be undertaken, including the treatment of agricultural and agro-industrial wastes, but excluding urban waste, to obtain for example by-products or agricultural fertilizers.

One of the positive effects of research in this field may also be the lowering of the cost and environmental impact of industrial processes. These activities will be complementary to, and synergistic with, the fundamentally oriented bioprocess engineering activities within the Biotechnology programme and the more applied activities within the Industrial Technologies Programme.

Area 3: Generic science and advanced technologies for nutritious foods

The food and drink industry, including fish processing, ranks second in terms of output in Europe. Research should improve the industry's competitive position but also provide consumers with a safer and higher quality including organoleptic quality, more nutritious and health promoting diet. A further focus of research is the development of environmentally-friendly technology for low-waste food production; food-packaging/storage/transport/distribution interactions and other environmental aspects of food production.

Generic technologies including biotechnology will be applied in the food sector to produce commercial crops with enhanced performance and improved nutritional and organoleptic qualities, again complementing fundamentally oriented research within the Biotechnology programme.

Other research will concentrate on generic scientific phenomena involved in the conversion of biological raw materials into food, and its metabolism. The emphasis will be on multidisciplinary, molecular, biochemical, microbiological and cellular physiological approaches which will support new advanced technologies for improving food quality, safety and wholesomeness, including freshness and spoilage of seafood and other foods.

Community activities will concentrate on methods for the quantification and control of quality and safety; origin identification; wholesomeness attributes; basic food and nutrition science (structures, interactions); food functionality, metabolism and safety *in-vivo* and *in-vitro*; novel processing technologies (as well as improvements to traditional technologies to improve product quality); equipment and products (emphasizing biotransformation/biotechnology and avoidance of unwanted substances); and interactions between these and consumer behaviour, including attitudes to new food technologies and impediments to the choice of a healthy diet, with the aim of helping consumers to improve their understanding of consumer choice in relation to diet, health and novel foods. This work will also encompass research on upgrading of fishery products and better utilization of under-used species and by-products.

Nutritional diseases and disorders are an increasing aspect of modern lifestyles. Multidisciplinary research combining production, processing and health aspects, will focus on the relationship between dietary components and health status, particularly food absorption and metabolism, the role of intestinal flora and immunology, and the tailoring of foods for specific nutritional requirements and functions.

Area 4: Agriculture, forestry and rural Development

The objective of the research in this area is to support the development and evaluation of the Community policies as well as identification of problems and their solutions in the rural world. The need is to develop new production systems which are economically viable, which are both compatible with the environment and maintain an adequate level of employment. An improvement in the economic situation of agriculture will be also sought by means of quality products, diversification of food (such as regional specialties) and non-food products and farming activities, and by cost-reductions that pre-suppose the introduction of new technologies and more efficient and better used inputs.

Following the United Nations Conference on the Environment and Development at Rio de Janeiro in 1992, the Community is resolutely committed to the conservation, characterization, and utilization of genetic resources in agriculture and the protection and sustainable management of forests. At the Ministerial conferences on the protection of forests in Europe (Strasbourg 1990 and Helsinki 1993) a commitment was given actively to contribute to a series of coordinated activities at European level leading to improved protection and an ecologically viable management of forest resources. Research is needed to address these objectives.

Research should improve the scientific base which underpins the development and implementation of rural development policy.

Optimization of methods, systems and primary production chains: In the new scenario, as a result of the reform of the common agricultural policy (CAP), it is necessary to develop the scientific bases which will identify and develop the means, techniques, systems and chains of production which will lead progressively

towards a less intensive, but still competitive, agriculture, compatible with the protection of the environment and natural resources, economically viable, while maintaining a sufficient employment level. New positive uses for set-aside lands for farmers and the Community should be developed and evaluated.

As a prerequisite for the necessary changes in agriculture, research is needed on the identification, isolation and exploitation of the genetic variability of cultivated crops (including those varieties no longer in use) and their wild relatives and of the diversity of animals.

Research will be undertaken in areas related to the preservation of the genetic heritage and biodiversity in seeds of indigenous species, which have proved their ability to adapt to adverse climatic effects, such as drought, or have shown their resistance to specific pests. At the same time, efforts will be made to develop varieties more resistant to these adverse effects to assist in extensive crops for dry farming.

In this context the priorities should be: evaluation of environmental impact of agricultural practices, reduction and optimal use of inputs, sustainable management of soil and water resources, uses for set-aside lands, and adaptation of production chains to changing market, economic and environmental needs.

Water management models will be developed for preserving crops when precipitation is rare or irregular, so that lowering of the water table through excessive irrigation from subterranean water can be prevented, and for modifying the procedures which prevent the salinization of water and surface layers. Under the same heading, special attention will be paid to management of soil resources and specifically to the promotion of methods of combating erosion.

The utilization of biotechnology, combined with traditional methods, should lead to the creation of new genotypes in the area of animal production, of new plant varieties and hybrids, including forest trees, more resistant and/or giving improved yield (especially for non-food uses) and better quality raw material for ultimate processing and end-use.

These activities will be complementary to those of a more fundamental character within the 'Biotechnology' programme and also to those of commerical application within the area above of Generic Science. Emphasis will be placed on enhancing the value of products and by-products of agriculture, implementation of new methods of biological protection of crops, creation of new genotypes or varieties leading to a reduction in use of inputs, resulting in reduced costs of production and to more sound use of natural resources as well as to minimize environmental impact. This aspect is of particular importance in the area of competitiveness of agricultural products and their eventual non-food utilization.

In support of the management of the CAP, research work will also be directed towards the methods of controlling the implementation of regulations, improvement of means of following and managing markets and multidisciplinary analysis of the ex-ante and ex-post impact of instruments of the CAP, the elaboration of trans-sectoral economic forecasting models or other instruments of quantitative analysis, and information systems and decision support for farmers and decision makers.

Quality policy: In the area of quality products, including traditional products, and the support of new Community regulation instruments (labels of origin, geographical indications and specific product types, biological agriculture) research should identify and characterize the criteria, the products and quality chains, define and diffuse the conditions which assure a viable income for primary producers. Community research is needed on conservation, hygiene and storage of fresh and processed food and feed on-farm.

Work will be carried out particularly on the improvement of methods of quality control of primary products, increasing the value added, and its benefit to all operators of the chains; on the primary concept of 'total quality'; on analyses of consumer behaviour; and on the scientific bases for the promotion of agricultural primary products.

Diversification of production, land use and farming sector activities require a research effort for the identification and analyses of economically, viable possibilities (food and non-food) as well as the development of complementary activities for farmers (e. g. agri-tourism, farm crafts, agro-forestry, etc.). In selecting priorities, equal weight will be given to economic and technical factors, and a multidisciplinary

approach will be favoured. Particular attention will be given to the economic viability and the compatibility of these new primary productions and activities with regard to respect for the environment.

Animal and plant health, animal welfare: Research should provide scienitific and technical support for the development and management of Community norms and regulations especially in the context of the large Internal Market and the reponsibilities of the Commission in the areas of plant and animal health as well as disease control and agricultural pests.

Of particular importance will be scientific support for hygiene, detection, diagnosis, evaluation of risks, epidemiology of diseases and prevention and control measures, the analysis of aspects relating to animal well-being, optimization of factors relating to animal feed, as well as research in support of approval relating to phytosanitary and animal health products so as to improve the safety of the users of these products and of consumers. Research in the field of farm animal behaviour (ethology) and into the development of husbandry systems consistent with the welfare needs of the animals should be included.

Utilization of biotechnology should also contribute to the detection (diagnostics), the prevention (e. g. vaccines) and the eradication (e. g. drugs) of animal and plant diseases.

Multifunctional management of forests: Research should contribute to an overall achievement of the objectives for the protection and the long-term development of forests adopted in Strasbourg in 1990, at Rio de Janeiro in 1992 and in Helsinki in 1993. In this context but also in keeping with the implementation of agriculture and forestry measures agreed as part of the reform of the CAP, the priorities for forestry research should be improvement of the knowledge base leading to implementation of sustainable management of forests, functioning of forest eco-systems, development and improvement of agro-forestry systems, integration of the multiple functions of forests, (including production, conservation, recreation/amenity and climate protection). There continues to be a need for economic, environmentally friendly and sustainable utilization of forests (including their role in mitigation of climate change) and research on how best to deliver their multipurpose benefits. Finally, research should improve the understanding of the multiple causes of forest decline in different forest ecosystems.

Rural development: Research must provide the scientific support for the implementation of the Community policy of rural development which will evolve significantly during the period 1994 to 1999. Themes which will be important are the following: methodologies for the assessment monitoring and evaluation of rural development programmes and measures, analysis of policies to improve agricultural structures and rural developments, typology of rural zones, identification of key socio-economic indicators, analysis of principal problems, potentials and constraints, introduction of new technologies and diversification of activities in fragile rural areas (especially Objectives 1 and 5b), identification and mobilization of partners and organizations likely to be efficient participants in rural development activities, and models of economic development based on an integrated approach and using local potential.

In a general manner, particular attention will be given to economic viability and its compatibility with the protection of the environment.

Area 5: Fisheries and aquaculture

The overall objective is to provide a sound scientific basis for the balanced, sustainable exploitation of the fisheries resources of the Community, and the further controlled development of Aquaculture. This is to be achieved by a better knowledge and understanding of the aquatic ecosystem, including the interactions between fishing activities, aquaculture and the environment. Socio-economic considerations are recognized as an integral part of the programme, together with the associated requirement to develop appropriate methodologies for evaluating fisheries and aquaculture policies.

An improvement of the economic situation of aquaculture and fisheries will be sought by means of improvements to quality of products, diversification of products (food and non-food) and activities and by a reduction of wastes, both at the point of capture and during processing.

Work in this sector will be targeted on five areas:

Impact of environmental factors on aquatic resources: The objective is to generate a better understanding of the influence of environmental factors (oceanographic, climate, primary production, etc.) on key biological

parameters (recruitment, distribution, natural mortality, etc.). This work, where appropriate, will link with activities within the Marine Science and Technology Programme.

Ecological impact of fisheries and aquaculture: Research will result in a better understanding of the effects that fisheries and aquaculture have on the ecosystem, with the aim of limiting their impact on the aquatic environment particularly reducing the mortality of juveniles and non-target species. Research will include fisheries/top predator relationships, gear selectivity, sea-bed degradation, and fish farm effluents, and will be undertaken against the background of other perturbations in the environment caused by natural (e. g. hydrographic) and anthropogenic factors other than fisheries (e. g. pollution, eutrophication, gravel extraction).

Biology of species for optimization of aquaculture: The work under this heading will contribute to a better knowledge of the biology of aquatic species, with the objective of encouraging the development of an economically profitable industry. Special emphasis will be put on the genetic adaptation of aquaculture species, and pathological issues. Multidisciplinary approaches will be adopted where relevant including the application of biotechnology. Research into new species as a means of diversification will be promoted.

Socio-economic aspects of the fishing industry: The objective is to generate better knowledge and understanding of the operation and management of all sectors of the fishing industry including associated industries. Particular emphasis will be placed on multidisciplinary studies, including evaluating the social and economic consequences of alternative management options.

Improved methodology: The aim is to improve existing methodologies for fish stock assessment (e. g. novel methods of data collection and analysis), and the development of new instruments and techniques for fisheries and aquaculture research.

Area 6: Other activities, mainly implemented by concertation

The programme will concentrate on the five areas identified above using as appropriate, both shared-cost actions and concerted actions. However, where Member States have extensive programmes, this programme will build upon these activities through concerted actions and, if appropriate, through shared-cost actions, with a view to improving coordination and cooperation at a European level (concertation). This concertation will be executed by establishing European networks which will bring together most of the relevant actors in the field. Examples of areas where this is appropriate are:

— primary production in agriculture, forestry, fisheries and aquaculture with main emphasis on competitiveness, sustainability, quality, security of supply and interactions with the environment,

— conservation, development and management of the natural, semi-natural and man-made landscape,

— rural (including mountain and coastal development): The RTD activities at Member State level, which could be relevant to rural and coastal development, are quite diverse. By providing a European forum in the area of research for the exchange of experience, know-how and methods, European concertation activities will help to develop innovative approaches to overcome the problems of these regions. Special attention will be paid to the opportunities offered by new economic activities in rural and coastal regions, training, as well as the assessment of their socio-economic and environmental impact,

— food production and processing: Networks will be created which better integrate research on-going at national level especially bringing together research in food production, quality (including organoleptic quality), safety, health and socio-economic aspects strategies for informing the consumer and incorporating this experience with food processing.

This pooling of experience should create synergistic effects of benefit to primary producers, processors, consumers and the other actors in rural development and should help in defining new research priorities for the sector.

In conclusion, the actions within this programme seek to extend the application of the basic technologies developed in biotechnology and biomedicine and also, as appropriate, in environment, energy and targeted socio-economic research.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	ECU million
1. Integrated production and processing chains	91
2. Scaling-up and processing methodologies	42
3. Generic sciences and advanced technologies for nutritious foods	97
4. Agriculture, forestry and rural development	225
5. Fisheries and aquaculture	103
6. Other activities, mainly implemented by concertation	49 (1)
Total	607 (2) (3)

(1) Of which: 3 % in agro-industrial research, 3 % in agriculture, 2 % in fisheries.

(2) Of which:
- a maximum of 3,3 % for staff expenditure and 4,0 % for administrative expenditure,
- approximately: 6 % for horizontal demonstration activities, 1 % for horizontal activities on ethical, social and legal aspects and 5 % for training activities,
- up to 10 % for specific measures in respect of SMEs,
- ECU 5,5 million for the dissemination and optimization of results.

(3) A sum of ECU 77 million, the difference between the amount deemed necessary for this programme and the amount envisaged in the fourth RDT framework programme for agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development), is earmarked for the specific (RDT) programme 'to be carried out, on the one hand, by means of direct action (JRC) and, on the other, by means of activities within the framework of a competitive approach and intended for S&T support to Community policies (1995 to 1998)'.

This breakdown does not exclude the possibility that a project could relate to 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 (including demonstration projects) carried out by undertakings, research centres and universities, including, where appropriate, basic research of an industrial relevance; consortia for integrated projects with a common objective may be encouraged.

   Demonstration activities, as defined in Annex III of the framework programme, are intended to overcome the obstacles hindering the utilization of new technologies and to build the bridge between technology producers and users. Feasibility studies and awards to those who get involved in these technologies may also be included.

   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) Thematic networks bringing together primary producers, manufacturers, end-users, universities and research centres on a generic technology, in order to facilitate the incorporation and transfer of knowledge and mobility of researchers, and to ensure that greater account is taken of market needs.

   Community funding will normally not exceed ECU 20 000, in average per partner and per year, covering up to 100 % of the additional costs for the coordination of the action. Members of a network could also apply for research projects under normal procedures.

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

      (i) by granting awards for carrying out the exploratory phase of an 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 45 000 or ECU 22 500 in the exceptional case of a single 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. Preparatory, accompanying and support measures, such as:

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

   — support for exchanges of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

   — use of external expertise, including access to scientific databases,

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out under the third activity; 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 and technological risks associated with the programme, which will also contribute to the programme 'targeted socio-economic research',

— training actions related to research covered by this programme in order to enhance employment skills and to facilitate technology transfer to industry,

— independent evaluation of the management and execution of the programme and of the implementation of the activities,

— 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 RDT.

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

3. Concerted actions, consisting of the coordination of RTD projects already funded by public authorities or private bodies. The Member States will help the Commission to identify relevant laboratories or institutes, in order to ensure that no major activities are left out of this concertation process.

The concerted action option can also be used under the programme as a way of establishing the feasibility and defining the content of proposals for shared-cost research activities.

Community funding will cover up to 100 % of the costs of the concertation.

COUNCIL DECISION

of 23 November 1994

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

94/806/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 programame 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 field of non-nuclear energy; 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 967 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 the promotion of engery technologies, including the demonstration of those technologies and pursued by the Commission under Council Regulation (EEC) No 2008/90 of 29 June 1990 concerning the promotion of energy technology in Europe (Thermie Programme) (5) ends on 31 December 1994, and it is desirable to ensure that the demonstration and dissemination activities continue after this date;

Whereas the objective of the Community's activites in the field of non-nuclear energy must be to design and demonstrate efficient, cleaner and safer technologies to make energy production and use compatible with the balance of nature and with the various aspects of economic development;

Whereas, despite the current energy situation, the efforts to diversify the Community's sources of supply and to improve energy efficiency must not be relaxed; whereas RTD helps to achieve these objectives and to provide greater protection for the environment against the impact of energy technologies;

Whereas it is necessary, as the fourth framework programme indicates, to ensure complementarity between research and development and the demonstration and that the two phases of the RTD are integrated into the same energy RTD strategy in the Community;

Whereas the programme for non-nuclear energies calls for a coherent strategy covering the whole process of innovation, from scientific breakthrough all the way to dissemination;

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, competitiveness and employment', in particular by the development and by a wider utilization of efficient energy technologies;

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 field of non-nuclear energy;

(1) OJ No C 262, 20. 9. 1994, p. 20.
(2) OJ No C 205, 25. 7. 1994.
(3) OJ No C 295, 22.10. 1994. p. 74.
(4) OJ No L 126, 18. 5. 1994, p. 1.
(5) OJ No L 185, 17. 7. 1990. p. 1.

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 through RTD projects to harness the potential indigenous energy resources of individual regions, taking account of the needs of less advanced regions;

Whereas the Community should only support RTD activities 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 involvement 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, and 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 non-nuclear energy by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas the nature of the activities to be undertaken in this programme requires close coordination with activities undertaken under other specific programmes in particular those concerning industrial and materials technologies and also enivronment and climate;

Whereas basic research in the field of on-nuclear energy must be encouraged;

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 this programme should also comprise activities 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 thereof;

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 the progres with the said 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 the present programme;

Whereas the JRC may contribute, through its own programme, to the attainment of the Community RTD objectives in the areas covered by this programme;

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

HAS ADOPTED THIS DECISION:

Article 1

A specific programme, covering both the research and technological development phase and the demonstration phase in the field of non-nuclear enery, 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 967 million, including a maximum of 5,0 % 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 undertakaings, 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, the 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, covering both the research and development phase and the demonstration phase, 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 lines of other measures, including preparatory, accompanying and support measures,

— arrangements for coordination with other RTD activities carried out in this area, in particular under the JRC programme and 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. These calls shall, whenever possible, cover both phases of the 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 two committees, one for the R&D and one for the Demonstration part of the programme, composed of representatives of the Member States and chaired by the representative of the Commission. The procedure described in pharagraphs (3) to (6) shall apply to each committee.

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 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 when 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,

— 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 ECU 0,2 million and in the case of dissemination activities equal or more than ECU 0,1 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 0,2 million and in the case of dissemination activities less than ECU 0,1 million, the Commission shall inform the committees of the projects and of the outcome of their assessment.

3. The Commission shall coordinate the work of the Committees and shall regularly inform them of progress with the implementation of the programme as a whole.

Article 8

Participation in the R & D part of programme only 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 and taking into account the principle of mutual benefit.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

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 5 of Annex III, on the first action of this framework programme, forms an integral part of this programme.

Background

The proposed agenda for energy RTD (*) is based on the following main considerations:

— The use of energy, its supply, its trade and technologies relevant to all these aspects interact in a unique and complex manner and are a determinant factor for economic growth, quality of life and the environment in a modern economy. Energy security in the broadest sense, i. e. assuring reliable energy services at affordable cost and conditions, constitutes a main reason for concern and must provide the principal motivation for supporting RTD at an European level.

— The growing concern regarding the environment in relation to the production and use of energy (contribution to greenhouse effect, emissions of polluting gas and other harmful emissions, safety, noise) and the public acceptance are today main driving forces for change.

— Finally, technology — although vital — is not in itself enough. Therefore, an effective RTD policy must consider the complete cycle embracing research, development, demonstration and diffusion of knowledge, the introduction of technologies into the market and the behaviour of the economic operators. It must integrate the different regional dimensions (local emissions, trans-frontier pollution and global pollution) and must build on concertation with other Community instruments and policies likely to affect the energy scene, such as energy policy, transportation policy, agricultural policy, structural funds, international collaboration (including Eureka) and fiscal measures.

As stressed in the White Paper 'Growth, Competitiveness, Employment', RTD should also favour the actions leading to the creation of jobs, which would be guaranteed, particularly by the strengthening of the competitiveness of the European industry.

In this sense, Community action of energy RTD could become an important driving force for economic development in general.

Indeed, there is an increasing awareness that economic development is no longer a matter of only single enterprises or sectors, but rather a set of global projects for society as a whole. One of those is to ensure sustainable energy supply for all, compatible with the maintenance of the environment and with the operation of society. This is a global challenge that must be met if conflict is to be avoided.

The Community RTD action addresses the following distinct areas:

— rational use of energy,

— introduction of renewable energies into Europe's energy systems,

— improved production and conversion and cleaner utilization of fossil fuels,

— safety of nuclear energy,

— pursuit of thermonuclear fusion as a long term option.

(*) Throughout this text, RTD covers research, technological development and demonstration.

This programme addresses the first three areas, together with a specific research activity which supports Community action in the interdisciplinary areas of energy-environment-economy. Strategic analyses will tackle medium-and-long-term issues from the technological and socio-economic viewpoint; they will consider energy and environmental specificities of Member States and regions, but also of other regions of the world (developing countries and, in particular, central European countries).

The other two lines of action on nuclear fission safety and on nuclear fusion are covered by separate specific programmes.

The proposed RTD activities

A Community RTD strategy will be set up in order to ensure the integration and coherence of all activities within the energy RTD programme. The proposed RTD activities will be deployed along two distinct phases, the R & D phase and that of demonstration but, as presented below, they will be implemented in close cooperation with one another. An activity to support the strategy effort will complete the two phases.

In order to support the technological action, specific activities for the definition and implementation of a global strategy for Energy RTD will be developed within the frame of the programme. This requires the introduction of socio-economic research, connected with the utiilization of energy as well as the development and application of new models for the analysis of scenarios consistent with the evolution of the energy scene in the medium to long term; such initiatives will allow the improvement of our knowledge on the interactions between energy, environment and economical growth and the analysis of the impacts of the Energy RTD strategy.

Furthermore, RTD efforts would include additional support and accompanying measures, among others:

— studies concerning the behaviour of economic agents in order to achieve a better understanding of the reasons which favour or hinder market penetration of a large number of cost-effective energy technologies; these studies will be complemented by market analyses and technological studies in order to facilitate the penetration of new energy technologies into the market,

— evaluation of technologies, in the more general context of political and economic instruments, accelerating their dissemination onto the market; in this connection, 'social' cost-benefit analysis, associated with the development of various forms of energy, (possibly forming a part of a European 'green accounting' framework) would help to improve the definition of such instruments; the development of RTD&D policy instruments capable of influencing the evolution of the use and supply of energy, including the public acceptance for innovative technologies, would originate from such an action.

In order to assure consistency and favour the synergies between RTD and its exploitation, a special action of dissemination and optimization of results will be followed. Use of the OPET network (offices for the promotion of energy technologies) established not only in the Community, but also in central and eastern Europe, the Commonwealth of Independent States (CIS) and the developing countries will be given priority by this action. Other instruments may be tested and deployed depending on their efficiency.

In addition, in its areas of competence complementary actions will be carried out by the JRC, especially in Section 1.1: Energy efficiency in buildings, Section 2.2: Solar photovoltaic electricity and Section 2.3: Renewable energies in buildings and industry (1).

RTD activities will include both research and development, demonstration and dissemination actions. The work planned in the various categories will of course depend on several criteria, which will be weighted differently depending on whether one adopts the R&D or the demonstration viewpoint.

Within the programme complex problems will be addressed, notably in fields such as integrated applications of renewable energies, combustion and urban transport, requiring a multi-disciplinary approach embracing the whole chain from research to demonstration with a view to market deployment. The projects within this programme may be complemented by concerted actions, restricted to those fields where a simple

(1) A description of the activities envisaged for the JRC in these areas is contained in the proposal for a decision of the Council relating to the activities of the JRC (doc. COM(94) 68 final, 30 March 1994/0095 (CNS)). An extract from this proposal is attached to this Decision.

coordination of the activities of Member States and of relevant industries would be appropriate, so as to render the programme more effective a Community level.

In this sense, research and development actions will be highly selective. Therefore, projects with a high potential for playing a true catalytic role at a European level in the fields considered as strategic for energy security, with environment as a main driving force, will be favoured.

The projects adopted along these research lines will be designed in such a manner as to harmonize results across the Community and to enable international comparisions. Furthermore, care will be taken to ensure the extension of their applicability (given the appropriate adaptations) to less developed countries, eastern Europe and the CIS. Networks of experts will be maintained or established in all Community Member States and close links with international organizations and third countries will be instigated in order to ensure the coherence of methods and approaches.

Demonstration actions are closer to the market and so they will be more diversified: they are the extension of the RTD efforts carried out by the private sector or the public sector at the Community level in the Member States. They aim at supporting more directly the different aspects of the energy policy (particularly those of the security of supply). They will be formulated such that the whole RTD effort contributes substantially to the reinforcement of the competitiveness of Euroean industry (especially SMEs) and to economic and social cohesion. This will be achieved through the development of regional and local resources. Their contribution to reducing and preventing air pollution, stimulating growth, strengthening competitiveness, increasing employment and to economic and social cohesion will depend crucially on account being taken of the possibilities for subsequent market take-up of the technologies concerned.

Different technologies (particularly combustion, gasification and storage) have a generic character useful for both fossil fuel and renewable energies. So, it is crucial to ensure the joint development of these technologies to be used for all the energetic sources and sectors.

This will enable the establishment of pilot or demonstration plants of common interest (e. g. advanced integrated gasification processes, which are usable for the combustion of either solid fossil fuel or biomass) and will help the introduction of renewable energies into the energy system.

1. RATIONAL USE OF ENERGY

Rational use of energy covers actions on energy efficiency on the demand side of the energy sector. Reducing energy consumption and stimulating market penetration of innovative efficient and clean technologies is vital in reducing dependency on external supply of energy products, and improving the impact of the use of energy in the environment.

As well as specific demonstration activities, an integrated approach will be followed for the application of clean and efficient technologies in such sectors as buildings, industry and transport. Transport is the sector whose energy demand is growing the most, therefore the Energy-Transport system will receive particular attention.

Community activities in this area will cover the following five areas:

— energy efficiency in buildings,

— energy efficiency in industry,

— energy industry, electricity and heat and fuel cells,

— energy storage,

— transport and urban infrastructure.

1.1. Energy efficiency in buildings

The objective is to achieve a substantial reduction in both energy consumption and CO_2 and other pollutant emissions in building stocks in the residential, commercial or public sectors through technical and economic improvements and efficient management and control systems.

The mechanisms aimed at improving energy economics in the building sector are not limited to technology alone, but are also dependent on a series of obstacles and distortions of social, economic and legal character or on consumer behaviour, which should be better understood. Moreover, the technological research indicated below will be followed by socio-economic research, on the same lines as actions under the Energy RTD strategy. These actions may take the form of integrated projects in a wider sense, i. e. including the concrete experimentation of economic instruments together with the introduction of new technologies. Coordination with similar activities presently carried out under the SAVE programme will be sought.

In addition, RTD will focus on the development of integrated energy concepts for both industry, buildings and agriculture, in particular cogeneration (including small combined heat and power units of 10 kWe) and other systems (equipment systems including turbines, fuel cells, diesel engines, heat pumps, batteries, etc.). Particular attention will be paid to the more efficient end use of electricity in both buildings and industry, including better transportation, distribution and storage of energy.

Research & development

R&D will be targeted on integrated projects using advanced technologies; more conventional technologies will be taken into account in the demonstration phase. Technical and non-technical barriers for decentralized energy production will also be investigated.

Within the building sector, priority will be given to 'system' approaches and these will be carried out in close cooperation with those investigating renewable energies in buildings, indicated in Section 2.3. In terms of R&D, these approaches will aim at a rational and efficient use of fossil fuels and electricity. They will include research on the 'smart' buildings, on CFC-free heat pump systems, etc.. Pre-normative type of work will also be considered. Indoor air quality will be taken into consideration.

These actions could be adapted having in mind their application in the developing countries, central and eastern European countries and CIS. In addition, this would also include results obtained in other programmes, related to RTD.

Demonstration

Demonstration activities will include low energy design, optimized materials and components, integrated load management for heating, cooling and electric consumption and optimized electric and HVAC equipment with efficient integration of renewable energy systems where possible. The demonstration work will also cover retrofitting of large commercial or public buildings and residential building stocks. Preference will be given to standardized and modular components and special consideration will be given to architectural integration systems. Indoor air quality will be taken into consideration.

1.2. **Energy efficiency in industry**

The objective is to reduce the specific energy consumption per unit of production or to increase the productivity at equal energy comsumption in order to increase the competitiveness of European industries or lead to new products.

Research & development

R & D in industry will focus on a limited number of generic technologies that are of major importance for energy, environment and — possibly — water resources. Examples include process integration and new process routes, heat exchangers (e. g. fouling), separation processes (such as membrane extraction, crystallization and absorption), stationary combustion equipment (as in Section 3.2) and the integration of solar energy. Projects on more efficient use of electricity would also be considered. The participation of industry will be strongly encouraged. Some innovative energy-efficient processes will be explored for energy intensive sectors.

Demonstration

Demonstration actions will support innovative technologies to improve or replace manufacturing processes which can lead to a substantial reduction in the energy intensiveness or consumption of the product, to an improved exploitation of residuals or waste heat, or to restricting or preventing an increase in energy consumption as a result of the implementation of environmental protection.

1.3. **Energy industry, electricity and heat and fuel cells**

The objective is to increase the efficiency both of transformation of primary energy into heat and/or electricity and of the transport and distribution of useful energy.

Research & development

R&D in the fuel cell sector will develop a strategy in cooperation with all the parties concerned and with potential users, in order to identify optimal targets. Without pre-empting the changes that might arise from this consultation, the priorities envisaged are set out below.

R&D on fuel cells will focus on complete systems and pilot plants for different applications (electricity production, cogeneration, road traction, ships and trains) by addressing the following topics:

— stationary applications (particularly cogeneration in buildings and industry): development of systems up to 400kWe with solid oxide and molten carbonate fuel cells aiming at 55 to 60 % efficiencies, ECU 1 500/kWe long-term costs and 10 to 100 times emission reduction of NO_x compared to gas turbines and diesel engines. For cogeneration in buildings, solid polymer fuel cell systems will be developed,

— road traction (electric): development of the solid polymer fuel cell for electric vehicles. The goal is a fuel cell with an efficiency of 45 to 50 %, a cost of ECU 100 to 200/kWe in the long-term and 100 to 1 000 times less pollutant than conventional systems. This development will be closely linked to R & D on the production of fuels, such as hydrogen or methanol. Road transport and, in particular, buses (where cost-effectiveness can be shown) and cogeneration in buildings and industry, will be addressed by pilot plants, in connection with demonstration.

A support activity is also planned to develop clean and efficient fuel processors (to transform natural gas, methanol and heavy oils (reformers) or coal (coal gasifiers) into hydrogen). The key issues will be their integration with the fuel cell, optimization of energy efficiency and pollutant emission for the whole system and extraction of remaining pollutants with different separation methods. Possible spin-offs from this work could be the development of new electrolysers with high efficiency (including the possible applications to renewable energy storage).

Demonstration

The objective of demonstration projects in the fuel cells sector will be the creation of the necessary conditions that will enable the users to develop the necessary confidence for the market introduction of fuel cells for electricity and heat production, as well as for the transport sector. Actions will concentrate on the demonstration of phosphoric acid, solid polymer and molten carbonate fuel cells. Progress in the 'Balance of the Plant' and technology transfer will get special attention.

General demonstration activities will cover new production cycles, combined production of heat and power, more energy-efficient methods of managing the networks for the transport, distribution and storage of energy and improvement of condensation systems.

1.4. **Energy storage**

Energy storage is a common requisite to many fields including transport, load levelling, renewable energy, electronic equipment, etc.. The present programme will focus on electricity storage by giving priority to transport (also in support of the activities foreseen by Section 1.5).

Research & development

Research on batteries will parallel that concerning fuel cells for vehicles, as in Section 1.3. It will include the development of batteries and super-capacitors for 'peaking' power in hybrid configurations with fuel cells.

Emphasis will be put on the more promising batteries such as those based on lithium polymer or those based on nickel metal hydrides in order to substitute NiCd batteries which contain toxic substances. Prenormative research on battery test procedures will be carried out within a network of battery and car manufacturers.

Other forms of energy storage will also be explored.

1.5. **Transport and urban infrastructure**

The objective is a substantial improvement in the overall energy efficiency of public transport systems, a more coherent tranport management and an increased awareness of public transport. Research on sustainable advanced road transportation systems should receive priority. This work aims to develop transport services that are attractive to the consumer, economically competitive, result in very low local pollutant emission, lead to dramatic reductions in greenhouse gas emissions and enhance energy security.

Several sections of this non-nuclear energy programme address a range of themes related to transport. These activities will be integrated into a coherent urban transport action in close collaboration with the activities of integration developed within the specific programme 'Research for a European transport policy'.

In the context of sustainable mobility under the best environmental, energy efficient and social conditions, this will help provide planning models to reduce the need for transportation and technical solutions to specific transport problems and support the rationale on which to base urban transport policy decisions.

The activities carried out in this section will be strictly coordinated with those in the transport, telematics and industrial technology programmes. The diffusion of the technologies tested in selected locations in the Community should also be extended to cover the entire European market.

Research & development

Research and development will address the integration of systems for energy storage, conversion, transmission, and management for guided and unguided vehicles. This will include consideration of chemical, kinetic and electrical energy storage systems; energy converters such as multi-fuel internal combustion engines, fuel cells and hybrid energy converter concepts.

From an energy viewpoint, the investigation of a broad range of generic technologies such as combustion modelling and simulation, computer controlled energy management systems, development of alternative battery technologies, improved transmission and regenerative braking systems and energy consumption and local consumption atmospheric pollution models will be crucial to enable progress in many of these research areas.

Optimizing available capacities will also require the application of state-of-the-art telematics to traffic management and control, and transport information systems. The results of the feasibility

studies will enable the application areas to be identified for which the different propulsion systems are best adapted, and to define the strategy to pursue the research, either to demonstrate proof of concept, or in the case of more mature technologies, the definition of full-scale demonstration projects in connection with the demonstration activity.

Demonstration

Demonstration actions will include traffic management and control techniques, including advanced information systems for users, improved modal interchange infrastructure, efficient public transport vehicle fleets in urban areas and complementary measures to promote a shift from private to public transport. Consideration will be given to integration and modal shifts. Activities will also cover energy efficiency improvements on new types of traction systems for vehicles using alternative or conventional fuels, including electric, hybrid and fuel cell vehicles. Particular attention will be paid to electric cars, especially in the urban setting, in order to avoid the adverse effects of exhaust fumes from combustion engines on people, buildings and the cultural heritage.

2. RENEWABLE ENERGIES

Renewable energies, in their new and modern forms which go beyond the classical usages of hydraulic power and wood for heating, are far from having realized their full potential because of lack of development. Nevertheless, these clean and indigenous energy sources appear to be well adapted to combat the greenhouse effect and to contribute to long-term energy security. As sources of technological innovation, they could be instigators of new industrial activity and employment at all levels, especially in the less-favoured regions of Europe. In addition, because of their decentralized nature, they are much more accessible to the layman. In the framework of international cooperation, the renewables will also have an important role to play in ensuring that the Third World, which will become the largest energy consumer, does not also become the greatest polluter.

Considering the association between quality of life and social impact, these are important sources which will in future allow a sustainable increase in energy consumption, based on total economic growth, while respecting the environment.

This programme foresees a new dimension for the renewable energies which will permit the introduction of new sources on a significant scale into the European energy system. With this aim, an appropriate strategy will be adopted in order to concentrate the effort on ambitious but realistic objectives for the short to medium term.

Integration with the Third World and with eastern Europe will also require a specific effort to adapt the technologies, prepare their transfer and support European industry for future export markets.

For the programme as a whole, the R&D accent will be put on state-of-the-art technologies which, except in a few cases, are still far from the market. Research and development activities will be undertaken in order to achieve priority goals of a scientific, technological and industrial character. A link will be established with non-technological instruments in order to reduce legal and administrative obstacles. More emphasis will be devoted to investigation of those policy instruments which will be required for the introduction of renewable energy including socio-economic research, planning and training (in the framework of support actions to the RTD Energy Strategy).

In Demonstration, the emphasis will be on targeted demonstration ventures in order to achieve in the short-and mid-term significant energy objectives. Demonstration actions in the field of renewable energies will cover all renewable energy sources, where appropriate in association with other community actions, in order to stimulate the market and to achieve agreed energy objectives.

To this effect, the activities of this chapter will be carried out in close conjunction with those of the chapters on 'Rational use of energy' and 'Fossil Fuels' (in particular co-combustion, production of electricity and heat, storage, fuel cells, energy savings in buildings) which have a direct interest in obtaining the technical and economic objectives regarding the introduction and utilization of renewables energies.

The financial efforts, which will be concentrated as a priority in areas 2.1 to 2.5 below, will be devoted to the following themes:

2.1. **Integration of renewable energies**

Research & development

This new initiative will be aimed at easing the integration of renewable energies from the technological point of view by taking into account economic and social aspects. In many ways, the renewable energies involve activities across all sectors of society.

Multidisciplinary activities will be initiated among the professions concerned, researchers, industrial groups and future users, to ensure accelerated deployment on as large a scale as possible. Special emphasis will be put on the integration of renewable energies into future energy systems as well as into the rural setting and large-scale integrated projects such as the development of electricity production from renewable energies. The impact of renewable energies will be studied in depth, especially in the areas where they will be developed, such as regions and towns, agriculture and industry, distribution networks; the impact on society and other dimensions will also be analysed. Development agreements and specific and sectorial programme actions will be arranged by means of networks, several of which will be linked in a ' major network for the development of renewable energies'. It will include among others thematic subnetworks, major European electric utilities, leading architects and building engineers, specialized research centres, pilot towns, regions and islands. Coordination will be ensured with activities currently carried out under the Altener programme, taking account of the objective for a significantly higher renewable energy share in Europe's energy system and economy.

Integration with the Third World and with eastern Europe will require a specific effort to adapt the technologies, prepare their transfer and support European industry for future export markets.

2.2. **Solar photovoltaic electricity**

Research & development

In R & D, the accent will be put on a 'three stage' vertical approach which will consist first of the continuation of research into crystalline or thin film solar cells, drawing together industry with university and para-university research laboratories. Other efforts will be devoted to accelerated industrialization of cells and modules. This is a new Community initiative to support RTD in industry, especially SMEs, relative to the aspects of precompetitive development engineering, flexible industrial processes and very large volumes.

The aim of this work will be to define guidelines directed at a production cost level of ECU $1/W_{peak}$ for multi-MW production lines.

Finally, the development and demonstration of pilot phovoltaic systems will be accelerated, in order to reduce costs and improve performances and the reliability of equipment. The testing and calibration of the new photovoltaic modules and systems will take place at the JRC in close collaboration with national research centres, in order to enable the elaboration of European norms and specifications regarding their utilization by producers and users.

An important objective will be to bring the reliablility and lifetime of complete photovoltaic systems (excluding electrochemical batteries) up to that of photovoltaic modules (lifetime of at least 20 years).

Demonstration

Demonstration activities will cover in particular the large scale commercialization of remote stand-alone photovoltaic applications and grid connected systems, and will involve electricity utilities and other key players.

2.3. **Renewable energies in buildings and industry**

Research & development

The best approach in this sector is also vertical and will consist in pursuing the efforts on components and integration procedures for active and passive solar, natural lighting and others. The research will concentrate on buildings and will be pre-normative but oriented towards the possiblities of standardization. Indoor air quality will be taken into consideration.

At the second level, the work on development of pilot buildings will be followed up, with the essential criterion of energetic aesthetic and architectural success. A new aspect in this context will be the development of bioclimatic habitat and the energy renovation of existing buildings.

Finally, a modern urbanization scheme will be developed in harmony with the specific needs of energy, architecture and social organization with a new integration of work, life and leisure in the town. This development should promote new pilot clean urban districts with minimum emissions. This last level of activities will best be implemented as a concertation with the networks of towns, regions, experts in solar urbanization and architects.

This initiative will aim at defining planning and associated technologies for new urban concepts based on the principles of solar architecture.

These actions will take place in a complementary and coherent way to those regarding the rational use of energy in buildings as stated in Section 1.1.

Demonstration

Demonstration activities will cover thermal applications for the production of large quantities of hot water (or other fluids) for heating and/or cooling applications and the production of large quantities of hot air for ventilation or drying. High temperature solar thermal energy in combination with fossil fuel power production will also be covered.

2.4. **Wind energy**

Research & development

The R & D activities will be vertically integrated as follows: first, new materials and components will be developed, particularly blades in advanced composites. Then, after completing the development programme for the current generation of wind turbines, a programme will begin on the development of a new more powerful generation exceeding 1-2 MWe and using new ultra-light blades and other novel components. Highly innovative wind turbines of smaller sizes could also be considered. Noise reduction will be investigated.

The general goal will be to make wind energy cost-competitive with lowest conventional electricity sources (e. g.ECU 0,04/kWh) and more acceptable to the public.

Finally, the programme will aim to promote alternative installation sites, especially in complex terrains and by extending to lower average wind velocities the situations in which wind power may be competitive.

Demonstration

Demonstration will concentrate on those technologies which will improve performance, efficiency, reliability and noise reduction, and achieve cost reductions. The maximum exploitation of wind potential will be achieved by the largest application of medium-sized wind turbines and of machines designed especially for lower wind potential and for new application in individual installations or in wind farms.

2.5. **Energy from biomass and waste**

The objective will be to reduce harmful emissions and the costs of electricity generation, improve reliability, promote the broader use of known technologies, improve their application and integration, increase their competitiveness and reduce their cost.

Research & development

This sector is particularly important for R & D actions and for their links with the environment and regional and rural development. An integrated biomass-bioenergy approach is necessary to assure the coherence and the pertinence of the Community R&D activities regarding the whole bioenergy chain in its technical and non-technical dimensions. Those included are, for instance, the aspects of energy balance, the cost-efficiency factor, the impact of national policies, etc., the combined production and treatment of basic agricultural products, utilization and conversion of these materials for the production of energy. Advanced conversion processes leading to the production of hydrogen from biomass will also be studied.

This strategic action will be implemented in conjunction with the AIR programme. The agro-industrial programme will concentrate on the production of basic materials, the know-how and their treatment, while the energy programme will focus on the conversion and utilization of biomass, on the utilization of new fast growing forestry, agricultural products or waste which will provide the basis for a second activity, leading to thermal conversion to liquid, gaseous and solid fuels or directly to heat. Urban, agricultural and industrial wast and waste from woodlands will be considered in connection with activities described in Section 3.1.

The programme will aim at demonstrating the feasibility of sustainable biomass production and utilization for electricity and thermal energy, and transport fuels via thermochemical conversion routes.

Furthermore, pilot projects will be developed, notably for decentralized production of electricity using high performance generators (engines and turbines).

Demonstration

Demonstration activities will concentrate on energy production from solid biomass as a fuel, production, substitution and/or energy savings from municipal, industrial, agricultural, animal and forestry wastes, and the reduction of costs for providing the energy produced from biomass.

2.6. **Hydroelectric power**

Demonstration

This area will be supported only within the framework of demonstration projects. Activities will cover design and construction, materials or methods of operation and control of new technologies. Industrial initiatives to produce high quality, reliable and competitive standard equipment and to perfect simple, reliable and cheap techniques or technology will also be promoted, especially those adapted to the markets and needs of countries whose development is lagging behind. The rehabilitation or modernization of abandoned sites or those which are approaching the end of their lives, by the use of high performance or state-of-the-art technologies, will also be covered. Barriers to the diffusion of hydropower deriving from environmental and land management problems will be addressed.

2.7. **Geothermal energy**

Research & development

The remaining element of geothermal energy R&D which may merit continuing support on a European scale is hot dry rock. Work will be focused on the support of a single European pilot plant that could provide the basis for a demonstration prototype at a later stage. Technologies relevant to

hot dry rock may also be studied through the stimulation of low permeability zones in high enthalpy fields. The latter would contribute directly to conventional geothermal energy exploitation, which will otherwise be treated in the demonstration phase. In additon, further research in certain other aspects of conventional geothermal energy may be carried out.

Demonstration

Work here include improvement of techniques in the drilling sector, wellhead equipment, corrosion, scaling, automation and treatment systems for brines, the exploitation of geothermal fields where the resources are proven, and the development of geothermal applications in agriculture, aquaculture and district heating.

2.8. Other options

Research & development

Some limited action could be undertaken on different families of renewable energies which are at different stages of development. These could cover wave and tidal energies, micro-hydro, solar thermodynamics, clean production and use of hydrogen and others. This work will aim at developing pilot plants rates at a few MW_e. Technologies associated with renewables will also be considered, notably storage of thermal or electrical energy. The main objective will be to develop new pilot storage devices (e. g. batteries, flywheels, hydrogen).

3. FOSSIL FUELS

The world energy economy is predominantly fossil fuel based and it is likely to remain so for a long time. In the Member States, the consumption of fossil fuels such as coal, petroleum and natural gas represents, at present, 82 % of the overall energy consumption in the Community. This part will grow regularly in the coming decades, with some variations among the different sources of energy.

Natural gas, for example, will continue its penetration into the European market even though its transportation over long distances (from Africa, Siberia, North Sea), in liquid form (LNG) or as gas, has a number of technical and economic constraints. The latter is a severe handicap to its utilization. Coal, where worldwide reserves will guarantee several hundred years of supply, is a major and growing player, but cleaner methods of use are required. The petroleum share, on the other hand, will grow very slowly but constantly over the coming years. This increase will take place essentially in the transport sector.

A major problem for fossil fuel use is the emission of CO_2 and other gaseous and solid pollutants. Hence Community action should, as a priority, provide guidance and incentives to reduce pollution emission and to increase the conversion and utilization efficiencies of fossil fuels.

R&D in this section addresses the improvement of coal and hydrocarbon-based energy conversion systems, the development of new energy systems, energy savings in the demand sectors, energy storage and the more efficient exploration and production of indigenous resources of hydrocarbons.

In addition to these specific activities, an integrated approach will be sought for the application of clean and efficient energy technologies in the relevant sectors such as in building, industry and transport. Since transport is the energy sector where energy demand has shown strongest growth, the energy-transport system will receive particular attention and it is envisaged that it will include an integrated project on urban transport.

3.1. Clean technologies for solid fossil fuels

The term 'solid fuels' covers all solid fuels linked to coal, such as lignite and peat, together with orimulsion and other heavy fuels produced by the refining of petroleum. These fuels can be used

separately or mixed with urban, industrial or agricultural waste or residues, or with biomass, providing that the emissions are of the same level and that the main part of the energy is produced by the solid fuels. Furthermore, synergies between solid fuels and natural gas processes will be considered.

Demonstration actions in the field of solid fuels will be coordinated with research actions in the corresponding areas and integrated into the European network which should be established.

A wide-ranging action, taken in cooperation with the second action of the framework programme and in synergy with the R&D work, will be aimed at the developing countries and eastern Europe so that the production and use of coal in those countries should be as non-polluting as possible. Without neglecting advanced technologies, this action will take due account of conventional options in so far as they can contribute in the short term to significant reduction of pollution levels.

The objective will be the reduction of the emissions produced by the utilization of solid fuels, and in particular to make coal fired power production cleaner by reducing CO_2 and other greenhouse gas emissions and, in so doing, reducing harmful gaseous emissions into the atmosphere, rendering the solid residues more neutral and consuming less coal for the same amout of electricity through improved efficiency or partially replacing coal by 'CO_2-neutral' fuels (biomass and wastes) at acceptable costs.

Research & development

Work will be carried out on processes intended to penetrate the market in the short, medium and long term. The short-term option aims at improving substantially the efficiency of conventional steam cycle based power plants and to achieve efficiencies above 40 % with coal/biomass/waste blends.

The medium-term option aims primarily at IGCC (integrated gasification combined cycle) processes with efficiencies above 45 % and further reduction of pollutants. The long-term option aims at the development of the 'post-IGCC generation' processes (efficiency high than 50 %).

Preference will be given to medium- and long-term options. The conventional options will, however, receive appropriate support in cooperation actions with the developing countries, the countries of central and eastern Europe and the CIS in synergy with the second action of the framework programme.

The research and development projects will include:

— development of integrated gasification combined-cycles and advanced (pressurized) and atmospheric combustion processes (supercritical-steam cycles or combined-cycles) for higher efficiencies and increased abatement of pollutants (either at the source or in flue gases) including hot gas cleaning and novel processes,

— development of processes for the combined gasification (or combustion) of coal with biomass, industrial, municipal or agricultural waste, which could entail a 10 to 20 % reduction in CO_2 emissions, this action would be linked to those mentioned in Section 2.5); careful control of all emissions and residues. At most the evaluation of methods for CO_2 and disposal should be part of the programme,

— research for the integration of high temperature materials into advanced systems (rather than on the materials themselves),

— integration of fuel cells using gas from solid fuels in combined cycles (demonstration on existing fuel cells in the framework of RDT as mentioned in Secton 1.3).

R & D will be implemented through integrated or targeted projects. The main objective will be to set up a European network of excellence to ensure an efficient application and utilization of the best available coal technologies. In the course of the programme, cooperation activities will be established in particular with eastern Europe and China.

Demonstration

The priorities of the demonstration activities, dissemination and valorization will include electricity and heat production from solid fuels, valorization of by-products and production of raw materials. The synergies with natural gas will be investigated.

Electricity and heat production will include:

— circular atmospheric fluidized bed combustion,

— luidized bed combustion under pressure, stationary or circular,

— primary measures for the reduction of emissions and the treatment of the flue gases.

In this activity, integrated gasification combined cycle and topping cycle, treatment of gas at high temperature and fuel cells utilizing gases from solid fuels, will also be supported.

3.2. **Generic combustion**

Research & development

A generic research action on combustion will be introduced to bring about significant advances in energy efficiency and pollution abatement of combustion processes. The research work will address fundamental and generic research such as: basic research to identify causes of pollutant formation, modelling of combustion processes and systems, diagnostic equipment, improvement of systems, and treatment of exhaust gases, etc.

The technologies to cover, by means of a generic approach, include internal combustion engines, including the use of alternative fuels, gas turbines, combustion and gasification of coal and biomass, and combustors for stationary applications in buildings and industry.

This action will be carried out in cooperation with major European car and boiler manufacturers, oil companies, utilities and users with a view to ensure technology transfer from the research community to the users. This action will take into account the European programme on engines, fuels and emissions project launched by the Community in collaboration with European oil and car manufacturer associations.

3.3. **Hydrocarbons and new fuels in transport**

Research & development

In this area, emphasis will be on the development of clean transport fuels by improving the efficiency of fuel reformulating processes. The work will concentrate, *inter alia*, on the catalytic conversion of natural gas into liquid fuels (and fuel additives) which have a higher added value and can be more easily transported. In this context, the global socio-economic impacts and the security of supply, related to the utilization of alternative fuels such as the methane will be considered.

Given the increased need for light products and the subsequent reduction in the demand of heavy oils, R&D efforts may be pursued on the catalytic conversion of heavy oil fractions.

The utilization of alternative fuels including hydrogen and mixes will also be investigated. Work will continue on the establishment of the relationships between fuel quality, engine technology and emission of pollutants and this mainly within the framework of the European programme on engines, fuels and emissions project previously mentioned in Section 3.2. Attention will be paid to refuelling infrastructures for alternative fuels.

Demonstration activities will focus on natural gas processes, as described in Section 3.4.

3.4. Exploration and production of hydrocarbons

The objective of activities in this area will be to strengthen the industry's capability to answer the short- and long-term requirements for the availability and implementation of efficient technologies in the field of oil and natural gas. Particular attention will be paid to the eastern and central European and CIS markets.

R&D actions will address medium- to long-term issues with the aim of improving the exploitation of hydrocarbon fields and underpinning the European industrial technology base. Demonstration, dissemination and optimization activities are particularly important in this area to assist market penetration of new technologies in the industry, with important strategic implications for the European Union's economy, competitiveness and energy supply. Beneficiaries in both categories will be mainly oil and gas-related companies which are developing innnovative and effective technologies to improve the exploration, production and use of hydrocarbons, as well as supply and service industries, with emphasis on SMEs.

Research & development

R & D will focus on:

— development of efficient technologies leading to improved reservoir characterization and management and to more accurate prediction of reservoir production; work will also be undertaken on the thermodynamics and modelling of complex fluids, in support of investigations on enhanced recovery techniques, and the modelling of fluid transportation in boreholes and pipeline networks,

— sedimentary basin analysis and three-dimensional modelling to give a better description of basin formation and geo-historical evolution,

— idenfication of both smaller and more complex deep structures using advanced geophysical and geochemical exploration methods,

— development of technologies to improve drilling efficiency, performance of wells and to allow the exploitation of deep offshore, marginal and satellite fields, as well as very deep fields with high temperature and high pressure.

Furthermore, it is planned to follow concerted research action on earth science. This action will not only provide the information needed in hydrcarbon exploration but would also improve the scientific knowledge base of o the research areas.

Demonstration

Demonstration activities will cover both 'upstream' and 'downstream' sectors:

— In the upstream sector, activities will cover methods for enhancing exploration capability, new technologies for marginal field exploitation, safety and environmental protection; they will embrace both exporation and production and seek cost reduction. Special attention will be paid to the North Sea and those reserves where economic conditions are difficult.

— The transport and storage of fuels will be addressed, with particular attention to underwater gas pipelines and LNG systems.

— Downstream activities will concentrate on the uses of natural gas, for example, gas conversion and gas use in the transport sector or in the improvement of industrial processes.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

(ECU million)

Area	R & D	Demonstration	Total
1. Rational use of energy	116	145	261
2. Renewable energies	271	164	435
3. Fossil fuels	48	223	271
Total	435	532	967 (1) (2)

(1) Of which:
- a maximum of 2,85 % for staff expenditure and 2,15 % for administrative expenditure,
- up to 6 % to support the definition and implementation of activities for the RTD energy strategy (including the modelling activity and socio-economic research) and of the programme,
- ECU 24 million for the dissemination and optimization of results,
- up to 5 % for specific measures in respect of SMEs.

(2) A sum of ECU 35 million, the difference between the amount deemed necessary for this programme and the amount foreseen in the fourth RTD framework programme for non-nuclear energy is earmarked for the specific RTD programme, to be carried out on the one hand by means of direct action (JRC), and on the other by means of activities within the framework of a competitive approach and intended for S/T support to Community policies (1995 to 1998)'.

This breakdown between different areas does not exclude the possibility that a project could relate to 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) R&D projects carried out by undertakings, research centres and universities, including, where appropriate, basic research of an industrial relevance.

   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) Demonstration projects jointly financed with other sources in the public and/or private sector and, usually, at least one operator to guarantee continuity, may qualify for a Community contribution up to a maximum of 40 % of the eligible cost of the project, the rate descreasing for projects closer to the market.

   The objective of the demonstration projects will be to prove the technical viability of a new technology, together with, as appropriate, its possible economic advantages.

   (c) 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 45 000 or ECU 22 500 in the exceptional case of a single applicant SME; and

   (ii) by supporting cooperative RTD activities, whereby SMEs normally 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.

   These activities will be complemented by specific preparatory, accompanying and support measures.

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

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

   — support for exchange of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

   — use of external expertise, including access to scientific databases,

   — scientific publications and activities for the dissemination, promotion and exploitation of results, in coordination with the activities carried out under the third activity; 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 and technological risks associated with the programme, which will also contribute to the programme 'targeted socio-economic research',

   — training actions related to RTD covered by this programme in order to stimulate technology transfer and enhance employment skills,

— independent evaluation of the management and execution of the programme and of the implementation of the activities,

— 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.

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

3. Concerted actions consisting of the coordination, 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 (networks of excellence) which, through shared-cost RTD projects (see 1 (a)) bring together around the same technological or industrial objective manufacturers, service providers, users, universities and research centres.

Community participation may cover 100 % of the costs of the concertation.

Description of the Joint Research Centre's (JRC) research activities corresponding to the areas covered by this specific programme and the subject of the proposal for a Council Decision for the JRC programme (COM(94) 68 FINAL — 94/0095 (CNS))

The JRC will contribute to the develoment of technologies for cleaner and more efficient use of energy through prenormative research, with the emphasis on environmental aspects, in the following sectors and in close cooperation with the corresponding shared cost action programme:

— photovoltaic energy: the activities will include component tests and studies on the design and control of large-capacity systems. The research will be based on the use of the ESTI ('European Solar Testing Installation') of the JRC and on networks with partners in the Member States. Basic scientific research into energy savings will be continued,

— materials for clean technologies: research will cover the development of materials for clean technologies such as long-lived catalyst supports for emission control, nanoporous ceramic membranes for advanced ceramic filters, ceramic alloys and composite materials for high-temperature applications (turbines and heat exchangers).

COUNCIL DECISION

of 23 November 1994

adopting a specific programme of research and technological development, including demonstration in the field of cooperation with third countries and international organizations (1994 to 1998)

(94/807/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 area of cooperation with third countries and international organizations; 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 of 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 540 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 the strengthening of the scientific and technological base of the European Union also depends on an adequate level of cooperation with third countries and international organizations, based on the principle of mutual interest; whereas such cooperation may enhance the competitiveness of European industry;

Whereas such cooperation may contribute to the implementation of Community policies vis-à-vis third countries;

Whereas cooperation should be improved with other fora for cooperation in the field of science and technology in Europe;

Whereas a contribution should be made to safeguarding the scientific potential of the countries of central and eastern Europe and the new independent States of the former Soviet Union and to enhancing their economic and social development taking account of the importance of basic research in this context;

Whereas collaboration with non-European industrialized countries should be promoted where appropriate;

Whereas it is necessary to contribute to the development of the scientific and technological potential of the developing countries; whereas cooperation on RTD can pave the way for industrial cooperation with those countries;

Whereas action by the Community in the field of cooperation with third countries and international organizations can, with the support of other Community instruments such as Phare, Tacis and the European Development Fund, help improve the living conditions of the inhabitants of the countries concerned in the context of development which respects natural equilibria;

Whereas greater cooperation in the field of science and technology can help to meet major international challenges such as health, nutrition and environmental protection and can contribute to solving regional and global problems;

Whereas it is necessary to concentrate international scientific and technological cooperation activities, including those formerly conducted outside the

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[1] OJ No C 228, 17. 8. 1994, p. 188 and OJ No C 262, 20. 9. 1994, p. 25.
[2] OJ No C 205, 25. 7. 1994.
[3] Opinion delivered on 14 and 15 September (not yet published in the Official Journal).
[4] OJ No L 126, 18. 5. 1994, p. 1.

framework programme, in a single programme in order to ensure a coherent approach;

Whereas coordination with other Community activities should be increased;

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, competitiveness and employment';

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 cooperation with third countries and international organizations;

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 support only RTD activities of high quality;

Whereas the rules for the participation of undertakings, research centres (including the Joint Research Centre (JRD)) 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 involvement of European industry, including small and medium-sized enterprises (SMEs), in this programme;

Whereas the Commission's effort 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 cooperation with third countries and international organizations by research centres, universities and enterprises, in particular SMEs, in the Member States and between these and the corresponding Community RTD activities;

Whereas the international cooperation activities with third countries will be implemented both centrally in this programme and in the specific programme of the first activity and their coordination must be ensured;

Whereas this programme should also comprise activities for the dissemination and exploitation of RTD results, and activities to stimulate the mobility and training of researchers with this programme to the extent necessary for proper implementation of the programme;

Whereas an analysis should be made of possible socio-economic consequences 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 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 cooperation with third countries and international organizations, 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 540 million, including a maximum of 10 % for 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 pursuant to 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.

4. Participation in the RTD activities of this programme by legal entities from third countries referred to in Annex I Sections A2 and C, may benefit from Community financial support under the programme.

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, the 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 the fourth frameword programme 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, and the general lines 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 coordination with other relevant Community activities undertaken within the European Union's development and economic cooperation policies (such as Phare, Tacis, LOME),

— 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 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) above shall apply to:

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

— the content of the calls for proposals,

— 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, ECU 0,15 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 0,15 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

This Decision is addressed to the Member States.

Done at Brussels, 23 November 1994.

For the Council

The President

J. BORCHERT

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the broad lines of the fourth framework programme, and applies the selection criteria and spells out the scientific and technical objectives set out in that programme.

This programme implements the second activity of the framework programme and is structured so as to reflect the different nature of cooperation with developing countries and cooperation with other third countries, including countries of central and eastern Europe and the new independent States of the former Soviet Union.

BACKGROUND

This activity is the vehicle for cooperation on RTD with third countries and international organizations. The essential aim of this activity is to add value to Community RTD via targeted RTD cooperation and synergy with other external Community activities, to strengthen the Community's scientific and technological base and to support the implementation of other Community policies. It will also aim at improving coordination with other Community instruments and synergy with Member States' activities in order to avoid duplication and better define the Community's areas of activity on the basis of the subsidiarity principle. An overall EU strategy for S&T cooperation with third countries should be developed including all relevant services of the Commission.

Cooperation will be developed in dialogue with all parties concerned and be based on the principle of mutual benefit in order to establish long-lasting relations. This means not only direct or short-term advantage, as perceived by those involved in a project, but also the long-term or indirect advantage to the Community in terms of S&T objectives, including industrial competitiveness.

The activities involved in cooperation will be accompanied by systematic monitoring and analysis of developments in the policies and in the machinery for implementing RTD in third countries in order to adapt Community cooperation policy and to derive maximum benefit for the Community and its partners. The collection and analysis of information on developments outside the Community (e. g. on science and technology options) will be closely coordinated with the corresponding activities to be carried out in the programme on targeted socio-economic research.

Non-nuclear cooperation activities and activities developed in the earlier framework programmes and the APAS, will be incorporated into this programme. Cooperation will be implemented through different well-focused activities according to the proposed objectives and will concentrate on four major target groups:

— other fora for scientific and technological cooperation in Europe, including international organizations,

— the countries of central and eastern Europe and the new independent States of the former Soviet Union,

— non-European industrialized third countries,

— the developing countries.

A closer link is planned between scientific and technological cooperation and education and training.

Where intellectual property is involved, the guiding principles adopted jointly by the Council and Commission on 26 June 1992 will be respected.

THE PROPOSED RTD ACTIVITIES

A. Scientific and technological cooperation in Europe and with international organizations

The Agreement setting up the European Economic Area (EEA) enabled six of the seven EFTA countries to become involved in all the specific non-nuclear programmes under the third framework programme.

The Agreement has later been adapted in order to permit their full involvement also in the fourth framework programme (1). Other western European countries outside the EEA may become associated via bilateral agreements, in accordance with the Treaty.

1. *Cooperation with other fora for European scientific and technological cooperation*

The aim is to boost the coherence and overall cost-effectiveness of European research, while taking full account of national programmes and activities within the European Economic Area as a whole, via COST, Eureka and links with European international S&T organizations and with relevant bodies at world level. In this manner the development of networks of scientific and technical excellence will be fostered, extending beyond the frontiers of the Community.

Cost

The COST actions, which complement the projects under Community programmes, are expanding vigorously and will continue to pave the way towards identifying new themes for scientific cooperation in Europe, an example of which is socio-economic research. An increasingly important role of COST could be to integrate scientists from central and eastern Europe and new independent states of the former Soviet Union, including action by action participation by those from non-COST Member States, into a broader European context. The possibility of improving their access to COST actions will be explored. Furthermore the assessment of the current and forthcoming COST actions, the utilization of their results and the increase of the effectiveness of the cooperation should be considered as priorities for the years ahead.

The intention is to continue to encourage the controlled development of COST activities and to provide the support needed for the proper functioning of the secretariats of the relevant committees and for international coordination. The support of the COST countries is illustrated by their readiness to second national expert in order to run certain secretariats.

Eureka

The dovetailing of Eureka with the Community's RTD framework programme is based on respecting the specific aspects of the two frameworks, Eureka being more appropriate for supporting RTD which is nearer to the market. The Edinburgh European Council in December 1992 stressed the need to intensify synergy between them.

Recent developments within the Community and Eureka open up new avenues and give practical expression to a common intention to extend concertation, which must be pragmatic and follow a case-by-case approach.

The practical implementation of this joint policy will meet the following aims:

— the movement of information and flexible concertation among the two fora will be guaranteed by the network of Community programme managers and Eureka-project cordinators, set up earlier,

— more efficient use of the existing counselling and information-distribution networks, at Community level (Value, OPETs, etc.) and at the level of Eureka and the Member States, in order to improve transparency for industry and researchers, and in particular SMEs.

The pre-competitive parts of Eureka projects, which meet the relevant scientific and tchnological objectives, are eligible for support by the specific programmes of the first activity, in accordance with the procedures for these specific programmes. The results of Community projects could be taken into account in Eureka projects closer to the market.

International organizations and institutions dealing with S&T

The aim is to strengthen the coherence of research in Europe via closer coordination with the European and international governmental and non-governmental scientific organizations and with the networks of researchers they have frequently set up. Links with the European Science Foundation (ESF), European Organization for Nuclear Research (CERN), European Space Agency (ESA),

(1) Decision 10/94 of the EEA Joint Committee amending Protocol 31 to the EEA Agreement.

European Molecular Biology Laboratory (EMBL), European Southern Observatory (ESO), European Synchrotron Radiation Facility (ESRF), Institute Laue & Langevin (ILL), etc. will be improved in order to identify common interests.

Member States should have a more systematic exchange of views on science and technology matters within the framework of international organizations.

In well-defined cases, cooperation activities with relevant European scientific organizations can be foreseen with a view to mutual involvement in projects of common interest. This will not concern the main fields of activity of those organizations, but rather the common application of ancillary, and often unique, expertise derived from their main activities.

2. *Cooperation with the countries of central and eastern Europe and with the new independent States of the former Soviet Union.*

The principal aim is to help safeguard the scientific and technological potential of these countries, in order to redirect research towards social needs, and thus restore their production systems and also improve the quality of life in the societies in question. The Community will be able to benefit from cooperation with the East European countries by obtaining access to the sometimes highly advanced results of research in those countries.

There are three principal aims here:

— To stabilize RTD potential: it is first of all a question of safeguarding highly-qualified human resources and existing equipment taking into account the ongoing reforms in the S&T structures in these countries.

  The aim is to avoid the best researchers leaving this sector to go abroad or take up other professional activities. There is therefore an urgent need to promote scientific and technical cooperation as a catalyst for action on a long-term basis: East European scientists should be associated with high-tech research, e. g. in the field of advanced technologies, essential to the creation of the future infrastructure of those countries. Links should be forged between research and industry in order to promote the integration of these countries into European and world markets. Special attention should be paid to the development of human as well as computerized RTD communication networks (e. g. in the context of Cosine).

— To help solve major social, economic and environmental problems specific to the east European countries by means of targeted technical, scientific and socio-economic RTD.

  Mention should be made of the following examples:

  1. resource utilization and production cycles in the East have caused environmental deterioration which goes beyond national frontiers and continents. There is an urgent need to find a common solution in areas such as the rational use of energy resources;

  2. in order that the information infrastructure established in the East develops in compatible fashion to that in the European Union, research conducted in this area should be complementary and convergent;

  3. action to combat environmental and public health problems of a regional and local nature in the new independent States of the former Soviet Union, in particular as a result of major accidents;

  4. RTD to improve industrial and agricultural competitiveness.

— To intensify cooperation in RTD areas where these countries are in the forefront at world level. Several of these countries have a very high quality of science, but the potential has not always been used in order to stimulate economic development. In order better to merge the east European countries with the fabric of the world market, special attention will be paid to their participation in pre-normative activities in industrial areas such as information technology, telecommunications, advanced materials and energy (by making use, for example, of the 'energy centres' set up in these countries under the Thermie programme) and in the dissemination and exploitation activities carried out within the third activity,

The acitivities with the countries of central and eastern Europe and with the new independent States of the former Soviet Union will be conducted via:

— specific RTD actions to meet specific needs and to be elaborated further in the work programme in consultation with the third countries concerned on the basis of mutual benefit. This includes accompanying measures on human resources development, e. g. research training, and RTD management;

— the International Association for the Promotion of Cooperation with Scientists from the New Independent States of the Former Soviet Union (Intas), provided that a new agreement is reached between its members on its continuation. Community participation in Intas beyond 31 December 1995 is subject to a decision by the Council authorizing the participation of the Community;

— the opening-up of the specific programmes of the fourth framework programme to these countries, notably the countries which have concluded an association agreement with the European Union.

This activity will complement that of the Member States and close cooperation and synergy with the Phare and Tacis programmes will be guaranteed. These programmes could support innovation, the exchange of information, supply of equipment, participation in other specific programmes. At the same time it will help to develop synergies between Member States' acitivties in this area, e. g. by facilitating exchange of information.

Cooperation between the Community and central and eastern European countries and the new independent States of the former Soviet Union within this activity could also encourage regional cooperation among these countries.

Where possible, synergies with worldwide initiatives of global interest can be encouraged (for example climate change).

B. Cooperation with non-European industrialized third countries

The aim is to further the Community's interests by ensuring that the direction of the Community's industrial research is in tune with the potential international markets for the future applications of this research, in order to improve the competitiveness of European industry and to optimize its efforts by seeking or easing access to scientific and technological sources in the countries in question, since these highly industrialized countries conduct RTD similar or complementary to that conducted by the EC.

In other instances cooperation with these countries is a basic prerequisite for the implementation of 'mega-science' research projects. This is the background to such multilateral cooperation and consultation as, for example, within the OECD or multilateral projects. To this should be added involvement in research in the preparation of international standards.

The dialogue on scientific policy with the abovementioned countries will be deepened. This might lead to cooperation on the basis of a sectoral agreement or a wider agreement on scientific and technical cooperation. Nevertheless, since the countries concerned are both Community partners and competitors, it is important to be selective as regards the areas of cooperation and to concentrate on a few carefully selected sectors in the light of Community priorities.

This cooperation requires a degree of flexibility as regards the types of cooperation, ranging from consultation to an exchange of information and experts, to programmes of post-doctorate fellowships in foreign laboratories, to joint projects or studies and possibly to reciprocal involvement in each other's research programmes on a project-by-project basis, or otherwise, as decided by Council.

No transfer of funds to non-European industrialized countries will take place. As far as mega-science projects are concerned, only coordination and participation in exploratory phases will be considered for support under this activity.

This section of the programme also helps to underpin the Community's external policy and offers all of the Member States the advantage of equal access to foreign sources of science and technology.

Measures facilitating access to, and dissemination of such information will be strongly encouraged.

C. **Scientific and technological cooperation with the developing countries**

The main aim of this activity is to enable the developing countries (DCs), whose levels of development differ widely, to be associated with the generation of knowledge and innovative technologies needed to solve their specific problems and to reach a sustainable economic development.

This general aim results in two strategies:

1. to harness training and the relationships that will be established between research workers and their institutions in order to maintain and even enhance DC research and technological capacities in particular at the human-resource and institutional level while paying attention to the strengthening of links with the sectors responsible for product development and distribution;

2. to enable the European scientific ocmmunity to maintain and improve excellence in the scientific areas that are relevant to DC problems in particular environment, food and health.

In order to achieve this general objective, north-south, north-north and south-south collaboration will be encouraged.

Dissemination and utilization of research results will be implemented in conjunction with the third activity. In addition, this operation will be implemented in synergy with other Community policies on development and economic cooperation.

In order to achieve this objective with due regard to the principle of sustainable development, research activities will target three sectors which are interrelated and of major importance in most of the DCs and emphasize, where necessary, interdisciplinary aspects:

— the sustainable management of renewable natural resources, including forests, oceans and other aquatic environments, water, soil and biodiversity, with particular emphasis on their interactions and on the relationship between utilization and conservation, including environmental protection. The problems lying at the interface of natural resources, energy production and consumption, socio-economic and demographic factors and the development of human settlements will also be covered,

— improvement of agricultural and agro-industrial production within this framework of preserving biodiversity and sustainable management of renewable natural resources. This concerns the areas of plant breeding and protection in order to adapt them better to environmental conditions, thus permitting better utilization of the available land; livestock farming, with a special emphasis on better health protection of animals, breed improvements and sustainable production of animal feed and nutrition; aquaculture, in order to facilitate the development of this activity and its environmental integration; improvements in food quality and safety and in the conditions of product storage and processing, areas in which losses are considerable in the DCs; analysis of production and market policies and systems and the scope for optimizing rural systems,

— health and population, focusing on control of the predominant diseases in the DCs, nutrition, improving health-care systems and the impact on the environment and on health of demographic change, migration and urbanization. This concerns research into vaccines the biology of pathogens and their vectors, the development of new diagnostic methods and the production of new drugs; research into population and reproduction health, health-care systems and methods of intervention, account being taken of the specific constraints and of the socio-economic context of the DCs.

In close consultation with the developing countries and the Commission services concerned and in consideration of the actions undertaken by relevant international fora (e. g. WHO; CGIAR, FAO), priorities will be focused within each of these sectors when the work programme is prepared, since this will be drawn up for the individual regions (several DCs, e g. the Mediterranean region), with the flexibility needed to take account of ecological, demographic and public health criteria their economic and social situation and the European Union's development and economic cooperation policies.

This activity should also be able to facilitate high quality institutions in DCs to join international research activities which, by their very nature, are global and must be dealt with in a global rather than

regional manner, for example, the greenhouse effect, pollution, desertification and control of urban growth, communicable diseases, pandemics, the social dimension of health care provision and the assessment and conservation of natural resources.

As levels of development differ widely in certain countries, additional priority areas of mutual interest in fields such as communications technologies, information technologies, industrial technologies, materials technologies and biotechnology may be identified and links may be established for substantive collaboration with Community research groups and networks. Special attention should be paid to the development of human as well as computerized RTD communication networks (e. g. in the context of Cosine). Where there is scope for substantive collaboration, opening of other specific programmes should be considered on the basis of a sectoral agreement to be decided by the Council.

In view of the cooperative nature of the research and the essential characteristics of the partnership, it will basically be implemented via joint shared-cost projects. In specific cases concerted actions could also be considered. The part played by joint research networks is also important as are actions concerning scientific stimulation meetings, workshops and conferences. The training and education provided under this activity will in essence be provided via joint research contracts and accompanying measures, the networks being, as it were, a means of continuous training and the contracts a basis guaranteeing that the training will be put to good use.

Cooperation with the developing countries will be implemented in close liaison with other Community initiatives or other fora for cooperation such as the Lomé Convention, the new Mediterranean policy and the regulation on financial and technical assistance to, and economic cooperation with, the developing countries in Asia and Latin America, in order to permit cross-fertilization between the efforts and results of these activities on the one hand and cooperation in the framework of Community RTD policy on the other.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

	ECU million
Area A1	
Cooperation with other fora for European scientific and technological cooperation	46
Area A2	
Cooperation with the countries of central and eastern Europe and the new independent States of the former Soviet Union	232
Area B	
Cooperation with non-European industrialized third countries	30
Area C	
Cooperation with the developing countries	232
Total	540 (1)

(1) Of which:
— a maximum of 4,5 % for staff expenditure and 5,5 % for administrative expenditure,
— ECU 4 million for the dissemination and optimization of results.

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.

(a) Shared-cost actions:

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.

The financial contribution for participants from the central and eastern European countries, the new independent States of the former Soviet Union and the developing countries may exceed 50 %.

(b) Concerted actions consisting of the coordination of RTD projects already funded by public authorities or private bodies. The Community participation may cover up to 100 % of the costs of the concertation.

(c) Specific measures for this programme:

(i) — measures to provide tools for general use in research centres, universities and undertakings,

— support for Community participation in the exploratory phase of a joint project. The financing of a possible operational phase of the project woud have to be covered by the specific programme concerned.

The Community contribution to the above measures may cover up to 100 % of the costs.

(ii) — support to facilitate participation of legal entities from third countries referred to in Annex I, sections A.2 and C, in certain other specific programmes of the framework programme. Such participation should, however, normally be financed by resources of the third country concerned or other Community instruments.

(d) Preparatory, accompanying and support measures, such as:

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

— support for exchange of information, conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings,

— use of external expertise, including access to scientific databases,

— scientific publications, including the dissemination, promotion and utilization of the results (coordination with the activities conducted under the third activity); 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,

— study and monitoring of the developments in the science and technology policies of the third countries,

— analysis of possible socio-economic consequences of international RTD cooperation, which will also contribute to the programme 'Targeted socio-economic research',

— training activities related to research covered by this programme in order to stimulate technology transfer and enhance employment skills,

— independent evaluation of the management and execution of the programme and of the implementation of the activities.

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