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(1) Text with EEA relevance.

(Continued overleaf)

[1] Text with EEA relevance.

II

(Preparatory Acts)

COMMISSION

PROPOSALS FOR COUNCIL DECISIONS CONCERNING THE SPECIFIC PROGRAMMES IMPLEMENTING THE FOURTH EUROPEAN COMMUNITY FRAMEWORK PROGRAMME FOR RESEARCH, TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION ACTIVITIES

(1994—1998)

Proposal for a Council Decision on a specific programme of research and technological development and demonstration in the area of telematics applications of common interest (1994—1998)

(94/C 228/01)

(Text with EEA relevance)

COM(94) 68 final — 94/0079(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision 94/. . ./EC, the Council and Parliament have adopted a Fourth Framework Programme for Community actions of research, technology development and demonstration (Referred to after as RTD) for the period 1994—1998 specifying *inter alia* the activities to be pursued in the area of telematic applications of common interest, and that the present Decision is taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 130i (3), stipulates that the Framework Programme shall be implementated through Specific Programmes developed within each activity of the Framework Programme; that each Specific Programme shall specify the implementation procedures, fix its duration and foresee the amounts estimated as necessary;

Whereas the present programme is implemented principally through the means of cost-shared actions, concerted actions, and preparatory, accompanying and supporting measures;

Whereas, in accordance with Article 130i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority asigned to the areas covered by this programme within activity I under the Fourth Framework Programme;

Whereas the Decision 94/. . ./EC (Fourth Framework Programme) foresees that the overall maximum amount for the Fourth Framework Programme will be re-examined at the latest by 30 June 1996 in the

perspective of re-inforcement; that as a consequence of this re-examination, the amount estimated as necessary for the execution of the present programme could be increased;

Whereas the present programme can contribute significantly to the re-launching of growth, to the re-inforcement of competitiveness and to the development of employment in the Community, as indicated in the White Paper on 'growth, competitiveness and employment' [1];

Whereas the European Council of Brussels on 10/11 December 1993 has decided, on the basis of the White Paper on 'growth, competitiveness and employment', to implement an action plan consisting of concrete measures at both Union and the 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;

Whereas telematics applications shall contribute to improving the quality and the economic efficiency of services of public interest, the access to knowledge sources and the conditions of life of citizens; 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 they can express their needs and be trained in using the results;

Whereas the content of the Fourth Framework Programme of Community RTD actions has been defined in conformity with the principle of subsidiarity; that the present Specific Programme defines the content of the actions to be undertaken in conformity with this principle in the area of telematics applications of common interest;

Whereas the Decision 94/. . ./EC (Fourth Framework Programme) foresees that Community action is justified if, amongst other things, the research contributes to the reinforcement of economic and social cohesion of the Community and to its harmonious overall development while at the same time respecting the objective of scientific and technical excellence; that the present programme is designed to contribute to the realization of these objectives;

Whereas the present programme and its implementation will contribute to the reinforcement of synergies between the RTD actions in the area of telematics applications of common interest carried out by research centres, universities and enterprises, in particular small and medium-sized enterprises, established in the Member States and between these and corresponding Community actions;

[1] COM(93) 700 final, 5. 12. 1993.

Whereas the rules on participation for undertakings, research centres (including the JRC) and universities, and the rules applicable to the dissemination of research results which are set out in the measures foreseen by Article 130j, apply;

Whereas, in the implementation of the present programme, and in addition to the association with Countries by the European Economic Area agreement, international cooperation actions, consistent with Article 130m, are also appropriate with other third countries and international organizations;

Whereas the implementation of the present programme will involve actions for the dissemination and exploitation of RTD results, in particular towards small and medium-sized enterprises notably in the Member States and regions which participate least in the programme, as well as actions to stimulate the mobility and training of researchers, developed within the present Programme and in line with its effective implementation;

Whereas in the implementation of the present programme, it is necessary to foresee measures to encourage the participation of SMEs, notably by technology stimulation measures;

Whereas it is necessary to carry out an evaluation of the economic and social impact, and of the technological risks, of the actions carried out in the present programme;

Whereas it is necessary, on the one hand, to examine in a systematic and continuous way the state of implementation of the present programme in order to adapt it, as necessary, to scientific and technological changes in this area; and that it is necessary, on the other hand, to have carried out at appropriate times an independent evaluation of the state of implementation of the Programme in order to provide all the elements necessary for determination of the objectives of the Fifth Framework Programme of RTD; that it is necessary at the end of this programme to carry out a final evaluation of results with respect to the objectives defined in this Decision;

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

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

HAS ADOPTED THIS DECISION:

Article 1

A Specific programme of research, technology development and demonstration in the area of telematics applications of common interest, as defined in Annex I, is hereby adopted for a period beginning on *(date of adoption of the present programme)* 1994, and ending on 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 843 million, including 10,3 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3) of Decision 94/. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each year in the light of the scientific and technological priorities fixed by the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. In particular, it shall establish whether the objectives, priorities and financial resources remain appropriate to the evolving situation. It shall, as necessary, submit proposals for the modification or reinforcement of this Programme as a result of these examinations.

2. In order to contribute to an overall evaluation of Community activities foreseen in Article 4.2 of the Decision of the Fourth Framework Programme, the Commission shall have an evaluation carried out, by independent experts, and at an appropriate time, of the actions in the areas directly covered by the present programme, and of their management during the five years preceeding the evaluation.

3. At the end of the present programme, the Commission shall have a final evaluation carried out, by independent experts, of the results of this programme with respect to the objectives defined in Annex III of the Fourth Framework Programme and in Annex 1 of the present Decision. The Commission shall communicate the report of this evaluation, together with its observations, to the Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the Programme and the proposed financial arrangements.

The work programme may also provide for participation in certain activities within the Eureka framework.

2. The Commission shall establish 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. For the cases specified 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.

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

The Commission shall adopt the measures envisaged where they are in accordance with the opinion of the Committee.

If the measures envisaged are not in accordance with the Committee's opinion, 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 qualified majority.

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

Article 7

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

— the preparations and updating of the work programme referred to in Article 5, paragraph I;

— the evaluation of RTD projects proposed for Community funding, and the estimated amount of

this funding where that amount exeeds ECU 2 million;

— the measures to be undertaken to evaluate the programme;

— any departure from the indicative breakdown of the amount set out in Annex II which has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228(1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNICAL OBJECTIVES AND CONTENT

The present Specific Programme fully reflects the orientations of the Fourth Framework Programme, applies the selection criteria cited and specifies its scientific and technological objectives.

Section 1.A of Annex III, on the first Action of this Framework Programme, is an integral part of the present programme.

Introduction

The new focus of RTD in the specific programme on telematics applications is 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 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.

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.

Research and technological development (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, 10/11 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 to further promote the competitiveness of European industry 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. In view of the user-oriented nature of the programme, the latter aim will also be given priority.

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', which covers all distributed and interactive multimedia applications. Secondly, more importance will be attached to user requirements. Finally, particular attention will be put on finding affordable solutions. These three new guidelines will not only apply to the programme as a whole but also to individual projects.

Guidelines for project management

As a rule, each project should 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 workstations.

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 and confidentiality. 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 workstations, 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—1998). In addition, close links will be established with public and private telecommmunications 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 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 strenghten the competitiveness of the European economy. It will also stimulate the investment necessary to provide Europe with an effective information and communication infrastructure — or 'infostructure' — and help ensure that this investment bears fruit.

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

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

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

— telematics for services of public interest: transport, health care, administrations.

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

This set of activities will be complemented by a series of accompanying measures on international cooperation, the dissemination of results 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.

II. RESEARCH AREAS

Area 1. Telematics for services of public interest

The European infostructure can also contribute to the smooth running of the internal market and to meeting the new obligations resulting from the Treaty on European Union. This will require new telematics services. Research will concentrate on three fields of major political, economic and social importance, i.e. the administrations, health care and transport. It will be based on previous Community activities in these fields.

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 telematics networks for administrations (TNA) and will be used as a basis for feasibility studies and pilot projects as part of the IDA multinannual 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. Administrations will be able to introduce new telematics systems and services, while rationalising 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. 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.

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.

Health care

There are two challenges facing the public health systems in Europe. On the one hand, operating costs need to be reduced while at the same time all citizens must be offered equal and guaranteed access to health care at any place and at any time. On the other hand, the medical professions need to take account of the rapid advances in knowledge and the increasing complexity of their tasks. Work under the Third Framework Programme has shown that telematics could help them meet these challenges.

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. 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 ' 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 services 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 professsions* 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 hospital's 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. For example, the development of a prototype virtual brain could make a significant contribution to the international efforts being undertaken during the 'decade of the brain'. Research will also cover remote medical assistence 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 bilogical signals and animated images via broad-bandland 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 fo 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.

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 to better contribute to the achievement of the aims of the common transport policy, while strengthening the competitiveness of European industry. A 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'.

Nature of the work

The RTD work will cover the entire telematics set-up in the transport sector, form 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 based 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 system 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 transport 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.

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 *sea transport, 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 optimise the use and management of multimodal transport, which 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 2 — Telematics for knowledge

In order to ease the transition towards a new information society, Europe must equip itself with an infostructure permitting remote access to and the sharing and continual updating of knowledge. Research centres, universities, company training departments, libraries and publishers represent the main categories of actors which both produce and use knowledge. The research must contribute to the development of new methods of access, sharing and up-dating of knowledge. The applications will have to take into account the needs of individuals as much as the needs of enterprises and the market realities. These activities will be based on previous Community action on these subjects under the Third Framework Programme.

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 application which will on the one hand enable European researchers to cooperate and work together regardless of where they are in 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 infostructure 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.

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 computernetworks and the management, monitoring and protection of these networks.Three aspects will be covered.

Firstly, particular attention will be paid to validating the improved interconnection of national networks at European level, and particularly to increasing the bandwidth rate needed for application 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, tele-working 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 broad-band 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.

Education and training

In a world undergoing major changes, the education and training systems must be reformed in order to make a contribution to the competitiveness of the European economy. All businesses, particularly SMEs, now face the challenge to continuously 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 is 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 the universities and training departments of businesses in taking up the challenges facing them, including the development of educational software allowing for interactivity.

Aim

The aim of this action is to extend this research, 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 it would 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 education 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 broad-band 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 workstations — either stand-alone or networked — for *in situ* vocational training. Methods for designing personalized interactive teaching programmes will also be investigated, particularly those used for producing electronic books. This will allow the student or the trainee a high degree off interactivity and enable him or her to follow personalized courses. 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.

These 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 training centres so that they can share their resources. These different experiments will thus provide the basis for European supply of tele-teaching and tele-training services.

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 infostructure. 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 infostructure.

To this end, the work will aim to establish interconnections 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 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, booksellers and end-users. These validation 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 3 — Telematics for improving employment and quality of life

Telematics systems and services should make it possible to improve employment and the quality of life by promoting better use of land, by raising the degree of autonomy of the less-favoured social groups, such as old people and the handicapped, and by permitting more effective protection of the environment.

Urban and rural areas

The ORA exploratory action under the Third Framework Programme showed that the rural areas whose economic, social and cultural infrastructure is no longer attractive to the business world and the general public could compensate, to some extent, 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 populations 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.

As a consequence, the exodus towards large conurbations should be reduced, urban congestion could be diminished and new populations could settle in rural 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 working at home, teleservice 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. Particular emphasis will be placed on ease of use and user acceptability of telematics applications.

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. 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 tele-working, 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, inter-personal 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.

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.

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 chemical plants and to manage natural risks such as desertification, earthquakes and forest fires. Research will also concern the development and interconnection of information networks and centres for the prevention 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 will also be studied.

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.

Other exploratory actions

If considered appropriate during the course of the programme other exploratory actions could be launched from 1996 onwards.

Area 4 — Horizontal RTD activities

The success of telematics applications amongst users depends on several common factors. These include the language problem and the usability of information services. The dissemination of telematics services throughout Europe will be hampered if users are not able to work with them in their own language. The vast resources available in electronic databases will be under-exploited if information retrieval methods are

not simplified. The integration of language-processing tools into telematics systems and the improvement of access to databases are therefore priority issues.

Moreover, such a recent development as telematics requires the production of appropriate tools and methods to make the new systems and services easily absorbable by users and to permit them to be developed by researchers and engineers as efficiently as possible.

These questions cannot be tackled efficiently under any one of the separate fields covered by the programme. For this reason, they are the subject of horizontal lines of action, the results of which will benefit all the fields.

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 analyze 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. 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 information 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 all projects in order to tackle horizontal issues of data security and confidentiality, 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.

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.

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 tele-banking 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 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 tele-working 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 language resources such as electronic grammars or 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.

Finally, 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.

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

Validation 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 conclude the development of quality control and system performance measurement and will lead to the promotion of standards for information exchange formats.

Area 5 — Horizontal actions

Horizontal actions address issues common to several areas of the programme.

'Telematics observatory' and consensus development

A specific action will be launched to evaluate user needs, assess technology and market trends and identify mechanisms to stimulate innovations on the user side. Consensus building across fields and projects will

concern standards and common telematics infrastructures which could help to accelerate the development of new telematic services. Horizontal concertation activities will intensify the exchange of experience across the areas of the programme.

Collaboration with COST and Eureka activities in the whole of the telematics domain will also be undertaken where appropriate as will coordination with actions funded under the ESF, ERDF, EIB, EIF and Cohesion Funds.

Dissemination of results and promotion of telematics

The activities 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 utilisation of the results of their research throughout the European Union. A significant amount of the budget allocated to the programme (19 MECUs) will be devoted to these types of activities.

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 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. Finally, there will be close coordination and where appropriate collaboration between this Community research programme and similar national or European RTD programmes (notably COST, Eureka, ESA, CERN, and Eurocontrol).

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 ESTIMATED AS NECESSARY

Area	ECU millions	
Telematics for services of public interest		395
— Administrations	50	
— Health care	135	
— Transport	210	
Telematics for knowledge		146
— Telematics for research	50	
— Education and training	66	
— Libraries	30	
Telematics for improving employment and the qualitiy of life		125
— Urban and rural areas	40	
— Elderly and disabled people	65	
— Exploratory action (environment)	20	
— Other exploratory actions	pm	
Horizontal RTD activities		136
— Telematics engineering	15	
— Language engineering	81	
— Information engineering	40	
Horizontal actions		41 (1)
Total		843 (2)

(1) Of which 19 MECUs for the dissemination and exploitation of results.
(2) Of which 53 MECUs for staff expenditures and 34 MECUs for administrative expenditure.

This breakdown does not exclude projects which might relate to several areas.

ANNEX III

IMPLEMENTATION PROCEDURES

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities established and regularly carrying out RTD activities

      — in the Community, or

— in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country;

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement;

(b) to legal entities established in a European country;

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. The present programme shall be executed through:

2.1. Financial participation of the Community in RTD actions caried out by third parties, or by the JUC institutes in association with third parties:

(a) Cost-shared actions of the following types:

— RTD projects carried out by enterprises, research centres and universities, including 'Integrated action' consortia bringing them together within a common theme; the participation of potential users in all phases of projects shall be required;

— Technological use stimulation aiming to encourage and enable the participation of SMEs through grants covering the exploratory phase of RTD actions — including a search for partners — and through cooperative research. Such grants will be made following the selection of outline proposals which can be submitted at any time;

— Financial support for infrastructures and installations necessary for trials and coordinated actions (reinforced coordination actions).

(b) Concerted actions which consist of the coordination, notably through 'concertation networks' of RTD projects already financed by public authorities or private organizations. Concerted actions may also serve as the necessary coordination for the operation of common interest groups which, through cost-shared RTD projects (cf. 2.1(a) 1st indent) bring together around the same technological or industrial objective, manufacturers, users, universities and research centres.

(c) Specific measures such as those in support of standardization, and measures aimed at the implementation of facilities of general value to research organizations, universities and enterprises. The Community participation may cover 100 % of the costs of these measures.

2.2. Preparatory, accompanying and supporting measures covering *inter alia* the following:

— Studies and analyses in support of the present programme, or the preparation of possible future actions;

— conferences, seminars, workshops, or other scientific or technical meetings, including conferences held at the European or the national level on dissemination and exploitation of the results of the research, as well as 'concertation' meetings between projects within the same application domain (vertical concertation) or between projects using the same technical systems (horizontal concertation);

— use of external expertise, including access to scientific databases and other telematics services, to improve the communication between the participants in the programme as well as between these participants and outside organizations interested in the results of the programme;

— scientific publications, including those for the dissemination and exploitation of research results (in coordination with the activities carried out within the third action);

— studies about the assessment of the socio-economic impact, as well as of any possible technological risks, related to the set of projects within the present programme. A close collaboration must be established with the specific programme on 'Targeted socio-economic research' in order to ensure optimal exploitation and further utilization of the results of these studies;

— training actions linked to the research covered by the programme, to the benefit of researchers as well as of the users of the results of this research;

— independent evaluation (including studies) of the management and execution of the actions in the programme, including project proposals and projects themselves;

— meaures aimed at facilitating the participation of companies and research organizations in the programme as well as their access to the results;

— measures to support the operaton of networks for growing public awareness and decetralized assistance in favour of SMEs, in connection with the action on 'Euromanagement — RTD audits'.

The actions for diffusion and exploitation of results carried out in this programme will be complementary to those carried out in action 3, and will be implemented in close coordination with them. Partners in RTD projects will constitute a key network for diffusion and exploitation of results. As indicated above, the actions will be reinforced by a programme of publications, conferences, results promotion, studies of potential techno-economic opportunities, etc. In order to ensure optimum exploitation of results, the factors liable to encourage use of results will be taken into account from the outset and throughout the duration of RTD projects.

Proposal for a Council Decision on a Specific Programme of research, technological development and demonstration in the area of advanced communications technologies and services (1994—1998)

(94/C 228/02)

(Text with EEA relevance)

COM(94) 68 final — 94/0080(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the Proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision 94/. . ./EC, the Council and European Parliament have adopted a Fourth Framework Programme for Community actions of research, technology development and demonstration (Referred to hereafter as RTD) for the period 1994—1998 specifying *inter-alia* the activities to be pursued in the area of advanced communications technologies and services, and that the present Decision is taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 130 i, (e) stipulates that the Framework Programme shall be implemented through Specific Programmes developed within each activity of the Framework Programme; that each Specific Programme shall specify the implementation procedures, fix its duration and foresee the amounts deemed necessary;

Whereas the present programme is implemented principally through the means of cost-shared actions, concerted actions, and accompanying measures;

Whereas, in accordance with Article 130 i, (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within activity I under the Fourth Framework Programme;

Whereas the Decision 94/. . ./EC (Fourth Framework Programme) foresees that the overall maximum amount of the Fourth Framework Programme will be re-examined at the latest by 30 June 1996 in the perspective of re-inforcement; that as a consequence of this re-examination, the amount deemed necessary for carrying out the programme could be increased;

Whereas the harmonized development and introduction of new generations of communication systems and services is vital to the consolidation of the internal

market: Research and technology development is an essential underpinning to the development of trans-European networks and services; new integrated communications services are the key to increased productivity, industrial competitiveness, economic growth and the creation of new employment; innovative use of new communications services underpins the development of more flexible working patterns and the convergence of the media, television and telecommunications sectors in provision of interactive video services; decisions on liberalization of telecommunications services by 1998 will pose new challenges in technology development for both network and service inter-operation and service management in a competitive environment, and continued support for RTD at Community level is therefore an essential part of Community policies for the internal market, industrial development, new employment creation, and telecommunications itself;

Whereas the present programme can contribute significantly to the re-launching of growth, to the reinforcement of competitiveness and to the development of employment in the Community, as indicated in the White Paper on 'growth, competitiveness and employment' [1];

Whereas the content of the Fourth Framework Programme of Community RTD actions has been defined in conformity with the principle of subsidiarity; that the present Specific Programme defines the content of the actions to be undertaken in conformity with this principle in the area of advanced communications technologies and services;

Whereas the Decision 94/. . ./EC (Fourth Framework Programme) foresees that Community action is justified if, amongst other things, the research contributes to the reinforcement of economic and social cohesion of the Community and to its harmonious overall development while at the same time respecting the objective of scientific and technical excellence; that the present programme is designed to contribute to the realization of these objectives;

Whereas the present programme and its implementation will contribute to the reinforcement of synergies between the RTD actions in the area of advanced communications technologies and services carried out by research centres, universities and enterprises, in particular small and medium-sized enterprises, establish in the Member States and between these and corresponding Community actions;

Whereas the rules on participation for undertakings, research centres (including the JRC) and universities, and the rules applicable to the dissemination of research results which are set out in the measures foreseen by Article 130 j, apply;

Whereas, in the implementation of the present programme, and in addition to the association with countries covered by the European Economic Area Agreement, international cooperation actions, consistent with Article 130 m, are also appropriate with other third countries and international organizations;

Whereas the implementation of the present programme will involve actions for the dissemination and exploitation of RTD results, in particular towards small and medium-sized enterprise notably in the Member States and regions which participate least in the programme, as well as actions to stimulate the mobility and training of researchers, developed within the present programme and in line with its effective implementation;

Whereas in the implementation of the present programme, it is necessary to foresee measures to encourage the participation of SMEs, notably by technology stimulation measures;

Whereas fundamental research must be encouraged, because of the rapid pace of technological innovation, particularly in the area of photonic communications;

Whereas it is necessary to carry out an evaluation of the economic and social impact, and of the technological risks, of the actions carried out in the present programme;

Whereas it is necessary, on the one hand, to examine in a systematic and continuous way the state of implementation of the present programme in order to adapt it, as necessary, to scientific and technological changes in this aera; and that it is necessary, on the other hand, to have carried out at appropriate times an independent evaluation of the state of implementation of the programme in order to provide all the elements necessary for determination of the objectives of the Fifth Framework Programme of RTD; that it is necessary at the end of this programme to carry out a final evaluation of results with respect to the objectives defined in this Decision;

Whereas the JRC may participate indirect actions covered by the present programme;

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

HAS ADOPTED THIS DECISION:

Article 1

A Specific Programme of research, technology development and demonstration in the area of advanced communication technologies and services, as defined in Annex I, is hereby adopted for a period beginning on *(date of adoption of the present programme)* 1994, and ending on 31 December 1998.

[1] COM(93) 700 final, 5. 12. 1993.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 630 million, including 10,3 % for staff and administrative expenditure.

2. An indicative breakdown of funds is set out in Annex II.

3. The amount deemed necessary for carrying out the programme, indicated above, could be increased as a result of and in accordance with the Decision mentioned in the Article 1, (3) of the Decision 94/. . ./EC (Fourth Framework Programme).

4. The budgetary authority will determine the funds available for each year in the respect of the scientific and technological priorities fixed by the Fourth Framework Programme.

Article 3

Rules for the implementation of the programme, other than those set out in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. In particular, it shall establish whether the objectives, priorities and financial resources remain appropriate to the evolving situation. It shall, as necessary, submit proposals for the modification or reinforcement of this programme as a result of these examinations.

2. In order to contribute to an overal evaluation of Community activities foreseen in Article 4.2 of the Decision on the Fourth Framework Programme, the Commission shall have an evaluation carried out, by independent experts, and at an appropriate time, of the actions in the area directly covered by the present programme, and of their management during the five years preceding the evaluation.

3. At the end of the present programme, the Commission shall have a final evaluation carried out, by independent experts, of the results of this programme with respect to the objectives defined in Annex III of the Fourth Framework Programme and in Annex I of the present Decision. The Commission shall communicate the report of this evaluation, together with its observations to the Council, to the European Parliament and to the Economic and Social Committee.

Article 5

1. A work programme shall be drawn up by the Commission, in conformity with the objectives set out in Annex I, and shall be updated as necessary. It will define the detailed scientific and technological objectives and the stages in implementation of the programme as well as the financial provisions planned for each implementation method.

The work programme may also provide for participation in certain activities within the Eureka framework.

2. The Commission shall establish 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. For the cases specified 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.

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

The Commission shall adopt the measures envisaged where they are in accordance with the opinion of the Committee.

If the measures envisaged are not in accordance with the Committee's opinion, 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 qualified majority.

If on expiry of a period of one month from referral of the matter to the Council, the latter has not acted, the proposed measure shall be adopted by the Commission.

Article 7

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

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

— the evaluation of RTD projects proposed for Community funding, as well as the estimated amount of the Community's contribution to them where that amount exceeds ECU 2 million;

— the measures to be undertaken to evaluate the programme;

— any adaptation of the indicative breakdown of the amount set out in Annex II which has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

The present 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.B of Annex III, on the first Action of this framework programme, is an integral part of the present programme.

Introduction

The new focus of RTD in the specific programme on communications technologies is 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 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.

EC support for research and technology development in this area started in 1988 under the Second Framework Programme and was reinforced in 1991 and 1993 under the Third Framework Programme. This industrial sector has considerably changed in recent years, and the focus of Community RTD support in the Fourth Framework Programme will be different, but it is vital that the Community continues to support RTD activities in advanced communications technologies and services for three reasons.

Firstly, the harmonized development and introduction of new generations of communication systems and services is vital to the consolidation of the internal market: Research and technology development is an essential underpinning to the development of trans-European networks and services.

Secondly, the telecommunications sector is of major economic importance in its own right and as a support for all other sectors of the economy: New integrated communications services are the key to increased productivity, industrial competitiveness, economic growth and the creation of new employment; innovative use of new communications services underpins the development of more flexible working patterns and the convergence of the media, television and telecommunications sectors in provision of interactive video services.

Thirdly, decisions on liberalization of telecommunication services by 1998 will pose new challenges in technology development for both network and service inter-operation and service management in a competitive environment. Continued support for RTD at Community level is therefore an essential part of Community policies for the internal market, industrial development, new employment creation, and telecommunications itself.

THE CONTEXT

Advanced communications technologies and services are crucial for consolidation of the internal market, for Europe's industrial competitiveness and for balanced economic development. The services are a vital link

between industry, services sector and market as well as between peripheral areas and economic centres. They are also a pre-requisite for social cohesion and cultural development.

Advanced communication services will multiply the benefits of more traditional services. Some major corporations have already realized the advantages that can accrue: lower costs, improved productivity, competitive advantages and reduced environmental impact. However, in Europe, there is still a gap between the potential of technology and the reality of applications.

The activities to be pursued will not only be a basis for innovation and a key to competitiveness, but will also make a contribution to answering European society's needs. The research will concentrate on the interworking, integration and verification through trials of high-speed, photonic and mobile communication systems, and the distribution of network and service intelligence. However, the actions will also include a number of 'high-risk', 'high potential' concepts from which the economic and social benefits could emerge in the longer term.

The two phases of the RACE programme focused on integrated broad-band networks and demonstrations of how services could exploit such networks. Work in this programme will build on the achievements, and contribute further to the success of European actions in this area. However, in the period to 1998, a paradigm shift is needed towards a stronger focus on stimulating innovative use. This will require a multi-disciplinary approach, and strengthened collaboration between users of advanced communications in the public and private sectors.

Community support for technology development is still needed in selected areas where no one player can act alone, and where common European specifications and standards are necessary. These are the areas covered in this programme.

The work will capitalize on the results achieved, and the collaboration frameworks established within the RACE programme. The emphasis on common functional specifications and standards is still vital. The actions will give greater emphasis to the interaction between technology development and regulations, in collaboration with national regulatory bodies, to support the continuing harmonization of regulatory regimes in Europe, and to allow national authorities to manage the industrial and social impacts of new technologies and services.

OBJECTIVES OF THE PROGRAMME

The objective will be to develop advanced communication systems and services for economic development and social cohesion in Europe, taking account of the rapid evolution in technologies, the changing regulatory situation and opportunities for development of advanced trans-European networks and services.

The aims will be to support European policies for early deployment and effective use of advanced communications in consolidation of the internal market, and to enable European industry to compete effectively in global markets. The work will enable the re-balancing of public and private investments in communications, transport, energy use and environment protection, as well as experimenation in advanced service provision. In conjunction with the work in the Specific Programme on information technologies, it will provide a common technological basis for applications research and development in the Specific Programme on Telematic Systems and will prepare the ground for the development of a European market for information services.

Measures for technology use stimulation, based on feasibility grants, will be implemented to encourage and facilitate the participation of SMEs.

THE AREAS OF WORK

The work will consolidate European technological leadership in digital broad-band communications and enable effective network management and service deployment in a diverse and competitive communication environment. In particular, the work will stimulate and coordinate the emergence of digital multimedia services and integrated photonic systems with a view to their widespread introduction in Europe from 2000,

including development of the technological basis for deployment of 'Transparent Highways': (all-optical networks). It will ensure mobility on fixed networks and through advanced wireless, radio and satellite systems across Europe, with particular emphasis on user access in both public and private networks, and develop and demonstrate technologies for the integrity, confidentiality and availability of information in integrated systems.

In all areas, technology and service demonstrators will allow users of generic advanced communications services to evaluate the applicability of new technologies and to focus technology developments on their needs and on key areas for Europe's economic and social development. The lead given by users will also ensure that the technology development activities respond quickly to changes in economic and social conditions and to new scientific discoveries and breakthroughs.

A key role will be given to system integration, usage trials and demonstration of advanced services, and a close link will be maintained with trans-European Network developments. Application trials will serve to demonstrate the capabilities of advanced communications in a variety of business and public service sectors, and will allow the advantages in terms of efficiency, reliability, and environmental impact reduction to be evaluated. They will enable common interest groups to experiment with emerging technologies, to address structural and regulatory constraints to better use of advanced communications, to identify 'best practise' and to evaluate the impacts of societal evolution to an 'information economy', with de-centralized collaborative working and small business networking.

It is expected that the main technology development activities will fall in the following six areas:

1. Interactive digital multimedia services

Multimedia services, including television, have a strong impact on the socio-cultural life of society. European standards and multi-lingual services are essential for social cohesion in Europe, and a strong multimedia sector will create new employment opportunities. Digital systems will allow better use to be made of existing infrastructures for TV distribution, and will enable the provision of increased image quality and definition (to HDTV and beyond). They will make it possible to increase the number of programmes, to increase the number of sound channels for multi-lingual programmes, and to create advanced interactive audio-visual services.

The objectives of the work will be to stimulate and coordinate the emergence of European interactive digital multimedia communication services with a view to their widespread introduction from 2000.

The aims will be to enable the integration of existing broad-band services, including terrestrial, cable and satellite TV distribution, with the public switched digital services (ISDN and GSM) for interactive multimedia services, and to enable network development towards fully symmetrical interactive multimedia services. The work will aim to increase the efficiency of frequency spectrum use, increase the number of channels and quality of service available on all TV distribution networks, and develop technologies for flexible use of digital video communications, including ultra-high definition video, for a range of different purposes.

The work will make it possible to introduce new services: from specialist and professional telework support to public entertainment services. Enhanced interactivity is a prerequisite for 'pay-per-view' TV, more selective public information dissemination, on-demand training support, electronic information services for the general public, on-line feature-film access, 'video dial' (to view a recent TV programme) and viewer-profiled advertising and direct marketing. Switched video services will allow high-quality video telephony and video-conferencing to be provided to a wide range of organizations, including small business and private individuals. By enabling the linking of multimedia work-stations through high-speed digital networks, it will allow full motion video to be received and transmitted.

The work will involve development of digital technologies for cost-effective transmission and reception of different image resolutions for large screens and portable receivers, in a coherent digital image hierarchy. The provision of a powerful, flexible multiplex scheme will enable the different configurations of image and sound streams within one channel; it will provide means for access control at programme and channel level, and it will enable more efficient use of the frequency spectrum. Technology developments will include work on image and channel coding, service multiplexing, network management and access control. It will include development of systems for efficient frequency allocation; multimedia communication architectures; an interoperable set of source-coding systems for storage, transmission and display; common channel-coding

and modulation techniques for digital transmission, and advanced operating systems for management of multimedia communication services. The source- and channel-coding systems will be based on a digital hierarchy offering flexibility in service provision to match the viewing situation.

The work will also involve the development of advanced image compression systems for communication on bandwidth-limited media, and image analysis, understanding and generation for advanced services such as 3D-video communication and 'Virtual Presence'. It will involve development of stereoscopic and 3D presentation technologies; advanced image capture, editing, storage and retrieval; and advanced interaction techniques for digital video services.

The work will make a major contribution to European common functional specifications and standards, particularly in the area of multimedia communication protocols, and image coding, and will permit the economies of scale that are needed for European industry to stay competitive in world markets.

2. Photonic technologies

The objective will be to stimulate and coordinate the introduction of integrated photonic systems, including development of the technological basis for deployment of fully optical networks ('Transparent Highways') in Europe by year 2000.

The work will exploit and build on the outstanding progress that has been made in optical communications in the last decade. Technology will be developed to use optic throughout the network, for both switching and transmission, avoiding unnecessary conversion between photonics and electronics.

The work will include development of techniques for multi-gigabit bandwidth provision (at minimal cost, bit-rate and distance independent), optical switching technology, optical signal processing and control. Migration paths and timescales will be established for the evolution from present-day networks, based on electronic switches, to the future hybrid and all-optical networks. Radically new concepts in design, network management and control of photonic networks will be developed. The fundamental advantages in physical properties that photons possess compared to electrons will be demonstrated in realistic applications.

New concepts in quantum optics, non-linear dynamics, femtosecond technologies and optical processing will be used to achieve the next generation of technological break-throughs and to provide terabit bandwidth capability beyond 2000. The necessary cost reductions for broad-band access will be made, to take full advantage of the 'Transparent Highway', particularly for customer network interfaces and interfaces between the fixed network and mobile services. The design and development of the new network infrastructure and interfaces will be closely linked with the broad-band services they will support.

3. High-speed networking

The objective is to provide integrated high-speed multi-gigabit networks by 2000 to leading-edge users in European industry, research organizations and universities, and to prepare for the Europe-wide mass deployment of these networks.

The technology and system development will support broad-band services, including videophones, teleworking, multimedia and social care. It will cover customer premises networks, public networks, and corporate networks; from basic technology development through to pilot implementation and advanced services.

It will involve a phase of *user-led definition activities* to outline the network services and the network infrastructure essential to support advanced applications. The activities will include a thorough analysis of usage planning, system design, implementation, management and supervision issues. The different technology and economic options will be mapped with network topologies and architectures. This will be followed by a second phase, *developing* the missing elements and integrating them with the results of R&D in the other areas. It will cover all the networking issues required for high-speed communications (protocols, routing and congestion management). The ATM (Asynchronous Transfer Mode) technologies developed in RACE will be a starting point, but they will be extended to higher speeds and capacities.

In a third phase, *interconnecton trials and demonstrations* will be supported. They will promote the use of reliable, high quality and secure broad-band network services and stimulate timely and coordinated

infrastructure deployment. These activities will also nurture progress towards the resolution of trans-border regulatory issues. The trials will be used to evaluate network management and operation, reliability and flexibility parameters. They will form a comprehensive test infrastructure based on the interconnection of islands and support a wide range of advanced applicatioins and services. Throughout, the various technologies will be aligned with evolving user requirements to raise user-acceptability.

4. Mobility and personal communications networks

The objective will be to accommodate the foreseeable demand for personal communications beyond the year 2000 and to permit the European industry to retain its leadership position in this area.

The dominant aspect of future telecommunication networks will be their capability to provide a wide range of telecommunication services to an ever increasing number of mobile users. It is expected that future requirements for personal communications will reach unprecedented levels, and the demand for a 'Personal communications space' will require radically new, expanded and spectrum-efficient networks, infrastructures and equipment.

The work will focus on operational trials and on the technological aspects of integrated fixed and mobile broad-band networks that have a direct bearing on the provision of enhanced personal communication services.

The trials will validate the wireless sub-system and network components in a variety of environments (office, residential, and factory). It will demonstrate cost/effective applications and services in such environments, validate the integration of different networks and services, and prove interface effectiveness. It will also involve the development and proving of maintenance procedures, reliability testing and end-to-end quality-of-service management. The work contribute to development of common specifications and standards, as well as to the identification of new market opportunities and needs for changes in regulatory procedures and equipment specifications.

The work will specifically address the following two main areas:

For mobile broad-band systems and services, technological developments will concern miniaturization, component integration and packaging techniques for low-power portable transceivers, for transmission, reception, display and local processing of multimedia information. Broad-band radio technologies will be developed for cost/effective transmission/reception of interactive and distributive multimedia information over wireless networks, including satellite and local area networks, with optimum use of the frequency spectrum. Advanced electrical/optical technologies will be used to permit 'radio-over-fibre' and the development of novel mobile network architectures using low power distribution points and base stations. Novel multiple-access techniques will be developed, together with associated coding and compression technologies, to meet the requirements for the reliable and secure transfer of very large volumes of information at speeds commensurate with those of fixed broad-band networks. Critical technologies will be developed for integrated satellite and terrestrial networks; signalling and transmission protocols will be developed, and assessments will be made of their capacity and coverage requirements. Standardization will be supported through development of common functional specifications for the integration/interworking of mobile broad-band networks (land and satellite based) with fixed networks.

To develop the concept of a 'Personal communications space', advanced technologies will be investigated for personal authentication, security and privacy through the use of voice recognition schemes and/or personal smart cards. Advanced broad-band integrated network management techniques will be developed for location/registration management and subscriber database management. Man/machine interfaces and common operational procedures will be developed for personalized service profiles, service and network access, call connection, service control and billing.

5. Intelligence in networks and service engineering

The objective is to develop technology for flexible and real-time management of communication assets, reflecting the requirements of users, service providers and network operators for solutions which can evolve organically with user needs, market evolution and technology changes.

The specific aim of the work on *intelligence in networks* is to equip the communications networks with the build-in features required for real-time communications management, including networks, services and user access.

The R&D on service engineering will advance the concepts of modular standardization of service components and building blocks, as a basis for cheaper, quicker and more responsive development of services. Modular standardization is the basis for re-usability and sharing of assets. It is also the pre-requisite for future-proof investments as it de-couples the technology from the functions and its integration in the realization of a given service or application.

This work will therefore contribute to the fast and flexible introduction of new services in advanced broad-band networks, and effective network management and service deployment in a diverse and competitive communication environment. The expected impact will be to speed up new service provision by at least one order of magnitude, thereby creating early market opportunities for new services. For the user, the impact of service engineering will be the ability to have more control over the services and communication media used: to combine voice, data and video in the form needed at a given time.

The software and system development will be carried out in the context of application trials, involving end uses, service providers and network operators. It will involve the development, assessment and validation of architectures, methods and tools, the integration of service components, and network and service management techniques. Self-learning and self-healing management systems for 'adaptable networks' will be developed and tested.

Work on the *reduction of the service development cycle* will focus on the whole provisioning cycle, from the identification of needs to the creation and deployment of services in the network. Particular attention will be given to transparent and reliable service introduction in real operational environments. The work will involve the development and testing of new service concepts which take advantage of increased bandwidth and intelligence in networks and increased mobility of users. Application programming interfaces will be developed and their validity tested. The work will take account of the heterogeneity of networks, migration to integrated networks, user mobility, the evolution to re-usable service components, and resource-hungry services, such as Virtual Presence. Techniques will be developed for rapid service conformance testing.

Work on *service engineering* will address new needs in an environment characterized by a rapidly growing diversity. The work will involve development of common functional specifications and codes of practise for integrated service engineering. Work on service creation environments will involve development of organizational frameworks and technologies for re-use of service components. Work on user issues will involve development of technologies and systems to increase user control of services, their integration, and use of resources; ergonomic research on use of services, and techniques for adaptive user-service interaction.

The work will be carried out in conjunction with that in area 6 on communications system safety, and security aspects of access to resources. Functional specifications and codes of practice arising from this work will support the standardization process.

6. Quality, security and safety of communication services and systems

The objective is to investigate and develop technologies for economically viable and operationally satisfactory solutions to requirements for services and systems that are of high quality, secure and safe.

Quality of Service, security and safety are closely related. Easy to use, reliable and maintainable solutions must be developed, within which security is one essential component. Information services require positive attention to the protection of information assets, both directly through the technology employed (functionality) and indirectly through the quality of the system design, development and operation (assurance).

The work will concern the public unclassified domain. It will therefore be relevant to most business sectors, public administrations and the public at large. It will be concerned with traditional requirements for integrity and reliability of communications (relating to the certainty that the information is as intended) and confidentiality (or privacy), as well as other features, such as non-repudiation (whether or not the originator is whom he claims, or that the addressee cannot subsequently deny receipt) and electronic signatures. This set of features, once publicly available, will allow the business community to perform most of their transactions electronically. In the area of confidentiality, it is recognized that solutions are required that are compatible with national security and the maintenance of public order.

The strong common links between Quality-of-Service, security and safety implies the development of a consistent technical approach. Trustworthiness implies both secure and safe networks and services. The

work will concentrate on technology developments to improve quality of service, security and safety throughout distributed information systems, paying particular attention to cost-performance. It will explore built-in early warning and fault/risk reporting techniques, as well as flexible response mechanisms. These will be developed, where appropriate, as a means of protecting public network-based services and applications against interference and loss of availability.

For better *Quality-of-Service*, technology development is a prerequisite for improved usability and reliability in multimedia and distributive services. The R&D will address new architectures for delivery of safe and secure broad-band services. For *secure communications*, R&D will address the flexible management of security in an open, world-wide network and service environment. For enhanced *safety*, technology development will be related to fail-safe mechanisms, self-healing and self-repairing networks and services.

The work will complement that in other areas of this programme and in other Specific Programmes and will include investigations, demonstrations, experiments and trials of integrated systems. The results will include Common Functional Specifications, Codes of Practice and contributions to standardization.

Horizontal actions

Consensus development and concertation of national and regional activities for stimulation and promotion of broad-band infrastructure and service development.

These actions, which will bring together work in each on the six areas, will include concertation between RTD projects, concertation with European standardization and strategic planning bodies (1), coordination with, as well as collaboration in appropriate cases, with COST and Eureka activities, and coordination with actions funded under the ERDF, EIB, EIF and Cohesion Funds.

Concerted actions and accompanying measures will focus on social and economic impacts of advanced communications. These actions will highlight opportunities for re-balancing of investments in both the public and private sectors between telecommunications and transport for energy saving and environmental protection. They will involve the identification and definition of advanced services for Europe-wide deployment, as well as their impact assessment. Special actions will be taken to increase the awareness of the advantages derived from the availability of new services.

Special actions in international cooperation.

Most business activities are world-wide, and telecommunications must therefore operate globally. The mergers that are going on in major industries, including telecommunications, emphasis this global dimension. Special actions to support international cooperation will focus on applications development and network management, and will be limited to areas of clear mutual and balanced interest. Particular attention will be given to synergies with the National Information Infrastructure initiative in the USA and with similar activities in Japan.

These actions will also provide a framework for stronger cooperation with initiatives in eastern and central Europe, as well as with the new Independent States of the ex-Soviet Union, including those funded under the PHARE and TACIS Programmes, and initiatives financed by the EBRD. At a time when eastern and central Europe is going through a very critical reconstruction, support for advanced communication experiments based on 'appropriate' technology, linking organizations in eastern and western Europe, will help speed up transfer of know-how, stimulate indigenous economic development and open up new opportunities for European business. Special measures will also be taken to facilitate the exchange of scientists and researchers between eastern and western Europe in the framework of some R&D projects and trials.

Special actions for dissemination and exploitation of results and for professional training in advanced communications technologies and service management.

These actions will include the organization of summer schools, seminars, workshops and support for selected international conferences. Provision will also be made for professional exchanges of scientists between the Member States of the Community, for limited periods of research in the projects.

(1) ETSI, CEN/Cenelec, Eurescom and ETNO.

An increased effort will be made to stimulate the effective exploitation of emerging technologies and services through a programme of public demonstrations and exhibitions.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area	ECU millions
1. Interactive digital multimedia services	150
2. Photonic technologies	112 (1)
3. High-speed networking	75
4. Mobility and personal communications networks	119
5. Intelligence in networks and service engineering	100
6. Quality, security and safety of communications services and systems	43
Horizontal actions	31 (2)
Total	630 (3)

(1) Of which 63 MECUs for fundamental research.
(2) Of which 6 MECUs for the dissemination and exploitation of results.
(3) Of which 40 MECUs (6,3 %) for staff expenditures and 25 MECUs (4,0 %) for administrative expenditure.

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

ANNEX III

IMPLEMENTATION PROCEDURES

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme the following precisions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

— in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country;

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. The programme will be implemented following definition of trials of advanced communications applications which will best contribute to a European growth, competitiveness and employment initiative. The work programme for research and technology development will be adopted in the light of the specific requirements of the trials.

The programme shall be executed through:

2.1. financial participation of the Community in RTD actions carried out by third parties, or by the JRC institutes in association with third parties:

(a) Cost-shared actions of the following types:

— RTD projects carried out by enterprises, research centres and universities, including 'Integrated action' consortia bringing them together within a common theme.

— Technological use stimulation aiming to encourage and enable the participation of SMEs through grants covering the exploratory phase of RTD actions — including a search for partners — and for cooperative research. Such grants will be made following the selection of outline proposals which can be submitted at any time;

— Financial support for infrastructures and installations necessary for trials and coordinated actions (re-inforced coordination actions).

(b) Concerted actions which consist of the coordination, notably through 'concertation networks' of RTD projects already financed by public authorities or private organizations. Concerted actions may also serve as the necessary coordination for the operation of common interest groups which, through cost-shared RTD projects (cf. 2.1(a) first indent) bring together around the same technological or industrial objective, manufacturers, users, universities and research centres.

(c) Specific measures such as those in support of standardization, and measures aimed at the implementation of facilities of general value to research organizations, universities and enterprises. The Community participation may cover 100 % of the costs of these measures.

2.2. Preparatory, accompanying and supporting measures such as:

— Studies and analyses in support of the present programme, or the preparation of possible future actions;

— conferences, seminars, workshops, or other scientific meetings or mechanisms, including inter-sectoral and multi-disciplinary coordination meetings;

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

— scientific publications, including those for the dissemination, promotion and exploitation of results (in coordination with the activities carried out within the third action);

— evaluations of the socio-economic impacts, as well as technological risks, related to the set of projects within the present programme. Close collaboration will be ensured with the programme 'targeted socio-economic research' in order to ensure an optimal exploitation and eventual use of the results of this work;

— training actions linked to the research covered by the programme;

— independent evaluation of the management and execution of the actions (including studies) in the programme

— measures to support the operation of networks for increasing awareness and decentralized assistance in favour of SMEs, in connection with the Euromanagement action — RTD audits.

The actions for diffusion and exploitation of results carried out in this programme will be complementary to those carried out in Action 3, and will be implemented in close coordination with them. Partners in RTD projects will constitute a key network for diffusion and exploitation of results. As indicated above, the actions will be reinforced by a programme of publications, conferences, results promotion, studies of potential techno-economic opportunities, etc. In order to ensure optimum exploitation of results, the factors liable to encourage use of results will be taken into account from the outset and throughout the duration of RTD projects.

Proposal for a Council Decision adopting a specific research and technological development programme in the field of information technologies (1994—1998)

(94/C 228/03)

(Text with EEA relevance)

COM(94) 68 final — 94/0081(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—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 130 i (3) of theTreaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted activities and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130 i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the area covered by this programme within acitivity I under the Fourth Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas information technologies increasingly underpin industry, services and other economic and social activities; whereas they are essential for the emerging information infrastructure and vital for the competitiveness of all industry and services; whereas information technologies help to enhance the quality of life and improve working conditions; whereas they require major research and development efforts calling for transnational cooperation, measures to disseminate and apply the results and training; whereas software, component and subsystem technologies, multimedia technologies, open microprocessor systems, high performance computing and networking, technologies for business processes, integration in manufacturing and the corresponding long-term research were considered priorities in Decision . . ./. . ./EC (Fourth Framework Programme);

Whereas this programme may contribute appreciably to increased growth, competitiveness and employment in the Community, as indicated in the White Paper on growth, competitiveness and employment [1];

Whereas the content of the Fourth Framework Programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this Specific Programme sets out the content of the activities to be carried out in accordance with this principle in the field of information technologies;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

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 small and medium-sized enterprises, in the Member States and between the latter and the corresponding Community RTD activities;

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

Whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular targeting small and medium-sized enterprises, and in particular those in Member States or regions which participate least in the programme, and schemes for promoting the mobility and training of researchers within this programme to the extent necessary for proper implementation of the programme;

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

Whereas an assessment should be made of the economic, social and environmental impact and any technological risks associated with the activities carried out under this 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 the indirect activities covered by this programme;

Whereas the JRC will also contribute, through its own programme of direct activities, to the attainment of the Community RTD objectives in the area covered by this programme;

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

HAS ADOPTED THIS DECISION:

Article 1

A specific research and technological development programme in the field of information technologies, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 1 911 million, including 7,2 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

[1] COM(93) 700 final, 5. 12. 1993.

Article 4

1. The Commission shall continuously and systematically monitor, with appropriate assistance from independent, external experts, progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the field directly covered by this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out the detailed objectives and specify the stages in the implementation of the programme and the corresponding financial arrangements.

The work programme may also provide for participation in certain activities within the Eureka framework.

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 consisting of representatives of the Member States and chaired by the representative of the Commission.

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

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

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.

If, on the expiry of a period of one month from the date of referral 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) shall apply to:

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

— the evaluation of the RTD projects proposed for Community funding and of the estimated amount of project funding, where this exceeds ECU 2 million per year,

— the measures to be undertaken to evaluate the programme,

— any changes to the indicative breakdown of the amount allocated set out in Annex II that has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

OBJECTIVES AND SCIENTIFIC AND TECHNICAL CONTENT

The Information Technologies Specific Programme fully reflects the orientations of the Fourth Framework Programme, applying the criteria for selection and specifying the scientific and technological objectives.

Paragraph I.1.C of Annex III to the Framework Programme forms an integral part of the Specific Programme.

The new focus of RTD in the Information Technologies Specific Programme 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 all industry and the employment situation in the European Union, and of enhancing the quality of life.

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, as well as the provision of societal services such as health, education, transport and entertainment. In addition to professional work-stations, 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: IT has enabled us to make very large amounts of information available — the next challenge is to enable us to make sense of it.

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.

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 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.

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.

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.

The programme will seek to be cohesion-friendly by providing interfaces for the use of Structural Funds in RTD. 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.

RTD ACTIVITIES

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 RTD modality 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.

A number of networks of excellence have already been 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 represent a major innovative modality in this specific programme. A cluster is a set of activities covering a number of technology areas but with a single well-defined goal. As well as collaborative research projects, a cluster may incorporate other kinds of activity, as its specific needs dictate. These may include networks of excellence, association of suppliers and users, cooperation with Eureka, coordination with national initiatives, international cooperation, dissemination of results, or training initiatives. 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 into account the complexity and cost of forming consortia and preparing proposals, and drawing upon successful past initiatives aimed at SMEs, including CRAFT and grants covering exploratory phases of activities. Networks of excellence, supplier-user collaborations and focused clusters provide further stimulus for SME participation.

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 semiconductors 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 of the future to the information infrastructure. The programme concentrates on the 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.

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, 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 domain is described in what follows.

SOFTWARE TECHNOLOGIES

The objective of work in this domain is to enhance Europe's software production capability, by stimulating the spread of software best practice 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 emphasised 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 thanm 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. Furthermore, all industrial countries are suffering a shortage of skills and a lack of well established industrial approaches. 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. However the development of dependable, extensible and usable systems with these characteristics presents 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 database systems; and advanced techniques for human-computer interaction. There will be close coordination with related work in other specific programmes. 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, and to establish international collaboration.

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.

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 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 midterm 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 impovements 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 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. 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 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 domain is to provide European industry with the technologies and capabilities to design and produce components and subsystems in three key areas: semiconductors, microsystems, and peripherals.

The on-time availability of low cost, high performance and high reliability integrated semiconductor 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 CD players 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, environmental 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 semiprofessional 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. 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.

Work on semiconductors 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, testing, manufacturing and equipment, will be supported. Some work may be undertaken in conjunction with the Eureka initiative. 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, for systems consisting of active and passive components; advanced system design methodologies and tools, for digital, analogue and mixed applications; electronic device technologies and system integration, in particular for advanced peripheral and storage systems, communication networks, optical computers, and microsystems; effective manufacturability of next generation ICs for small and large volume production; 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 industria 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 programme on industrial and materials technologies and with other specific programmes concerned. RTD will be directed primarily towards the technological needs of three major application fields: 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 processes 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); 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, microoptics, micromechanics and microchemistry, drawing on results developed elsewhere in the Framework Programme.

The potentially wide applicability of microsystems and the inherent difficulties in mastering microsystems technologies necessitate the creation of efficient Community-wide mechanisms for dissemination and technology transfer. 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 displays. Activities will be directed towards the development of low-cost high-resolution thin-screen display components, emphasising improvement in visual quality of displays, especially for portable equipment, and increased screen size and flatness. Active matrix LCD technology is of particular importance, exhibiting the most attractive features in term of colour and resolution, but other display technologies will also be addressed, such as field effect displays and ferro electric displays for very low cost and low power applications. Requirements will be defined through cooperation between the user and supplier industry. In the field of memory subsystems work will 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 will 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, a Special Interest Group 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 TECHNOLOGIES

The objective of this domain is to support strategic RTD in generic information technologies which underpin multimedia end-user systems and applications. Specific work will be undertaken on technologies for integrated personal systems, which represent one of the main market opportunities in the area of multimedia systems.

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. 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 customised 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, 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 domain 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 will be considerable convergence of the IT, communications, consumer electronics, information publishing and entertainment industries, a trend which will be fully taken into account.

The domain will provide generic and enabling technologies to allow the creation, manipulation, display, and storage of multimedia information. RTD includes the specification of appropriate components, for example video compression/decompression chips, high capacity optical memory and processors, and liquid crystal displays, and their integration into advanced multimedia systems; standards for multimedia storage, representation, and compression/decompression; and generic multimedia software. 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.

Work in the domain 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 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; 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. A Special Interest Group involving both technology suppliers and the authoring industry will provide information dissemination in both directions to support industrial cooperation, and to achieve consensus on 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 de 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 will be achieved through networks of excellence and upstream RTD projects.

Thematic networks of excellence will ensure that, in any one theme, a framework for coordinating RTD, technology transfer, training, as well as a common infrastructure is dynamically maintained by the technological community itself (suppliers, users and researchers). These coordination frameworks, in which the vision of industry would be the key determinant, are expected to play a central role in focusing RTD activities of both long and short-term nature.

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 but clear 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 in other parts of the programme. 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

The objective of the Open Microprocessor Systems Initiative (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 co-ordinate efforts in microprocessor systems RTD throughout the Community in order to provide the critical mass which will enable European industry to compete effectively world-wide.

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 by European companies of microprocessors, a viable European alternative should be provided as well as a smooth migration path from currently available to new technology.

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, both hardware and software. This includes high-performance microprocessors of 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 supercell libraries and systems software.

FOCUSED CLUSTER HIGH PERFORMANCE COMPUTING AND NETWORKING

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 pay 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 first 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, 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. 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 standardization.

A fourth set on software and systems technology will support the development of this new generation of user 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 addressed. 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 requiring a Community dimension will be supported and will help users to evaluate the opportunities and facilitate the accelerated uptake of HPCN technologies.

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 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 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. 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 as well as in styles of organizing IT will also be incorporated into the research.

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 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 tele-conferencing, 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 organising the storage, archiving and clustering of documents, and techniques for the retrieval of parts of documents, such as illustrations, citations, subparagraphs, and annotations.

Pilot experiments will be undertaken, together with activities in the field of best practice. 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 MANUFACTURING

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 throughout 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. 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 80's 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, 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. 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 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. 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. 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 States and international initiatives will be established as appropriate.

ANNEX II

INDICATIVE BREAKDOWN OF AMOUNT

(1 911 MECUs [1] [2] [3] [4])

		LTR	OMI	HPCN	TBP	IIM	Totals
Application specific		—	4 %	7 %	5 %	3 %	19 %
ST	14 %	4 %	2 %	4 %	3 %	6 %	33 %
TCS	23 %	4 %	4 %	1 %	—	2 %	34 %
MT	8 %	2 %	—	1 %	2 %	1 %	14 %
	Totals	10 %	10 %	13 %	10 %	12 %	100 %

KEY:

ST Software technologies

TCS Technologies for components and subsystems

MT Multimedia technologies

LTR Long term research

OMI Open microprocessor systems initiative

HPCN High performance computing and networking

TBP Technologies for business processes

IIM Integration in manufacturing

The table shows the indicative allocations to the underpinning technology domains, long term research, and the focused clusters.

The left hand column gives the indicative allocations to the underpinning technology domains. The five central columns show for each focused cluster the indicative allocation of funds to work with an application focus, and for each cluster and for long term research the indicative allocation to work related to each of the underpinning technologies. The totals for each cluster and for long term research are in the bottom row. The right hand column shows the overall totals for the work with an application focus, and for work related to the underpinning technologies.

The breakdown between the different headings does not exclude the possibility that projects could come under several headings.

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[1] Including expenditure on staff totalling 4,2 % and administrative expenditure totalling 3 %.

[2] At least 2 % of the total appropriations will be spent on training activities carried out as part of the programme.

[3] An amount of 19 MECUs from the total appropriations will be spent on dissemination and optimization activities carried out as part of or in conjunction with the other activities of the programme.

[4] An amount of 21 MECUs, which is the difference between the amount deemed necessary for the present programme and the amount foreseen for Information Technologies in the Fourth Framework Programme, is allocated to the 'specific RTD programme implemented by means of on the one hand direct actions and on the other hand S & T support activities carried out in the framework of a competitive approach.'

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results, will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out in the form of:

2.1. Financial participation by the Community in RTD activities carried out by third parties or by JRC Institutes in association with third parties:

   (a) Shared-cost activities:

      — RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;

      — technology stimulation seeking to encourage and facilitate the participation of SMEs through an award covering the exploratory phase of an RTD activity (including the search for partners) and through cooperative research;

      — support for financing the infrastructure or installations necessary for coordinated action (closer coordination).

   (b) Concerted action, which consists of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective under shared-cost RTD activities (cf. first paragraph of Section 2.1(a)).

   (c) Specific measures such as measures to encourage standardization and to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100 % of the cost of the measures.

2.2. Preparatory, accompanying and support measures:

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

   — conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidicisplinary coordination meetings;

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

— activities for the dissemination and utilization of the results, including scientific publications (in coordination with the activities conducted under the third area of activity);

— studies to assess the socio-economic consequences and any technological risks associated with all the projects under this programme, in close collaboration with the targeted socio-economic research programme;

— studies to assess the environmental impact of the activities in this programme;

— pilot and preparatory activities in collaboration with third countries;

— training activities related to research covered by this programme;

— independent evaluation (including studies) of programme administration and of the implementation of the activities;

— measures in support of the operation of networks for providing information and decentralized assistance for SMEs in coordination with the Euromanagement RTD audits scheme.

3. The activities relating to the dissemination and utilization of results carried out under this programme will complement those carried out under the third area of activity and will be implemented in close coordination with the latter. The partners in RTD projects are excellent vehicles for the dissemination and utilization of results. Back-up will be provided via publications, conferences, promotion of results, studies of technical and economic potential, etc. To ensure optimum exploitation, factors liable to encourage the subsequent utilization of results should be taken into account from the outset and throughout the RTD projects.

Proposal for a Council Decision adopting a specific research and technological development programme in the field of industrial and materials technologies (1994—1998)

(94/C 228/04)

(Text with EEA relevance)

COM(94) 68 final — 94/0082(CNS)

(Submitted by the Commission on 30 March 1994)

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,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of industrial and materials technologies; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130i(3) of the Treaty specifies 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 resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted activities, specific measures, and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130i(3), an estimate should be made of the financial resources needed to carry out this specific programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within the first activity under the Fourth Framework Programme;

Whereas Decision . . ./. . ./EC lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas a strengthening of cooperation in RTD concerning industrial and materials technologies is needed in order to develop technologies for the sustainable development of European industry;

Whereas this programme may make a significant contribution to growth, competitiveness and employment, as indicated in the White Paper on growth, competitiveness and employment [1];

Whereas Decision: . . ./. . ./EC (Fourth Framework Programme) lays down that a Community action is justifies if *inter-alia* research contributes towards strengthening economic and social cohesion within the Community and its harmonious development globally, while at the same time meeting the objective of scientific and technical quality; whereas this programme contributes towards meeting these objectives;

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 industrial and materials technologies;

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

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology stimulation measures;

Whereas coordination between research projects targeted towards common strategic objectives should be stepped up; whereas the establishment of thematic networks will permit greater synergy between fundamental research and industrial research and coordination with other European initiatives and programmes, in particular Eureka;

Whereas applied research relating to steel product and process innovation may gradually be taken into account in the context of this Specific Programme, given the forthcoming expiry of the ECSC Treaty;

Whereas the rules for the participation of undertakings, research centres (including the 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, in accordance with Article 130m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the European Economic Area (EEA) Agreement for the purpose of implementing this programme;

Whereas this programme also comprises support activities and activities for the dissemination and exploitation of RTD results, in particular vis-à-vis small and medium-sized enterprises (SMEs), and in particular 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 assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this programme;

Whereas progress within 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 within 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 the indirect activities 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.

[1] COM(93) 700 final, 5. 12. 1993.

HAS ADOPTED THIS DECISION:

Article 1

As specific research and technological development programme in the field of industrial and materials technologies, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 1 623 million, including 5,08 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1(3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the available resources needed for each exercise within the respect of the scientific and technological priorities defined by the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. It shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute towards the evaluation of Community activities as regard to Article 4.2 of the Decision concerning the Fourth Framework Programme, the Commission will proceed in due time through independent experts in the evaluation of activities done within the domains directly covered by this programme and their management during the five years preceeding the evaluation.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the programme and the proposed financial arrangements.

The work programme may also provide for participation in certain activities within the Eureka framework.

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 Commissionshall be assisted by a committee consisting of representatives of the Member States and chaired by the representative of the Commission.

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 that the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority provided for in Article 148 para. 2 of the Treaty as regards adoption 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 abovementioned article. The chairman shall not vote.

The Commission shall adopt the measures envisaged when they are in accordance with the opinion of the Committee. 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.

If, on the expiry of a period of one month 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) above shall apply to:

— the preparation and updating of the work programme referred to in Article 5 par. 1,

— the evaluation of the RTD projects proposed for Community funding and the estimated amount of the Community contribution for each project where this exceeds ECU 1 million,

— any adjustment to the indicative breakdown of the amount as set out in Annex II and which was not subject to budgetary decision,

— the measures to be taken for programme evaluation.

2. The Commission shall inform the Committee, at each of its meeting, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228(1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

OBJECTIVES AND SCIENTIFIC AND TECHNOLOGICAL 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 technological objectives set out in that programme.

Paragraphs 2.A, 2.B and 2.C of Annex III, (first activity) of the framework programme are integral parts of this programme.

OBJECTIVES

The globalization of markets, the greater international competition with newly industrialized countries, the increased cost of developing new technologies and the reduction of product lifetimes are forcing European industries to revise their cooperation strategies in order to master a broad spectrum of technologies and to ensure the cost-effectiveness of RTD efforts. In addition, in our changing society we are moving towards a different development model in which more importance is attached to the quality of life and more rational use of human and natural resources. In this context substantial R&D is needed to develop the technology for human-centred production systems taking account of human factors and based on clean technologies. This being the case, Community programmes may act as a catalyst in spurring medium to long term R&D and in supporting national activities and industrial efforts.

As indicated in the White Paper on growth, competitiveness and employment, boosting industrial competitiveness is one of the most effective means of maintaining and even increasing employment, this being one of the most urgent problems to be overcome if jobs are to be guaranteed for the coming generation.

Technological research may be a major factor in stimulating innovation in respect of products, processes and business organization, and underpinning and prompting new industrial activities which will ease the transition from traditional sectors to new, emerging sectors, for which Europe's export capacity is currently still limited. The Community's industrial research activity is particularly well placed to provide assistance where the best means of conducting R&D is to do so on the basis of multidisciplinary, cross-frontier cooperation, focusing on generic technologies which can rapidly be applied in different Member States and different industrial sectors.

In order to boost the effectiveness and impact of Community action, efforts will concentrate on the following areas: objectives, scientific and technical content, programme implementation and administration of research projects:

(a) Objectives: The programme, which is multi-sectoral and open to various types of industrial activity, will focus on the following three objectives:

— in the short term, priority should be assigned to research for the adaptation of existing technologies, or for the development of new industrial technologies, which provide competitive leverage, particularly in sectors where the level of technology is lower; small and medium-sized enterprises (SMEs) in these sectors account for a large proportion of European industry and provide the bulk of employment;

— in the medium term, research will focus on industries which are already developing innovative technologies and strategies allowing better use of human resources while endeavouring to reduce the adverse environmental impact of production;

— in the long term, research will focus on new technologies for the production and design of products which allow new industries or markets to be created in a context of sustainable growth.

(b) Content of the programme: research will concentrate on technologies needed by European industry in relation to critical stages of production systems and the quality of products:

— Production technologies for future industries: priority will be given to improving production systems, and area which provides numerous opportunities for technological innovation and the greatest potential in terms of lasting competitive advantages. In a context of respect for human beings and the environment, and sustainable growth, the research will cover new process engineering methods, new manufacturing techniques, new inspection, diagnostic and quality maintenance and assurance systems, research into component miniaturization within industrial systems and into emerging technologies (such as nanotechnologies), and the incorporation of new technologies, especially available information and communications technologies [1], into manufacturing centres taking into account the new production organization models. Special attention will be paid to business organization, the incorporation of technologies addressing social concerns, the health and safety of workers (working conditions) and environmental concerns (clean technologies, rational use of resources) whilst taking into account their economic and industrial impact.

— Technologies for product innovation through research into new techniques for the design and preparation of products, including engineering and civil structures, in the context of a rational use of resources, to reduce manufacturing costs and environmental impact, and improve quality, reliability and safety. The research will look into ways of improving the functional properties of traditional and advanced materials for new and improved products via innovative design and preparation techniques, as well as new technologies for the recycling and reuse of industrial products at the end of their life-cycle. Special attention will be paid to high-performance materials engineering and molecular engineering, in particular supramolecular chemistry. The principle of materials cycle optimization, avoiding the use of harmful materials, will be a common feature of the various research activities.

— Technologies for transport means: in support of the establishment of the single market and the implementation of Community policies, in particular the creation of trans-European networks, the development of new, faster, more reliable, comfortable and environment-friendly means of transport at competitive costs calls for a considerable amount of research at Community level, complementary to that undertaken in the preceding areas, concerning the incorporation and application of new design, manufacturing, modelling, simulation and maintenance technologies, and new advanced materials and environmental technologies. Particular attention will be paid to aeronautical research in order to ensure the continuity of the activities already undertaken and synergy with other transport sectors.

(c) With regard to programme implementation, the following three types of research activities will be carried out:

— industrial activities targeted on priority objectives of major strategic importance to the future of European industry taking into account user needs;

[1] The industrial technologies research programme will draw upon information technologies as well as other generic technologies with a view to promoting innovation and applications in manufacturing industry. In turn, it will provide inputs, knowledge, and expertise for the information and communication technologies (ICT) programme aimed at the development of new ICT solutions for advanced manufacturing and engineering processes. To ensure complementarity between the two programmes, close coordination and an active interface will be maintained.

— activities by and for SMEs: measures for technology stimulation, based on the CRAFT and Feasibility Awards experience, in order to encourage and facilitate the participation of SMEs, in particular those from less advanced regions; and

— know-how development and dissemination activities based on generic technologies and coordinated through thematic networks.

Stress will be placed on projects displaying multidisciplinary and multi-sectoral characteristics in order to ensure the development and optimum transfer of know-how and technologies, in particular those developed and used in the high-technology sectors, into basic industries adding more to GDP or into those which are the subject of industrial policy. This research will be organized around consortia of suppliers, manufacturers, end users, universities and research centres. Also, in order to help the steel-making sector, having due regard to its critical situation and in view of the expiry of the ECSC Treaty, research activities linked with steel product and process innovation may gradually be taken over in the context of this programme. Lastly, within its technical competence, complementary activities will be implemented by the CCR in particular in domains 2.1 'materials engineering' and 2.4 'recovering products at the end of their life-cycle' described hereafter [1].

(d) Project management: a major concentration of effort concerning the management of selected projects will be obtained by means of 'vertical coordination', which aligns closely with certain industrial sectors, and the 'network' approach, which is aimed at coordinating all projects on a given topic. Taking into account the fact that competitive advantages are obtained right from the basic research stage through the manufacturing or production process, including the design stage, efforts will be made to coordinate research projects around common industrial objectives in order to facilitate the incorporation of technologies and the transfer of knowledge and to encourage cooperation between suppliers, manufacturers and users and between industrial sectors. This will make for improved synergy between those involved and better coordination with the various other complementary Community programmes (in particular, information technologies, telematics, energy, environment, transport) and other initiatives at European level, and in particular with Eureka, which is more market-oriented, and with which joint seminars and an exchange of information between projects will be organized.

SCIENTIFIC AND TECHNOLOGICAL CONTENT

Area 1: Production technologies for future industries

1. *Background*

In accordance with the White Paper on growth, competitiveness and employment, action by the European Union should focus on technological areas and applications which will have an impact on a broad range of industrial activities and which are geared towards sustainable economic growth, the rational use of natural resources and the optimum use of human resources. This topic covers all manufacturing and processing industries. The challenge is to develop generic industrial methods and technologies and apply them to design, engineering, organization, production and the maintenance of high quality and high value-added, thus enabling European industry to remain in the forefront of technological innovation and to clear the way for future industries. The incorporation of new, advanced technologies into production systems, including infrastructures and plant, will help to boost industrial competitiveness and create new jobs by cutting costs, improving reliability and safety and shortening market lead times. It will also help to improve the environment and health and safety at the workplace.

2. *Proposed activities*

The research will aim at developing and incorporating the most advanced design and engineering tools. These enabling technologies will be applied within production systems in such a way as to meet the requirements of inter-company networks, and the need to optimize industrial plant, cost-effectiveness, product quality and manpower management. Increasing competitiveness by improving productivity, flexibility and quality will be a major aim; the research will look for a proper balance where there is a middle way between full automation and the use of labour alone. Stress will be placed on the integration of intelligent and computer-aided techniques, the latest developments in rapid prototyping, application of

[1] A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council Decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

cognitive engineering and microsystem technologies, the development of new organizational approaches, man-machine interfaces and the technologies required to deal with the critical aspects of production systems, and in particular those associated with clean, flexible and just-in-time manufacture. The concept of clean production puts a special emphasis on the efficient and hence more cost-effective use of energy and raw materials resources. Research efforts should therefore focus on reducing or eliminating polluting substances at source and reducing or avoiding the pollutants released into the environment.

Area 1.1.: Incorporation of new technologies into production systems

The need for production to be rapidly and continually adapted to changes in demand calls for flexible production systems and structures which include new technologies.

The main ways of making progress are to use new production technologies and information and management systems, and to take greater account of the company's environment. Moreover, the use of computer-aided design and manufacturing technologies (CAD/CAM), the trend towards microsystems and their incorporation in industrial products and processes are changing traditional industrial practices. Finally, optimization of performance, quality, environmental impact, employment, training and health and safety aspects must also be taken into account; the technical requirements in question should be addressed by research in the following areas:

— generic approaches drawing upon all the possibilities offered by new technologies, in particular computer-aided technologies (CIME), control systems, mechatronics or microsystems, with a view to optimum incorporation into production systems, for example in the machine tool or construction sectors;

— research into new manufacturing technologies (forming, assembling, micro-fabrication) which are better matched to user needs in terms of reliability and flexibility, and which may be used more efficiently for the building, maintenance and re-use of industrial systems and facilities;

— research into quality production systems based on the rapid identification, gathering and communication of manufacturing data or data concerning the use of industrial machines or facilities, defining production or service parameters or establishing references for the continual improvement of industrial processes.

Area 1.2.: Development of clean production technologies

In an integrated production system the overall quality of the final product increasingly depends on advances in materials science, process control and an understanding of the phenomena governing these processes. It is therefore necessary to develop the know-how needed in order to design and control increasingly complex processes, and in particular to develop and apply innovative and clean techniques. The European chemicals industry represents one of the most successful European industrial sectors, with a turnover of roughly ECU 200 billion. Despite its leading position it is under constant threat and still requires basic RTD — mainly in the field of environmentally friendly processes. The priority research topics should therefore be as follows:

— improvements in the design and control of increasingly complex industrial processes, taking account of progress in artificial intelligence, including the use of control strategies, increasing productivity and safety, and reducing the need for waste management.

— research into innovative chemical, biochemical and biotechnological engineering techniques, as applied to industrial processes, which boost productivity and performance through a better understanding of basic phenomena, while taking account of pollution prevention, recycling and process safety.

Area 1.3.: Rational management of raw materials

The rational management of raw materials must be seen in a world context in order to safeguard the supply of resources while respecting the environment. Given the importance of employment in this sector, emphasis will be placed on technologies aimed at maintaining or creating jobs in a context of safety, health and respect for the global system. The prevention of pollution, which improves productivity and at the same time allows more efficient allocation of resources, has become a crucial industrial parameter. Attempts will be made, in particular, to make progress on technologies for the disposal of problem wastes or the re-use of

waste. This means viewing industrial systems in their totality so as to optimize the total materials cycle from raw material to end product. The research will concentrate on:

— new technologies to ensure a sustainable supply of raw materials, especially in the field of mining and exploration;

— research into new processes and techniques used for ore treatment, and production of metals and industrial minerals in order to trim production costs and mitigate safety, environmental and energy problems;

— multidisciplinary approaches to the production, exploitation and use of raw materials, to make economic use of residues in production processes and to use them as secondary raw materials.

Area 1.4.: Safety and reliability of production systems

Within the Community one of the main industrial objectives is to ensure the safety of factories, mines, building sites, offshore installations etc., and the health and safety of the workforce or their families. That is why technological research must place emphasis on new methods of diagnosing potentially dangerous faults and the constant monitoring of the condition of plant, buildings, infrastructures and machinery. Also, efficient maintenance and the ability to intervene at the appropriate time, to ensure maximum plant availability, which has a direct impact on company viability, must be ensured. The most urgent research tasks will be:

— research into controlling the service life of production plant and systems, in connection with safety and reliability requirements, based on failure-mode analysis and optimization of inspection, monitoring, diagnostic, maintenance and repair techniques;

— research into new on-line inspection systems incorporating intelligent materials, sensors, actuators and microsystems and the use of advanced technologies, especially vision systems or available information and communication technologies (ICT), in order to monitor and perform diagnoses on large facilities, and to monitor production within the 'clean factory';

— research and development concerning the application of integrated and expert systems for inspecting and monitoring products and industrial processes, in particular by incorporating technological knowledge, improving performance and reliability and by means of the efficient integration of decision-making aids.

Area 1.5.: Human and organizational factors within production systems

One of the major challenges facing industry is to improve business organization and man/machine and man/factory interfaces. There are many process-control situations where the use of a system is restricted by its operator's level of confidence — or otherwise — in the information given to him or her. The solution is not simply more automation, but systems which the operator can understand and on which he or she can easily be trained. Likewise it means that operators must be freed from repetitive or unsafe work and be redirected towards more interesting activities. A major effort is needed to provide a degree and form of automation which is suited to the wide range of skills in the workforce and which will ensure that the operator at any level feels confident that he or she and not the machine is in control. As part of a total quality approach and to increase flexibility, new ways of addressing human and organizational aspects within production systems and labour will be taken into account, as well as research into innovative solutions. The aims of the research are as follows:

— improving the quality of production systems via research into ergonomics, technologies and work organization, account being taken of cultural factors, operator skills and the inherent requirements of the job itself;

— improving working conditions, health and safety, man/machine and man/factory interfaces, by means of harmonization of codes of good practice in company organization and the optimum harnessing of advanced manufacturing, processing and construction technologies;

— research into planning and logistical methods and their incorporation into industrial enterprises and their environment.

Area 2: Technologies for product innovation

1. *Background*

The competitiveness of European industry will depend on the ability to make new products with a higher added value reflecting the increasing level of quality demanded by the market. This objective can be

achieved by developing new design and engineering methods based on the life-cycle of products and aimed at reducing the variety and complexity of materials, costs and production times and increasing the quality and reliability of clean products reflecting environmental concerns and the need for sustainable growth. Materials research can help to provide new solutions capable of optimizing the application of various current technologies and to reduce the complexity of advanced materials themselves, harmful emissions, and even production costs by enabling materials to be recovered and re-used, which is particularly relevant to components with high added-value.

The industrial sectors in the field of materials and materials-related technologies constitute a key component of European industry. As an example, the advanced-materials sector alone will represent a market worth ECU 200 billion worldwide by the year 2000. Europe must maintain its presence in this strategic area, firstly by improving the processes generally used in the materials-working or processing industries (metal-working, building, textiles etc.), secondly by ensuring that the most advanced materials can be used cost-effectively by both traditional industries and the high-tech industries in producing the products of the future, and thirdly, by contributing to the competitiveness and balance of the global system.

2. *Proposed activities*

By adopting an approach which takes account of the entire product life-cycle, the research activities should seek to harness the best and most appropriate means of ensuring the conservation of resources and satisfying consumer requirements in order to make quality products at a reasonable cost and to act responsibly with regard to the environment and to minimize social exclusion. Priority will be given to research topics relating to product design and manufacturing based on improved or advanced components and materials (and in particular intelligent materials), clean treatment processes and, in the longer-term, processes of an exploratory nature which may quickly yield practical applications and thereby strengthen European industry's technological lead, above all by identifying the products of the future. Examples of this are molecular engineering and biotreatment, new technologies which were not in existence 10 years ago and which are expected to play an important part over the next 10 years. The activities will also concern manufacturing processes making it possible to improve the properties and functionality of traditional materials, possibly resulting in the generation of new products. The programme will also place emphasis on the treatment of waste, and on product recycling and reuse based on product life-cycles, and will include projects relating to the quality, ease of use and reliability of products.

Area 2.1.: Materials engineering

Advanced materials are used in industrial components and their characteristics often determine the critical threshold for increasingly complex systems such as propulsion units, or electronic, mechatronic or medical devices. Account must be taken of their behaviour throughout the product life-cycle. Often the progress made in materials research sets the speed at which the key sectors of the economy can develop. This is particularly true for the high-tech sectors but it also applies to basic industries such as chemicals, construction or mechanical engineering. Therefore, RTD in advanced materials engineering (e.g. molecular engineering), or in more forward-looking areas is essential to the future prosperity of industry. However, market demand is forcing industry to reduce the use of excessively exotic materials and try to improve existing traditional and advanced materials. Research and development should focus on the following areas:

— innovations and integrated approaches to techniques for the preparation and treatment of materials, including traditional materials, (e.g. near-net-shape production, powder metallurgy, surface treatment, etc.) aimed at improving the properties and functionality of materials, process efficiency and product quality;

— functional and intelligent materials with a view to obtaining more efficient products for multisectoral applications in electric motors, actuators, sensors and other electrical or mechanical devices, including superconducting materials;

— multidisciplinary research into materials aimed at enabling natural materials to be used cost-effectively in industrial products, at eliminating harmful substances, at increasing their suitability for recycling and at predicting the effects of repeated recycling on the structural and functional characteristics of materials;

— research into the synthesis of new, high-performance materials and chemicals using, for example, computer-aided technologies in order to incorporate specific properties into materials, and minimizing

their impact on the environment and health, in particular through their biodegradability and suitability for recycling and re-use;

— support for the development of products and materials of the future, in particular using molecular engineering and supramolecular engineering; research will also focus on biotechnology materials aimed at industrial products and processes, in coordination with the Specific Programmes in the domains of biotechnology and agro-industry.

Area 2.2.: New methodologies for product design and manufacture

The competitiveness of manufacturing industry will be improved through optimum use of new technologies and improved synergy with knowledge-based activities (such as services, engineering and training). The challenge in particular is to reduce the lead time between the design and marketing of a new product or process. Market competitiveness is increasingly determined by the time factor. This means that engineers must deal with the design and planning of production and marketing at one and the same time. However, research into the optimization of performance also has to consider the entire life-cycle of products and processes, and thus has to endeavour to solve all the related problems. Up to 75 % of life-cycle costs and over half of reliability and quality problems arise during the critical product design period. The design of products with a very high added-value and for products of the future calls for research centred on the following points:

— research into, and application and incorporation of new design and engineering methodologies, in particular by making use of recent developments incognitive engineering and computer-aided technologies (CAD), and rapid prototyping, account being made of the planning and implementation of the critical stages of production systems and of the whole product lifecycle;

— research into methods of analysing and modelling phenomena connected with the transformation of materials (e.g. solidification) and product behaviour (e.g. deformation, vibration);

— support for product innovation by developing multidisciplinary approaches involving comprehensive research into materials, design and manufacturing methods, effects on employment and health and safety in the workplace, quality control and products recycling in order to improve cost-effectiveness and reduce environmental and social impacts;

Area 2.3.: Reliability and quality of materials and products

Linked with the need for increased reliability, safety, health protection and cost-effectiveness, the need for a deeper knowledge of material, component and product behaviour is of growing importance. This area, studied at length in the past, is becoming increasingly important given the current economic, social and environmental challenges. The research topics in this field — mainly in the form of coordination activities — should be:

— studies combining microstructural and macrostructural modelling, improving detection of microdefects and enabling the phenomena involved to be understood and improvements to be made to the reliability and safety of materials;

— multidisciplinary approaches in order to control the deterioration of products, structures and industrial components (corrosion, fatigue, etc.) based on the modelling of actual behaviour and a better understanding of materials property relationships and how these affect ultimate behaviour;

— development of new approaches to guarantee the quality of products and materials.

Area 2.4.: Technologies for recovering products at the end of their life-cycle

In the past, technological advances often had adverse effects on the environment during the materials treatment phase, the manufacturing process or the disposal of obsolete products. However, it is possible to develop materials, processes and products which satisfy both the needs of the economy and of the environment in accordance with society's demand for sustainable development. Science and technology now offer opportunities for designing products taking into account the entire life-cycle and the re-use of materials at the end of the life-cycle. This means that research efforts will focus on the design of new products and materials which can continually be recycled and the development of new products with a longer lifespan, e.g. using repair, partial or total re-use techniques. Research will focus on the following as a matter of priority:

— support for research into new product design methodologies and technologies based on the possibility of re-using or repairing products, in particular by simplifying assembly and disassembly and reducing the number of components and the diversity of materials in a product;

— new techniques for recovering and recycling materials from products at the end of their life-cycle, and quality assurance methodology to satisfy standards or specifications for re-use;

— more research into cost-effective and safe construction, repair and disassembly techniques allowing the total or partial reuse of components of industrial systems, structures and products.

Area 3: Technologies for transport means

1. *Background*

European integration and current trends in the economy are creating a growing demand for flexible and efficient transport systems. The progress made by the various modes of transport is doubtlessly contributing to the economic development of the regions and European countries, particularly those situated at the periphery, but at the same time it is increasingly exacerbating current environmental and mobility problems. The environmental impact of the various modes of transport is a factor which limits the growth of this sector of activity. Society will accept the future modes of transport if medium and long-term solutions are found to the problems of energy consumption and local and global pollution. The rational use of the different modes of transport is the key element in bringing about improvements with regard to capacity, energy consumption, cost-effectiveness, comfort, quality, safety, volume, speed, and environmental compatibility, in liaison with the other European policies concerning industry, transport, environment and energy. This is particularly true as regards the aircraft, motor vehicle, rail and maritime industries.

2. *Proposed activities*

The main objective is to strengthen the scientific and technological base of European industry concerned with the production of means of transport. The research carried out in this domain will be closely coordinated with that in the two preceding domains and with the other specific programmes and, in particular, telematics, energy and transport. In the case of the aeronautics, automotive, railway and shipbuilding industries, research will focus as a matter of priority on design, advanced materials, and the production and maintenance of advanced means of transport in order to improve their cost-effectiveness, quality, capacities, time to market and environmental impact. Special attention will be paid to aeronautics research with the objective of responding to the needs of the aeronautics industry and enable it to demonstrate the feasibility of advanced generic technologies capable of being applied to other transport sectors. Actions previously undertaken will have their continuity assured within the specific programmes of the Fourth Framework Programme according to their content.

The competitiveness of each transport mode will depend on the ability to produce vehicles at competitive costs and ensure passenger safety, ease of access and comfort under optimum conditions of speed, range, reliability and efficiency. The vehicles of the future will also have to meet new needs arising from the creation of the trans-European networks foreseen in the White Paper. To this end, research and development will focus on the following areas:

3.1. Vehicle design and systems integration

Excellence in design is one of the primary means of improving industrial competitiveness and profitability. Transport vehicles present a quite specific challenge in terms of design because of their multi-functional capability and dependence on the effective integration of, and interaction between, complex onboard and external systems. The research must therefore aim to bring together multidisciplinary modelling, analysis and simulation tools within an Integrated Vehicle Design environment, fully exploiting state-of-the-art high performance computing and multimedia communications technologies. Research should be carried out in the following areas:

— development of design tools and support systems for configuration and concept design of vehicles, equipment, subsystems and system interfaces, facilitating rapid and easy definition of users' needs and product specifications;

— development of methodologies for a vehicle design knowledge base, incorporating best practice with regard to materials, safety, standards, environmental protection, manufacture and maintenance, in order to optimize overall vehicle design;

— development of multidisciplinary analysis and optimization tools capable of supporting design/engineering decisions throughout the design cycle from initial concept design to final prototype validation. These will include, for example, modelling, manufacturing methods and whole life-cycle cost estimation;

— application of rapid prototyping techniques such as virtual reality and stereo lithography for the validation of design, simulation of component functionality and optimal vehicle operation;

— research into advanced materials, including steel and non-ferrous metal alloys, composites or multimaterials, in particular for high-temperature applications;

— research into light structures, including composite structures, to reduce the weight of vehicles and specific subsystems such as suspension, steering, transmission and auxiliary equipment.

3.2. Vehicle production

The production of transport vehicles varies considerably in terms of scale, volume and precision. The ability to respond to orders for individually customized vehicles is increasingly influencing competitiveness and favours a more modular and flexible approach to manufacture and assembly. The demand for vehicles which are lighter, faster, more efficient and yet competitively priced, necessitates the use of alternative structural materials such as composites, introducing new challenges for volume production and flexible assembly. Research in this area will therefore address:

— the development of modular, flexible and reconfigurable systems for the fabrication and assembly of components and subsystems manufactured from homogeneous or heterogeneous materials such as composites or advanced materials;

— the development of advanced materials production and fabrication techniques for niche applications in vehicles such as energy storage/converter devices, including batteries, alternative fuel tanks and ancillary equipment;

— development and validation of more efficient and cost-effective procedures for the quality control and testing of components of large complex structures.

3.3. Technologies to improve vehicle efficiency

The efficieny and cost-effectiveness of transport vehicles are crucial factors for an efficient transport system and the competitiveness of the respective supply industries. Research will address:

— the development of techniques for the design and production of highly energy efficient propulsion systems with low environmental impact and which require less maintenance;

— the development of modelling and experimental techniques to improve the understanding of complex aerodynamic, aerothermodynamic and hydrodynamic flow phenomena, including aspects such as combustion, laminar flow control, shock-wave propagation and structure-fluid interaction;

— development of shape optimization techniques aiming at drag reduction and improvement of vehicle stability and whole body dynamics;

— advanced, highly integrated, high-integrity information processing and control sub-systems for optimal vehicle operation, applying established information and communications technologies;

— development of methods and tools for propulsion/transmission integration, aiming at optimal propulsion efficiency.

3.4. Environmental technologies

As transport provision grows, criteria such as efficiency and economy need to be accompanied by reduced environmental impact. Research in this area is also concerned with user needs in terms of comfort, convenience and efficiency, with particular emphasis on measures to improve user acceptability. Related research topics will include:

— a reduction in the volume of emissions leading to an ultra-low or zero level of harmful atmospheric emissions, by applying variable cycle concepts and advanced combustion chamber design;

— the development of environmental monitoring techniques to detect *in situ* malfunctions liable to cause increased pollution;

— noise source identification and propagation path analysis, active and passive noise and vibration control;

— development of technologies to improve the dynamics, comfort and ergonomics of vehicles, including suspension systems, seating and baggage containment;

— development of new, lightweight equipment for improving passenger comfort, including air conditioning and pressurization.

3.5. Technologies for vehicle safety

The objective of this research will be to contribute to a significant improvement in transport safety by means of structured approaches that address the different components of the transport system, including vehicles, human aspects and operational infrastructures. This encompasses a combination of safety analysis and deployment techniques, cognitive research, vehicle repair and maintenance strategies, including the different approaches to operational and human management that underline the major factors affecting safety and performance. The research in question will include the development of:

— structured approaches for risk assessment of complex vehicles operation and their associated operational systems, leading to the development of computer-aided safety audit and analysis tools;

— passive and active safety techniques aiming at significant improvements in aspects such as vehicle crashworthiness and fireworthiness and occupant survivability;

— methods and tools to identify and control human errors, including data collection, error scenario development, contributing factor analysis and impact assessment methodologies;

— inspection techniques, repair and maintenance strategies for critical systems and components, including large structures and enabling feedback to vehicle design;

— development of simulators for operator training and behavioural response analysis, including electro-mechanical components and their integration with control system software.

3.6. Technologies for vehicle operation

An important component of transport system effectiveness is provided by the control of transport means and the operational systems within which the transport vehicles operate. Research in this area will address:

— advanced on-board vehicle command and control systems design, taking into account the requirements for their integration with navigation and communications systems, such as those developed in the telematics programme;

— development of integrated, intermodal cargo handling systems, enabling efficient and flexible transhipment and consignment tracking;

— advanced techniques and methods for predictive maintenance and real-time health and usage monitoring, including advanced non-destructive test techniques and smart structure concepts.

* * *

In the development of the abovementioned technologies, due account will be taken of the requirements of the various transport industries:

Where the aircraft industry is concerned, research will concern advanced technologies, in particular for environmental protection, to reduce both noise and polluting emissions, and, as regards design, to reduce overall energy consumption. The activities in question will aim to improve safety, increase the capacity of the air transport system, and facilitate the production, operation and maintenance of future generations of aircraft and equipment (complementing the activities foreseen under the telematics programme and the programme of research for transport policy).

As regards the motor vehicle sector, particular emphasis will be placed on efficient and flexible production technologies and the technologies needed to develop intelligent, clean and safe vehicles, taking into account the activities developed in the other Specific Programmes.

Turning to the railways, efforts will focus in particular on techniques contributing to intermodal operation and interoperability as well as the efficiency of high-speed and urban trains (including electric traction, and on-board control and command and braking systems).

With regard to the shipbuilding industry, efforts will focus in particular on the development of a new generation of vessels with specific automated and integrated functions (intermodal operation, interoperability and the interface with port infrastructure).

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Type of activity	Total
Technologies for future industries	35—39 %
Technologies for product innovation	31—35 %
Technologies for transport means	28—32 %
Total	100 % (1) (2) (3) (ECU 1 623 million) (4)

(1) Including 5,08 % for staff and administrative expenditure.
(2) Of which 3 % for preparatory, accompanying and support measures, including ECU 15 million for the dissemination and utilization of results.
(3) Including 5—6 % for coordination activities and 10—15 % for activities in respect of SMEs.
(4) A sum of ECU 84 million, the difference between the amount deemed necessary for this programme and the amount foreseen in the fourth RTD framework programme for industrial and materials technologies, is earmarked for the specific RTD programme to be carried out through direct action and science/technology (S/T) support activities in the context of a competitive approach.

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

   — in the Community or,

— in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out 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:

2.1. Shared-cost activities covering the following means of action:

— industrial RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common objective;

— basic research projects within thematic networks to be established, based on generic technologies of strategic importance to European industry, involving industrial companies, research centres and universities;

— technology stimulation to encourage and facilitate participation by SMEs by granting an award covering the exploratory phase of an RTD activity, including the search for partners, and via cooperative research. The award will be granted following the selection of outline proposals which may be submitted at any time.

2.2. Concerted action, whereby RTD projects already funded by public authorities or private bodies are brought together, in particular in concertation networks. The Member States will help the Commission to identify the laboratories or institutes which will be involved in the activities in question, 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 shared-cost research activities.

2.3. Specific measures aimed at establishing general instruments for research centres, universities and industrial companies, and measures in support of Community policies. In particular, these measures will concern the preparation and operation of thematic networks bringing together manufactures, end-users, universities and research centres on a single technological or industrial objective in order to facilitate the incorporation and transfer of knowledge, including less advantaged regions, and to ensure that greater account is taken of market needs. They may include the co-financing of exchanges of information or staff, specific training, conferences, workshops or seminars, and possibly the financing of coordination and concertation between research projects covered not only by the specific programme but also by other European programmes or initiatives (e.g. Eureka) or national programmes.

2.4. Preparatory, accompanying and support measures covering the following means of action:

Accompanying measures are intended to make the programme more effective by making it more accessible and enhancing its impact. They will dovetail continuously throughout the programme, and will be implemented in cooperation with complementary activities under the third area of activity of the research and development framework programme. Efforts will be stepped up to facilitate the incorporation of techniques and exchanges of knowledge between projects and sectors, and with other European initiatives such as Eureka or the European Space Agency (ESA) programmes. To ensure optimum exploitation, factors liable to encourage the subsequent exploitation of results should be taken into account from the outset and throughout the RTD projects. The measures will take the following forms:

— studies in support of this programnme 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;

— studies to assess the socio-economic consequences and any technological risks associated with all the projects under this programme, linked with the programme 'Socio-economic Research';

— Training activities related to research covered by this programme;

— independent evaluation (including studies) of programme administration and of the implementation of the activities;

— promotion of research results and support for their exploitation;

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD;

— bursaries and subsidies to facilitate technology transfer to industry in the context of current research contracts.

ANNEX IV

DESCRIPTION OF THE JOINT RESEARCH CENTRE'S (JRC) RESEARCH ACTIVITIES CORRESPONDING TO 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 contribution of the JRC to this sector is aimed at improving the competitiveness of European industry, conducted in close coordination with the corresponding shared cost action programmes. It will focus on prenormative research which, save exceptions, will be undertaken within the framework of networks of European bodies with interests and capabilities in this type of research and in association with standards organizations, in particular the European Committee for Standardization (CEN). This will guarantee that the overall requirements of industry are taken into account from the start.

Research into materials will be directed mainly at the following sectors, which have a prenormative dimension and good potential as enabling technologies, with an emphasis on clean technologies:

— ceramics, metals and composite materials: process development, study of interfaces and joints, improvement of technological properties, characterization and demonstration;

— surface modification and characterization technology: ion implantation and laser beam, protective coating, non-destructive evaluation methods;

— prenormative research leading to standards on material recyclability, including the development of a database on recyclable materials (ecological characteristics and estimation of useful life).

This research is aimed at acquiring, in close cooperation with the national laboratories concerned, the scientific knowledge necessary for these materials to be used industrially, and to provide the standards bodies with knowledge which is essential for standardization in this field.

Proposal for a Council Decision adopting a specific research and technological development programme in the field of standards, measurement and testing (1994—1998)

(94/C 228/05)

(Text with EEA relevance)

COM(94) 68 final — 94/0083 (CNS)

(Submitted by the Commission on 30 March 1994)

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,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of standards, measurement 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 specifies 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 resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted actions, preparatory, accompanying and supporting measures and specific measures;

Whereas, in accordance with Article 130I(3), an estimate should be made of the financial resources needed to carry out this Specific Programme; (whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within the first activity under the Fourth Framework Programme);

Whereas this programme may make a significant contribution to growth, competitiveness and employment as indicated in the White Paper on growth, competitiveness and employment [1],

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

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 only be achieved by using improved methods of measurement and testing;

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, measurement and testing;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas this programme and its implementation 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 small and medium-sized enterprises, in the Member States and between in the latter and the corresponding Community RTD activities;

[1] COM(93) 700 final, 5. 12. 1993.

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

Whereas, in accordance with Article 130 M of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the European Economic Area Agreement (EEA), for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular vis-à-vis small and medium-sized enterprises, and in particular those in 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 provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

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

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this programme;

Whereas progress with this programme should be continuosly 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 within 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 the indirect activities 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 research and technological development programme in the field of standarfs, measurement and testing, as set out in Annex I, is hereby adopted for the period from *(date of adoption of this programme)* to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 167 million, including 10,9 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1(3) of Decision . . ./ . . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the global evaluation of Community activities foreseen by Article 4(2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, instruct independent experts to carry out an evaluation of the activities in the fields directly covered by the present programme and of their management during the five years prior to the evaluation.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final

evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specifies the stages in the implementation of the programme as well as the proposed financial arrangements.

The work programme may also provide for participation in certain activities within the Eureka framework.

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 an advisory committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The representative of the Commission shall submit to the committee a proposal for the measures to be taken. The committee shall give its advice on the proposals, within the timescale set by the president in view of the urgency of the matter concerned, if necessary proceeding to a vote.

The advice shall be written in the minutes; in addition, each Member State has the right to ask that its position is recorded in the minutes.

The Commission shall take into account to the greatest extent possible the advice given by the committee. It shall inform the committee of the manner in which it has taken account of this advice.

Article 7

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

— the establishment and implementation of the programme of work foreseen in Article 5(1),

— the evaluation of RTD projects proposed for a financial contribution of the Community when the estimated amount of the contribution to a project is greater than 0,25 million Ecu;

— the measures to be undertaken to evaluate the programme;

— all adjustment of the indicative breakdown shown in Annex II, not having been made the object of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meeting, of the progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228(1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNICAL OBJECTIVES AND CONTENT

1. GENERAL

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.

Paragraph 2.d of Annex III (first activity) of the Framework Programme is an integral part of this programme.

2. SCIENTIFIC AND TECHNICAL 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 Commission's White Paper on Growth, Competitiveness and Employment.

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 process 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 technique and procedures to be used in demonstrating conformance. 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 EIC's who responded, 81 % had identified enterprise 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 harmonizations 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, not only needed 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 definition 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 (Single Market, environment agriculture, 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 other specific programmes (for example, Industrial and Materials Technologies, Environment and Climate, Marine Sciences and Technologies, Biotechnology, Biomedicine and Health, Agriculture and Food Technologies, Socio-Economic Research). 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.

In the domains which are within its competence, complementary actions will be performed by the JRC, in close collaboration with national laboratories, especially on standardization for the construction sector and the setting-up of new measurements and reference material (1). The distribution of the reference materials produced by the Standardization, Measurement and Testing programme will be assured by the JRC (IRMM).

3. SCIENTIFIC AND TECHNICAL 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. Technology stimulation measures based on experience with CRAFT activities and feasibility awards will be carried out to encourage and facilitate participation by SMEs and the less advanced regions.

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. The characteristics of the measuring and quality assurance systems to be employed at any stage of the research, design, development and production cycle depends upon the nature of the industry involved.

(1) A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council Decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

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 traceabilitiy 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 quality assurance procedures appropriate to their needs. When necessary prenormative 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 Paper 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 prenormative research to enable industry to comply with Community legislation.

— Support to 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. 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 measurements 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 addition, measurement 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 narcotics control in support of the newly established cooperation in 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 to quantitatively evaluate the conditions of physical objects and the efficacy of the methods proposed to protect them against environmental pollution and the ravages of time.

Where necessary, all the above activities would include the development of new reference materials and support to the establishment of laboratory networks.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Theme I: Measurements for quality European products	40—45 %
Theme II: Research related to written standards and technical support to trade	35—40 %
Theme III: Measurements related to the needs of society	20—25 %
Total	100 % (1) (2) (167 MECU) (3)

(1) Including 8,7 % for staff expenditure and 2,2 % for administrative expenditure.
(2) Of which 5 % for preparatory, accompanying and support measures, including 2 million ECU for the dissemination and utilization of results.
(3) A sum of 121 million ECU, the difference between the amount deemed necessary for this programme and the amount foreseen in the Fourth RTD Framework Programme for Industrial and Materials Technologies (Standardization, Measurement and Testing) is earmarked in the specific programme of RTD for activities to be carried out, on the one hand, by means of direct action and, on the other hand, by S/T support activities in the framework of a competitive approach.

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

However, for the purposes of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community,or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out in the form of indirect actions, in which the Community makes a financial contribution to RTD activities carried out by third parties or by JRC institutes in association with third parties:

2.1. Shared-cost activities, according to the following rules:

— RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common objective;

— technology stimulation to encourage and facilitate participation by SMEs by granting an award covering the exploratory phase of an RTD activity, including the finding of partners, and the cooperative research. The award will be granted following the selection of outline proposals which may be submitted at any time;

— support for financing the infrastructure or installations necessary for the realization of a coordinated action (reinforced coordinated activities).

2.2. Concerted actions, which consist of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies. Concerted actions can also include the requisite coordination of thematic networks which, through RTD cost shared actions (cf. 2.1 first paragraph) bring together manufacturers, users, universities and research centres around the same technological or industrial objective.

2.3. Specific measures necessary to supply short- to medium-term scientific and technical research for the development or application of Community policies including actions to be undertaken in collaboration with standardization organizations such as CEN/Cenelec/ETSI. These will include the establishment of thematic networks of excellence in the various fields covered by the Community's policies and a call for proposals open throughout the programme. To ensure a rapid response to the needs demonstrated in the call for proposals, as far as possible the participants in the shared-cost activities will be selected from the thematic networks on the basis of their expertise and of their availability at the time required. The Community's contribution covers 100 % of coordinating expenditure and up to 100 % of the expenditure on the shared-cost activities.

2.4. Preparatory, accompanying and support measures according to the following rules:

— studies in support of this programme and in preparation for future activties;

— 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;

— in liaison with the programme 'Socio-Economic-Research', studies to assess the socio-economic consequences as well as any eventual technological risks associated with all the projects under this programme;

— training activities related to research covered by this programme;

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD;

— independent evaluation (including studies) of programme administration and of the implementation of the activities of the programme;

— distribution of reference materials by a third party.

These measures will be carried out in addition to and in conjunction with the corresponding activities under the third area of activity of the framework programme for Community research and technological development.

The partners in RTD projects constitute privileged networks for the dissemination and utilization of results. They will be reinforced via publications, conferences, promotion of results, studies of technical and economic potential, etc. In order to ensure optimum exploitation, factors liable to encourage the subsequent utilization of results must be taken into account from the outset and throughout the RTD projects.

ANNEX IV

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 contribution of the JRC to this sector is aimed at improving the competitiveness of European industry, conducted in close coordination with the corresponding shared cost action programmes. It will focus on prenormative research which, save exceptions, will be undertaken within the framework of networks of European bodies with interests and capabilities in this type of research and in association with standards organizations, in particular the European Committee for Standardization (CEN). This will guarantee that the overall requirements of industry are taken into account from the start.

These activities are directly related to standardization and include:

(a) Prenormative research on reference materials and prenormative and normative research on reference measurements, in particular in the following sectors:

— preparation, characterization and certification of high-quality reference materials. International intercomparison exercises will be used to ensure adequate quality assurance and to facilitate harmonization;

— establishment of a common scientific basis for the chemical reference measurements;

— measurements and evaluation of basic data, improvement of their quality and accuracy using the experimental installations available and by making use of European and international collaboration, in particular through networks.

— The distribution of reference materials produced within a Community framework is assured by the Institute for Reference Materials and Measurements (IRMM). The results achieved by IRMM in establishing extremely accurate measurements have won it recognition as a reference centre. Intercalibration campaigns conducted by the IRMM among the network of all interested in the Community will provide each laboratory with an impartial and reliable evaluation of the quality of its own measurements. This activity will be extended on request to any third-country laboratory, on payment of a fair fee.

(b) Prenormative research in the field of structural safety and reliability to improve the design specifications of civil engineering works for the development of standards (Eurocodes), in particular, by taking into account earthquakes, and the construction technologies of European industry. This research will continue to be conducted with the organizations in the Member States which have been grouped together since 1989 in the European Association of Structural Mechanics Laboratories. In order to carry out destructive dynamic tests on civil engineering works and industrial structures made of steel, concrete, brickwork and composite materials, the JRC has constructed the ELSA ('European Laboratory for Structural Assessment') test wall and the LDTF ('Large Dynamic Test Facility'), which are unique in Europe.

Furthermore, the development of non-destructive evaluation techniques to study the reliability and useful life of mechanical constructions will continue with a view to the development of component inspection techniques and the harmonization of qualification procedures. This research will continue to be conducted in the framework of the laboratory networks which have existed for a number of years, which will be gradually enlarged in line with needs.

Proposal for a Council Decision adopting a specific programme or research and technological development in the field of environment and climate (1994—1998)

(94/C 228/06)

(Text with EEA relevance)

(COM(94) 68 final — 94/0084(CNS)

(Submitted by the Commission on 30 March 1994)

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,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme of Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of environment and climate; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130i(3) of the Treaty specifies that the Framework Programme is to be implemented through Specific Programmes developed within each activity under the framework programme; whereas each Specific Programme must define the detailed rules for implementing it, fix its duration and provide for the means deemed necessary;

Whereas this programme may contribute appreciably to increased growth, competitiveness and employment in the Union, as indicated in the White Paper 'Growth, competitiveness, employment' [1].

Whereas this programme will be carried out mainly through shared-cost activities, but also through concerted actions and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130i(3), an estimate should be made of the financial resources needed to carry out this Specific Programme; (whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within activity I under the Fourth Framework Programme);

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) specifies that the overall maximum amount of the Fourth Framework Programme will be re-examined by no later than 30 June 1996 with a view to its being increased; whereas, as a consequence of that re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas the activities to be carried out under this programme will help to develop the scientific knowledge and technical competence which the Union needs in order to fulfil the environmental mandate confered on it in Part Three, Title XVI of the Treaty;

Whereas the content of the Fourth Framework Programme of 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 environment and climate;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Union and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas this programme will help to strengthen synergy between the RTD activities carried out in the field of environment and climate by research centres, universities and undertakings, in particular small and medium-sized enterprises in the Member States and between these and the corresponding Community RTD activities;

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

Whereas, in accordance with Article 130m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by

[1] COM(93) 700 final.

EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular vis-à-vis small and medium-sized enterprises, and especially those located in the Member States or regions which participate least in the programme, as well as activities promoting the mobility and training of researchers within this programme to the extent necessary for the proper implementation of the programme;

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

Whereas basic research in the field of environment and climate must be encouraged owing to the importance of a detailed understanding of their functioning of the design and implementation of a strategic approach to the lasting protection of the environment;

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this 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, in the resolution of the Council and the representatives of the Governments of the Member States meeting within the Council on a Community Programme of Policy and Action in relation to the Environment and Substainable Development [1], scientific research and technical progress were identified as one of the main instruments with which to implement this policy;

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

Whereas the JRC will also contribute, through its own programme of direct activities, 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 of research and technological development [and of demonstration] in the field of environment and climate, as set out in Annex I, is hereby adopted for the period from *(date of adoption of this programme)* to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 532 million, including 7,44 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1(3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continuously and systematically monitor with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4(2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the fields directly covered by this programme, and of their management during the five years preceding the assessment.

[1] OJ No C 138, 17. 5. 1993, p. 1.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the programme and the proposed financial arrangements.

The work programme may also provide for participation in certain activities within the Eureka framework.

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.

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.

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

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

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.

If, on the expiry of a period which may in no case exceed one month from the date of referral 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) shall apply to:

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

— the evaluation of RTD projects put forward for Community funding and of the estimated amount of funding where this exceeds ECU 0,35 million;

— the measures to be undertaken to evaluate the programme;

— any adjustment to the indicative allocation of the amount set out in Annex II which has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is hereby authorized, in accordance with Article 228(1) of the Treaty, to negotiate international cooperation agreements with European third countries not coverd by the EEA Agreement and with international organizations with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

Introduction

This specific programme fully reflects the approach embodied in the Fourth Framework Programme, applying its selection criteria and specifying its scientific and technological objectives.

Chapter 3 (introduction and Parts A and B) of Annex III, Activity 1 of the Framework Programme forms an integral part of this programme.

The programme incorporates the degree of continuity needed to maintain and develop the RTD capacity set in place during previous programmes. We now need to pursue and make use of the work to build up environmental RTD at European level, in particular by consolidating the establishment of networks of excellence.

As is made clear in the explanatory memorandum, however, the programme will focus on a limited number of themes and areas where action by the Union is justified.

The programme covers three themes: (1) the natural environment, environmental quality and global change, (2) environmental technologies and (3) space technology applied to environmental monitoring and research.

In accordance with the Framework Programme and the Commission's working document COM(93) 459, the research conducted on each theme and on the various areas which constitute them will have to meet the following criteria:

1. It must help strengthen the scientific base needed to implement the Union's environment policy by developing the strategic capacity for such implementation and by reconciling the notions of environmental protection and the sustainable management of resources with Europe's legitimate hopes for development and economic growth (themes 1 to 3).

2. It must help meet the objectives of the world programmes of research into global change (themes 1 and 3) by focusing on those aspects where only the intervention of the Union, in the form of large projects organized in concert with the Member States, is liable to produce significant results.

3. It must contribute to the development of environmental products, technologies, techniques and services which meet new needs and the exploitation of which could help to boost economic growth (on a lasting and sustainable basis) and create new jobs, as is stressed in the Commission's White Paper on Growth, Competitiveness and Employement (COM(93) 700) (themes 2 and 3).

These actions will be carried out on the basis of close cooperation between universities, scientific institutions and undertakings in the Member States, including SMEs.

Technology stimulation measures, based on experience gained in CRAFT activities and feasibility awards, will be introduced in order to encourage and facilitate participation by SMEs.

The programme will be implemented in close collaboration with the other specific programmes, in particular those on 'Industrial and Materials Technologies', 'Non-nuclear Energy', 'Agriculture and Fisheries', 'Measurement and Testing', 'Transport', 'Targeted Socio-economic Research', 'Telematis' and 'Marine Science and Technology'.

Complementary actions will be implemented by the JRC in areas where it is competent, in particular in the areas A I 'Climate change and impact on natural resources', B II 'Instrument, techniques and methods for monitoring the environment', B III 'Technologies and methods to protect the environment', also in Area C 'Space techniques applied to environmental monitoring and research', described below [1].

[1] A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council Decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

A. RESEARCH INTO THE NATURAL ENVIRONMENT, ENVIRONMENTAL QUALITY AND GLOBAL CHANGE

Area I: Climate change and impact on natural resources

1. *Dynamic processes in the climate system*

Objectives

(a) To work towards a better understanding and description of the basic processes of the climate system, particularly as regards their reciprocal influences on the global and regional scales.

(b) To improve climate models by taking account of and incorporating into them improved knowledge of key climate processes.

Research tasks

1. Analysis and description of land surface/atmosphere interactions and their role in the hydrological cycle, particularly on a regional scale.
2. Analysis and description of the coupling between atmospheric processes and oceanic circulation.
3. Analysis and description of atmosphere-cryosphere-ocean couplings and their role in the climate system.
4. Studies of radiative couplings, including the role of greenhouse gases, clouds and their dynamics, and aerosols.
5. The global cycles of greenhouse gases, their atmospheric balance and their fluxes and transformations in the oceans, the biosphere and the lithosphere.

2. *The climatic system in the past*

Objective

To contribute to the high-resolution reconstruction of climate conditions and environmental conditions linked to the climate with a view to enriching our documentation on the climate system and improving our understanding of the way it works.

Research tasks

1. Reconstruction of climatic and environmental conditions on a global and regional scale over recent climatic cycles (+/– 250 000 years).
2. Deep cores in old glacial strata and associated glaciological investigation. Modelling of ice rheology and glacia flow.
3. Reconstruction of the evolution of the climate and its variability in the Holocene and the late Holocene.
4. Analysis of the dynamics of climate change and the variability of the reconstructed climates.

3. *Modelling and analysis of climate change and variability*

Objectives

(a) To be able to describe the evolution of the climate and its variability over the coming decades and centuries.

(b) To help develop high-resolution scenarios of climatic and environmental change, for use in forecasting the impact of climate change.

To meet this objective, Europe's climate modelling centres will be associated in order that the scientific teams may have access to the latest models and instruments.

Research tasks

1. Development and validation of improved climate models.
2. Analysis and description of the present climate and its variability using global and regional data; dynamic assimilation of data and other advanced analytical techniques.

3. Analysis of the climate variability predicted by the current climate models; development and application of statistical methods suitable for validating the model forecasts in relation to actual data.

4. Development of models for the seasonal forecasting of climate parameters, including models for the seasonal forecasting of extremes (precipitation, drought); development of methods to validate these models.

5. Development of downscaling methods to achieve accurate simulation of weather variability (e.g. precipitation) with high spatial and temporal resolution. Development of improved forecasts of change in the type, distribution and frequency of meteorological extremes.

6. Study of feedback into the climate system of longer-term environmental change (decades/centuries), with particular regard to the hydrological cycle and changes in the biosphere.

7. Study of changes in average sea-level, statistics on sea-level, storms and floods, especially in areas subject to flooding.

4. *Impact on natural resources*

Objectives

To assess the major reactions and the elasticity of natural resources under pressure from man, as well as climate variability and change.

4.1. *European water resources*

Objective

To provide a full assessment of surface and underground water resources and develop strategies for their future management.

Research tasks

1. Assessment of the response of water resources to change, climate variability and more intensive exploitation; probable resource trends.

2. Development of methods to estimate, forecast and improve the availability of water resources following environmental change, especially in regions where there is likely to be a gap between availability and demand.

3. Development of techniques to re-establish and improve underground water reserves.

4. Assessment of the impact of a variation in sea level on water supplies in coastal regions and in relation to other factors.

5. Assessment and validation of techniques and methods of integrated management.

6. Development of techniques to re-establish the quality of surface and underground water which has been affected by pollution caused by agricultural practices or unsuitable land use.

4.2. *Agriculture, forests and the natural environment*

Objective

To study and assess the probable effects of climate and other environmental change on crops, forests and other land ecosystems and its consequences for land resources in Europe; to provide a basis for assessing the socio-economic impact of these consequences.

Research tasks

1. Analysis and description of the long-term impact of climate change and other human factors on natural vegetation and on agricultural productivity in Europe.

2. Development, validation and application of regional mechanistic models which describe the effects of changes to the climate and to parameters linked to the climate on forests and other natural ecosystems, taking into account other human factors.

3. Development of forecasting models to assess the reaction of biodiversity to long-term environmental change; development of a scientific base for *in situ* conservation strategies; establishment of criteria for optimization of the landscape structure with a view to preventing extinction and maintaining appropriate diversity.

4. Study of the particular effects of climate change on the northern forests and on marginal ecosystems such as tundra and taiga in the arctic and subarctic zones.

5. Integrated studies of the effects of the climate and of human factors on mountain ecosystems and establishment of links to assess socio-economic impact.

6. Study of trends in the risk of flooding and landslides in mountainous terrain (e.g. the Alpine region), as linked, notably, to the effects of a change in land use and to a change in snow and ice cover.

7. Development of models to assess the potential impact of increased UV-B radiation on the environment and on health.

8. Assessment of the way in which land use, through such activities as forestry, agricultural practices, urbanization, the collection and processing of waste, water drainage, concentration of specific industrial activities in coastal zones, tourism and civil engineering projects, can influence eutrophication and the contamination of aquatic systems.

9. Development of strategies to attenuate and manage the effects of the anticipated changes.

4.3. *Land resources and the threat of desertification in Europe*

Objectives

(a) To provide an integrated approach to understanding the process of desertification in Europe in the context of climate change. This will take account of the complex system of varying interdependent factors which lead to the deterioration of land resources in areas susceptible to desertification.

(b) To develop the scientific foundations for rational management of land resources in certain parts of Europe which are threatened or affected by desertification.

Research tasks

1. Integrated research to assess qualitatively and quantitatively the relative roles of the various processes involved in desertification: climatic, hydrological, biological and soil-related.

2. Modelling of the complex dynamics of the various processes concerned, on different spatial and temporal scales, in systems which are desertified or susceptible to desertification, including their repercussions on the climate, so as to predict the future course of the phenomenon.

3. Setting-up of suitable sets of data with which to detect any change and validate models; identifiation of indications of potential desertification.

4. Development and improvement of counter measures and strategies to control and reduce the deterioration of land resources in areas susceptible to desertification, including assessment of essential technological intervention.

Area II: Atmosphere physics and chemistry; Biosphere processes and consequences

II.1: Atmosphere physics and chemistry

Objectives

(a) To understand and predict the processes which are depleting the ozone layer in the stratosphere.

(b) To understand and quantify the chemical processes in the troposphere; to assess the contribution of regional processes (on a European scale) to environmental change on a hemisphere or planetary scale.

Research tasks

1. *Stratosphere chemistry and depletion of the ozone layer*

   1. Collection of data, interpretation and modelling of the dynamics of and trends in the chemical composition of the lower stratosphere at high and medium latitudes in the northern hemisphere; detection of the beginning and the extent of anomalies of a chemical nature and of the resulting loss of ozone; mapping of trends in ozone and trace compound concentrations in the lower stratosphere in time and space; assessment of the impact of chemically anomalous air being transported towards lower latitudes.

   2. Understanding and modelling of the homogeneous and heterogeneous processes which influence the distribution and spread of the active radicals of halogens, nitrogen and hydrogen in the stratosphere; study of the dynamics and composition of the air in the lower stratosphere; assessment of the incidence of and trends in solar UV radiation in Europe; assessment of troposhere/stratosphere exchanges.

2. *Troposphere physics and chemistry*

   1. Self-cleansing capacity of the atmophere: study of the chemical and meteorological processes which control concentrations of oxidizing compounds such as hydroxyl and ozone radicals, including the effect of aircraft exhaust emissions on the level of ozone in the atmosphere and the effect of emissions in the Mediterranean basin on the free troposphere in other regions.

   2. Identification of the origins of and the physio-chemical alterations to aerosol particles in the atmosphere and their interactions with clouds; studies of the properties and chemistry of clouds.

   3. Quantification of the role of natural emissions in atmosphere chemistry: release of volatile organic compounds by vegetation and their contribution to the formation of ozone, release of sulphur compounds through biological activity in the marine environment and biological release of reduced and oxidized forms of nitrogen (dinitrogen oxide and nitrous oxide); assessment of the impact of emissions from fossil fuels, e.g. using installations of the Europhore fumigation chamber type (European photoreactor).

   4. Characterization of 'chemical alarm signals' of global change in the atmosphere, such as the depletion of troposphere ozone in the Arctic and high winter concentrations of nitrogen dioxide and nitrous acid in towns.

II.2: Biosphere processes

Objectives

(a) To understand the processes taking place within land, aquatic and coastal ecosystems and the way and the extent to which they are disturbed by environmental change (including the effects of UV-B radiation).

(b) To understand the role of biodiversity in ecosystems; to understand the mechanisms which control the maintenance or evolution of biodiversity and how these mechanisms are influenced by environmental change.

Research tasks

1. *The functioning of ecosystems*

   1. Analysis of ecosystem processes; identification of disturbance to these processes following changes in environmental factors, but allowing for their variability in time and space.

      Emphasis should be placed on fluxes of chemical elements, water and energy within and between ecosystems (e.g. between land and coastal ecosystems), on the physio-chemical and biological mechanisms which control such fluxes, in particular the organic matter cycle, and on feedback processes (e.g. those which control gaesous emissions from ecosystems to the atmosphere, the absorption and release of carbon, etc.).

   2. Quantification of organic and inorganic pollutant fluxes within and between ecosystems; analysis of the behaviour and transformation of these pollutants and their effects on ecosystem processes.

3. Development of indicators related to the environmental effects of different pollutants and greenhouse gases. If necessary, these may be differentiated by region in order to guide the technological choices and strategies should there be an exchange between the emissions. Such research could contribute to the definition of indicators sensitive to the reduction of different pollutants.

4. Studies of the factors which control the stability of ecosystem structures, their adaptation and their resistance to environmental change.

5. Assessment of the effects of environmental factors on the key biological processes of plants and of microbe populations.

6. Development of functional analysis methods for the integrated management of ecosystems and selected habitats.

7. Determination and comparison of interactions and links between various process and impact phenomena at regional and local scales, such as the links between eutrophication and contamination, and changes in land use; impact of physical processes in contrasting situations.

2. *Alteration of processes as a result of UV-B radiation* [1]

1. Greater accuracy in the relationship between the dose, depending on the wavelength of the UV radiation, and the response, in cases with the most significant effects.

2. Identification of the mechanisms controlling the adaptation, tolerance and susceptibility of living beings at genotype and phaenotype level.

3. Quantification of the synergetic/antagonistic interactions between UV-B radiation and other aspects of global change, e.g. increased temperature and CO_2.

4. Assessment of the chain of secondary effects of UV-B radiation on ecosystem processes and on biogeochemical cycles, e.g. changes in composition, species associations, the speed of litter decomposition, etc.

3. *Biodiversity and environmental change* [2]

1. Understanding of the role of biodiversity in maintaining the structure, function and stability of ecosystems.

2. Understanding of the mechanisms which adjust biological diversity at the various organizational levels (molecule, gene, species, population, community); assessment of the impact of natural and human factors on these adjustment mechanisms and on biological diversity itself.

Area III: The human dimension of environmental change

1. *Socio economic causes and effects of environmental change*

Objectives

(a) To understand the main social and economic factors of environmental change at global and European level.

(b) To gauge the principal risks and impact of environmental change on the economy and society, and more specifically in the European Union.

Research tasks

1. Analysis of the relative contributions of the main economic activities and of social behaviour to environmental change at global and European level; development of appropriate ratings of environmental pressure and of models relating to critical interactions leading to environmental deterioration.

[1] The improvement of UV-B radiation dosimetry via the perfecting of measuring techniques is dealt with in Area II of Environment Technologies.

[2] The programme does not include research on the conservation or extinction of specific species or communities.

2. Assessment of the scale of the impact of environmental change on society and on such key economic sectors as agriculture, livestock breeding, industry, transport and tourism, with particular attention to regions characterized by great environmental and social vulnerability (e.g. coastal zones, urban zones, regions of high unemployment, etc.); development of measurements of socio-economic impact such as damages and avoidance cost; notion of consent to pay; indicators of quality of life, etc.

2. *Economic and social responses to environmental problems*

Objectives

(a) To identify and assess possible options in the field of social and economic action in response to critical environmental situations.

(b) To formulate economic and social criteria with which to assess progress in the realization of sustainable development.

Research tasks

1. Establishment of appropriate quantitative indicators of 'environmental sustainability', in space and time, in key economic sectors, with reference to the total stock of natural and human capital, ecological support capacity (including ecological diversity and the functioning of ecosystems), efficacy of materials and use of energy (industrial metabolism), and incorporating ethical considerations relating to the environment (e.g. fairness to and between present and future generations).

2. Development of the necessary instruments to evaluate and compare various instruments of environment policy.

3. Development of methodological approaches with which to incorporate environmental costs and benefits into economic performance indicators; establishment of key approaches to the application of accounting systems adjusted to the environment at several levels; improvement of techniques to internalize environmental costs; assessment of hypotheses and ethical implications, while stressing alternative systems of environmental assessment.

4. To provide support for lowering the methodological, political and institutional barriers to preventive management of the environment by developing appropriate techniques with which to integrate environmental aspects into such key sectoral policies as agriculture, development aid, energy and transport and by improving the economic efficiency and the scientific base of the environmental regulatory instruments (e.g. economic incentives, financial instruments, 'tradable pollution quotas'), release and quality of environmental standards, etc.

3. *Integration of scientific knowledge and economic and social considerations into the framing of environmental policies*

Objectives

(a) To analyze and improve the use of scientific knowledge and develop methods to deal with uncertainty in the framing of environment policies.

(b) To establish generic and interdisciplinary approaches to optimize the combination of scientific gauging of risk with socio-economic assessment of risk in environmental risk management.

(c) To step up the capacity to use environmental statistics with a view to drawing up the policies concerned.

Research tasks

1. Development of new approaches integrating scientific and socio-economic parameters into the management of natural and technological risks. To conduct case studies on complex problems involving several components of the environment with a view to studying and improving the management of risks integrated at local and regional level (e.g. the Mediterranean basin, wetlands, alpine regions, urban environment; waste and problems related to water management).

2. To assess and improve the methods and procedures for using scientific knowledge in the formulation, implementation and evaluation of environmental and other policies; to examine alternative approaches so as to take account of scientific uncertainty in the formulation of policies, and taking account also of such essential environmental principles as the 'principle of prevention'.

3. Development of models to establish links between damage to the environment and the other relevant physical and socio-economic variables. This will be achieved by improving the design and definition of information systems on environmental damage and of techniques for integrating environmental data.

B. ENVIRONMENTAL TECHNOLOGIES

Area I: Sustainable development and technological change

Objectives

(a) To understand the key parameters of environmentally sustainable technological development and its interaction with competitiveness and employment in the European Union.

(b) To develop methodologies to assess and maximize the contribution of RTD to sustainable development.

Research tasks

1. Develop and apply criteria (e.g. economic, regulatory, employment potential, social acceptability) for the specification of core technologies which promise competitive advantage as a result of environmental improvements: either by means of 'generic', innovations such as minimization of materials, improved product design, etc.; or by systematic assessments of possible technological responses to critical environmental problems (e.g. global warming, ozone depletion, biodiversity loss, water shortages, soil degradation, etc.).

2. Develop methods for cost-risk-benefit of evaluation of technologies which have a major impact on the environment, including integrated assessment approaches at the regional process and production levels (e.g. cost-benefit analysis, eco-audits, cumulative environmental impact assessment, industrial metabolism/life-cycle analysis, process re-engineering); incorporate sustainability criteria into the formulation, assessment and utilization of European RTD activities.

3. Elucidate the links between social preferences based on environmental considerations and technological change, e.g. social acceptability of technologies, societal preference for 'green' products; impact of new ideas on environmental protection such as life-cycle management, extension of producer liability, etc.; develop combined environmental/commercial performance indicators; undertake studies of successful approaches to sustainable development at the level of the company.

4. Elucidate the links between various types of environment policy instrument (legislation; market instruments) and their influence on technological development.

Area II: Instruments, techniques and methods for monitoring the environment

Objectives

(a) To help develop and improve analytical and monitoring methods for certain components of the environment with a view to better monitoring and forecasting of environmental change.

This contribution will be made (a) in the form of concerted actions, associating manufacturers and potential users of instruments, the JRC, in those areas which concern it, and the Measurement and Testing RTD programme; these concerted actions will aim to identify the needs of potential users and guide development work, and (b) through supplementary RTD projects in the areas not covered by the Measurement and Testing RTD programme.

(b) To develop procedures and methods for the identification and study of environmental change (land and coastal environments).

These objectives will, among others, aim to meet the needs of the European Environmental Agency.

Research tasks

1. Contribute to the development of highly sensitive rapid-response instruments for the ground or airborne measurement of the trace compounds of the atmosphere which cause important environmental phenomena (depletion of the ozone layer, changes in UV radiation, photo-chemical reactions, etc.).

2. Contribute to the development of analytical methods to identify and measure certain organic substances in industrial waste water.

3. Contribute to the development of biosensors for application in environmental monitoring where conventional methods prove inadequate, e.g. with respect to sensitivity, selectivity, precision, reliability, sample preparation, on-line monitoring, cost-effectiveness.

4. Development and validation of land, airborne and spaceborne methods and procedures for the early detection of changes in the continental and coastal environment and for studying the evolution of such changes.

5. Development of new technologies to provide improved dosimetry of UV-B radiation.

6. Development of new methods of environmental archeometry to permit the reconstruction of the environmental conditions of the past.

Area III: Technologies and methods to protect the environment

Objectives

(a) To develop methods for the identification, estimation, comparative assessment and management of the risks posed to the environment, natural resources and human health by industrial processes (regular activities and accidents) and products (including chemical products).

(b) To help develop industrial and synthetic products which pose fewer risks to the environment; to help develop, improve and apply the entire range of environment technologies, from preventive to remedial technologies.

This contribution will be made (a) in the form of concerted actions associating scientists responsible for analysing environmental risk, enterprises responsible for technological development, enterprises liable to benefit from technological development, the JRC, in the areas which concern it, the legislator and the 'Industrial and Materials Technologies' RTD programme, and (b) in the form of supplementary RTD projects in the fields not covered by the 'Industrial and Materials Technologies' RTD programme.

Research tasks

1. *Methods of estimating and managing risks*

1. Improvement of exposure assessment methods for hazards and risks to health and the environment from chemicals, (particularly for early indicators of exposure); the development of suitable effects assessment methodologies, including alternatives to the use of animals in testing. This research will include methods for exposure prediction. Key elements of this research theme include the validation of existing assessment and testing methods through improving both the quality of the data used and the scientific bases for their inherent assumptions, particularly the validity of the extrapolations used e.g. *in vitro* to *in vivo* tests, animal models to man, laboratory to field, high to low doses, specific populations to vulnerable groups, and from single exposures to exposures to mixtures of chemicals.

   Care will be taken to ensure consistency between these research activities and those undertaken under the 'Life Sciences and Technologies' programme as well as the work of the JRC's European Centre for the Validation of Alternative Methods.

2. Development of methodologies to analyse the complete life-cycles of industrial and synthetic products, their effects on natural resources, consumption of energy and their effects on the environment at the various stages of their existence, from raw material, through manufacture, up to the final use of products and their disposal in the form of waste; development of methodologies for comparing the impact of substitute products.

   Development of methodologies to assess the impcat of industrial processes on the environment, natural resources and energy consumption; development of a methodology for comparing the impact of alternative industrial processes.

   Atmosphere pollution will serve as a test case in which to integrate all the above aspects in a paradigm of risk management to control air quality, i.e. from characterization of emissions and assessment of exposure and effects, biomonitoring and risk analysis, to helping to develop control measures.

3. Better understanding of the mechanisms underlying the accidental release by industry of products which harm the environment or human health; development of safety management systems and systems to attenuate effects. Research should be geared primarily to materials and production systems which, owing to their high toxicity, their widespread use in industry or their physical properties (e.g. tendency to form clouds which remain close to the ground) cause risks which become

apparent far from their source. Work on this theme should be linked to the EU's policy on the prevention of industrial accidents and accidents in the workplace.

2. *Technologies to protect and rehabilitate the environment*

1. Contribute to the development and improvement of industrial processes and products so as to prevent or minimize their impact on the environment.

2. Contribute to the development and improvement of integrated technologies to minimize solid, liquid and gaseous emissions. The technological choice must be based on a thorough understanding of the exchange between pollutants.

3. Contribute to the development and improvement of new technologies for the recycling of materials, including their decomposition to re-usable raw materials and the recovery of energy and waste. Study of systems to encourage product recyclability.

4. Management of dangerous waste; development of safe procedures to process dangerous waste, including recycling of materials or recovery of energy to help make the operation profitable, where appropriate. Processing of residues to ensure they are detoxified, stable and safely disposed of.

3. *Technologies to protect and rehabilitate historical and industrial sites*

In accordance with European Union policies, research for the protection and preservation of the cultural heritage will be reinforced. The scientific base for the identification and assessment of the consequences of technology needs to be broadened. Research on this theme will be supplemented by assessment of the environmental risk factors (including the effects of tourism) for a range of materials, via the development and improvement of non-destructive methods of analysis and measurement, methods of mapping risks and damage, etc.

The programme will contribute to the development of technologies to rehabilitate polluted industrial sites and abandoned waste dumps; development of rapid, non-invasive methods to localize and measure contaminants and study absorption/desorption processes and the pathways and bio-availability of pollutants to help establish suitable practices for *in situ* rehabilitation technologies.

Area IV: Technologies to forecast, prevent and reduce natural risks

Objective

To contribute to the development of methodologies and technologies for the early warning, reduction and management of natural risks (seismic, volcanic, forest fires, meteorological and hydrogeological).

Research tasks

1. *Hydrogeological risks*

1. Development and validation of methodologies to prevent flooding on the basis of *in situ* data and remote sensing (radar systems, satellites), including the development of methodologies for the modelling of spatial and temporal distribution of precipitation, particularly in complex terrain. Development of and experimentation with flood models (water training models), including appropriate coverage of the behaviour of layers of snow and ice.

2. Improvement of the monitoring of landslides and of warning techniques. Monitoring and mapping of landslide risks.

2. *Seismic risk*

1. Development of advanced technologies to observe and analyse stress, strain and displacements in tectonically strategic areas with the aid of modern space technologies. Development of advanced instrumentation to localize and detect earthquakes.

2. Development of advanced automatic sensors for continuous monitoring and control of earthquake-related phenomena including effects on human habitat in tectonically strategic zones, appearing either during or before seismic activity. Integration and validation of warning systems and the systems referred to above, to forecast earthquakes and tsunamis. Improvement and harmonization of structures and technological devices for the acquisition, transmission, storage and exchange at European level of earthquake data.

3. Improvement of European data bases in the field of seismic risk.

3. *Volcanic risk*

   1. Development of and experimentation with automatic sensors for monitoring geophysical and geochemical phenomena. Development and validation of automatic systems to monitor volcano activity. Development of and experimentation with remote sensing techniques to monitor eruption clouds. Development of data processing methods to integrate these diverse sources of information (e.g. monitoring data and *in situ* geophysical and geochemical data).

   2. Development of mobile warning systems.

4. *Forest fires*

   1. Mapping of fire risk and assessment of fire damage by means of remote sensing; modelling of fire behaviour; improvement of the scientific base necessary for the development of tools to manage and reduce forest fires. Improvement of risk ratings, collection and analysis of statistical data on forest fires.

C. SPACE TECHNIQUES APPLIED TO ENVIRONMENTAL MONITORING AND RESEARCH

Area I: Methodological research and pilot projects

As a relatively new technique, Earth observation (EO) will require further research and development, as well as practical application, in order to reach its full potential to deliver benefits in the public interest commensurate with the on-going investment in the space segment.

Objectives

(a) To improve the European technical capability in EO data treatment and interpretation.

(b) To develop applications of EO data of European interest, and to improve the quality and cost-effectiveness of the derived information.

Research tasks

Research projects should focus on application areas which are relevant to the policies and interests of the European Union. Projects may be directly linked and/or support other research activities of the Framework Programme, particularly in the fields of the Environment and Marine Science.

A programme of cost-shared research will complement the direct action of the JRC by fostering improved cooperation between environmental researchers, EO scientists, value-added companies and the providers of space data.

1. Methodological research should aim to overcome specific problems currently inhibiting the use of EO data in a specific application, or should address basic scientific and technical problems relevant to a broad group of EO applications. Projects will involve the participation of both EO scientists and application specialists as appropriate.

   The following technical themes will be addressed:

   1. Development of new techniques and improvement of existing techniques to obtain useful geophysical information from EO data provided by new or existing sensors. Research projects will relate to specific application, notably in the fields of climate change, environmental management, environmental protection, forestry and fisheries.

   2. Development of generic tools and techniques for automated pre-processing, interpretation and integration of data. Projects will be coordinated with research into expert systems, neural networks, parallel processing and integrated (geographical information systems) GIS undertaken at the JRC. In particular, appropriate data models and structures for GIS will be developed with a view to facilitating the integration into the statistical information systems of data derived from Earth observation.

   3. Support towards the planning of field measurements and ground data gathering campaigns, and development of improved procedures for calibrations and validation.

2. *Pilot projects* are to test the cost-effectiveness in an operational environment of selected applications for which the basic technical feasibility has already been demonstrated.

Pilot projects will normally consist of the following elements: analysis of the operational needs of cooperating user (or users), and the value of the EO-derived information as a function of information quality; identification of a suitable data supply chain and suitable processing schemes to derive the required information; preparation of an implementation plan, showing the close involvement of a collaborating user; establishment of a pre-operational pilot system.

Where appropriate links will be sought with relevant actions of the JRC, notably in the domains of environmental monitoring, tropical forest assessment, biomass burning, agricultural monitoring, and ocean colour.

Pilot projects may also be established within the framework of the implementation of the CEO (Research Area III) in order to test infrastructures for data handling and to help establish coherent user communities.

Area II: Research and development work on advanced sensor technologies

The Commission acts both as a major customer itself, and as a proxy for other users, with a special concern to encourage the development of continuing operational services. The completion of the development of the instruments Vegetation and AMAS, based on activities from Member States agencies, will be considered as test cases.

Objective

To ensure that space instruments of relevance to European Union policy are defined and developed to meet the requirements of existing and potential users.

Research tasks

Instruments of relevance to EU policy could be developed according to needs expressed by users. Technical support will be provided as appropriate by the JRC.

Area III: Centre for Earth observation

An effective ground infrastructure is needed to enable the growing community of users to make optimum use of available data, and to allow the emergence of operational applications.

Objective

To encourage the use of EO data through the development of a European decentralized network for space data management and access.

Research tasks

A programme of work for the implementation of a Centre for Earth Observation will be executed on the basis of the results of the Pathfinder Phase to be completed by the end of 1994. The CEO will aim to improve the distribution and access to the data and derived products, increase the user-base and improving cooperation among users, encourage standards and provide certification and quality assurance, provide long-term archive, and ensure access to foreign space data networks.

Cost-shared research will complement related initiatives of the JRC and Member States. Specific topics may include the following:

— development of data and archive systems;

— establishment of services to provide high-level data products to routine users of EO data (i.e. a publishing service aimed at a large number of users);

— establishment of libraries of robust, well-documented and transferable data processing algorithms to service specific communities of users;

— actions designed to assist different user communities to coordinate and specify their evolving needs.

In addition, pilot projects undertaken under section theme A, may contribute to the implementation and testing of the CEO.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Area 1: Natural environment, environmental quality and global change	46—52%
Area 2: Environment technologies	24—30%
Area 3: Space techniques applied to environmental monitoring and research	20—25%
Total	100% (1) (2) (3) (4) (5)

(1) Including 3,8% for staff expenditure and 3,6% for administrative expenditure.
(2) Including ECU 5 million for the dissemination and utilization of results.
(3) Including 15% for basic research activities and 2% for training.
(4) A sum of ECU 320 million, representing the difference between the amount deemed necessary for this programme and the amount provided for in the Fourth Framework Programme of RTD for environment and climate, is allocated to the 'specific research and technological development programme to be carried out by means of direct action and scientific and technical support activities in the framework of a competitive approach'.
(5) Including 5—9% for socio-economic research (Area III, theme A and Area I, theme B).

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities and for the dissemination of results will be laid down as provided for in Article 130j of the Treaty. However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities
      — in the Community, or
      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) for part A 'Research on the natural environment, environmental quality and global change' to any legal entity,

   (b) for part B 'Environmental technologies' and C 'Space techniques applied to environmental monitoring and research'
      (i) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,
      (ii) to legal entities established in a European country,
      (iii) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

1.4. The programme will include assessment of the socio-economic impact of the research results. Where necessary, proposals will also have to provide for assessment of the potential risks to the environment posed by the proposed research activity. The studies to assess socio-economic impact will be carried out in close collaboration with the programme on Targeted Socio-economic Research so as to ensure optimum exploitation and continued use of their findings.

2. This programme will be carried out in the form of indirect actions, namely the financial participation by the Community in RTD activities carried out by third parties or by JRC institutes in association with third parties:

2.1. Shared-cost activities covering the following possible procedures:

— RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;

— technology stimulation to encourage and facilitate the participation of SMEs by means of awards covering the exploratory phase, including the search for partners, of RTD activity and through cooperative research. Such awards will be granted following selection of draft proposals, which may be submitted at any time;

— support for financing the infrastructure or installations necessary for coordinated action (closer coordination).

2.2. Concerted action, which involves the coordination, particularly in the form of concertation networks, of RTD projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective through shared-cost RTD activities (cf. first paragraph of Section 2.1).

2.3. Preparatory, accompanying and support measures

Objective

To improve coordination, cooperation and the exchange of information between European researchers; to assist the smooth running of the national and international programmes by encouraging the rational use of research infrastructures and the transfer of expertise and knowledge; to develop international cooperation.

Activity themes

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

— 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 dissemination, promotion and utilization of results;

— studies to assess the socio-economic consequences and any technological risks associated with all the projects under this programme;

— training activities related to research coverd by this programme;

— independent evaluation of programme administration and of the implementation of the activities;

— development of international scientific cooperation, in particular in the area of research into global change, including with the developing countries;

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with Euromanagement — auditing activity of RTD.

With a view to focusing the Community's research effort and giving it a higher profile in the context of world research into global change, the research activities envisaged in this area will be carried out within the framework of the European Network for Research into Global Change (Enrich). Such activities will be pointed in a direction which ensures that the research effort will help meet the objectives of the International Geosphere-Biosphere Programme (IGBP), the World Climate Research Programme (WCRP) and the Human Dimensions of Global Environmental Change Programme

(HDP), and that the results can be used in the implementation of the Fifth Framework Programme of action for the environment. Account will also be taken of the scientific requirements expressed in the setting-up of the Global Climate Observing System (GCOS) and the Global Terrestrial Observing System (GTOS). In addition, programme activities will be coordinated with those of the Marine Science and Technology Programme.

Finally, programme implementation will include close linkage with the corresponding JRC activities and collaboration with the other Community research programmes, whereover necessary, and with the European Environment Agency. Appropriate collaboration will also be set up with the corresponding activities of the Eureka programme.

The activities relating to dissemination and utilization of results carried out under this programme will complement those of the third activity and will be closely coordinated with them. The RTD project partners constitute privileged networks for the dissemination and utilization of results. They will be enhanced by means of publications, conferences, promotion of results, studies of technical and economic potential, etc. In order to ensure optimum exploitation, account must be taken from the outset in RTD projects of factors that can encourage subsequent utilization of results.

2.4. Specific measures such as action to promote standardization, and measures to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100 % of the cost of these measures.

ANNEX IV

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 promotion of environmental protection in close cooperation with the corresponding shared cost action programme and through the following three sectors:

— Natural environment, environmental quality and global change

— Technologies for environmental protection

— Applied space techniques for environmental monitoring and research

The European Community should make a major contribution to international research into global change, in particular by participating in major initiatives undertaken by the scientific community, such as the International Geosphere Biosphere Programme (IGBP) — the activities of the European IGAC (International Global Atmosphere Chemistry) Project Office (EIPO) will be continued at Ispra for IGBP — the World Climate Research Programme (WCRP) and the Human Dimension Programme (HDP).

In this context, the Joint Research Centre will concentrate its research on:

— the surveillance and study — particularly using remote sensing technology — of biosphere-atmosphere interactions and interactions between the processes taking place on land and in the ocean and the related parameters affecting climate change;

— physical and chemical analyses of atmospheric processes (in particular the study of sulphur in the atmosphere), including the behaviour of biogenic and anthropogenic emissions. This should include both measurements and modelling;

— the surveillance of global change by remote sensing through the development of advanced Earth observation techniques. This should include research into the development of techniques for using space data obtained from satellite observation for the surveillance of the marine environment and of changes in the terrestial ecosystem. A number of advanced techniques (including those of a statistical nature) for using the new Earth observation system should also be developed.

In addition the JRC will make a significant contribution to the implementation of the Centre for Earth Observation (CEO).

The scientific community and decision-makers need accurate and consistent Earth observation data spanning a long period. To meet this urgent need, the European Community should set up the Centre for Earth

Observation in close cooperation with the Member States and in association with the European Space Agency. This project is designed to guarantee users continuous and long-term availability of consistent data relating to Earth observation. It will set up a decentralized network of interested European bodies and thus bring users, the bodies responsible for thematic analysis and data-processing centres together in a single forum. The role of focal point of such a network should be performed by the JRC, while the programmes of shared-cost action will provide support for the national components of the network.

The JRC will also contribute to the Enrich network by making its scientific research on global change available.

The JRC will continue to contribute to improving environmental quality, mainly through research on air and water quality and the evaluation of the risks arising from chemical products and waste. Research into air quality inside buildings will also be continued, as will the study of pollution caused by metals in trace quantities.

Research into innovative technologies for environmental protection will aim to:

— improve industrial safety and environmental management by providing industry, research bodies and the public authorities with innovative methodologies (in particular design tools) for evaluation of the safety of chemical installations;

— developing mechanisms for the control of chemical reactions which might become uncontrollable, tools for predicting the dispersion of toxic or flammable products and the consequences of combustion and explosion.

Proposal for a Council Decision adopting a specific research and technological development programme in the field of marine sciences and technologies (1994—1998)

(94/C 228/07)

(Text with EEA relevance)

COM(94) 68 final — 94/0085(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme of Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—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 130 i (3) of the Treaty specifies that the Framework Programme is to be implemented through Specific Programmes developed within each activity under the Framework Programme; whereas each specific programme must define the detailed rules for implementing it, fix its duration and provide for the means deemed necessary;

Whereas this programme may contribute appreciably to increased growth, competitiveness and employment in the Union, as indicated in the White Paper on growth, competitiveness and employment [1];

Whereas this programme will be carried out mainly through shared-cost activities, concerted actions and preparatory, accompanying and support measures;

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[1] COM(93) 700.

Whereas, in accordance with Article 130 i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within activity I under the Fourth Framework Programme;

Whereas Decision .../.../EC (Fourth Framework Programme) specifies that the overall maximum amount of the Fourth Framework Programme will be re-examined by no later than 30 June 1996 with a view to its being increased; whereas, as a consequence of that re-examination, the amount deemed necessary to carry out this programme could increase;

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 forecasting change, and to strengthen the technological basis of European industry with regard to the exploration, monitoring and sustainable exploitation of mankind's inheritance, the oceans;

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 marine science and technology;

Whereas Decision .../.../EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Union and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas this programme will help to strengthen synergy between the RTD activities carried out in the field of marine science and technology by research centres, universities and undertakings, in particular small and medium-sized enterprises, in the Member States and between these and the corresponding Community RTD activities;

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

Whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular vis-à-vis small and medium-sized enterprises, and especially those located in the Member States or regions which participate least in the programme, as well as activities promoting the mobility and training of researchers within this programme to the extent necessary for the proper implementation of the programme;

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

Whereas basic research in the field of marine science and technology should be encouraged owing to the need to understand the fundamental processes governing global change and the climate;

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this 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 the indirect activities covered by this programme;

Whereas the JRC will also contribute, through its own programme of direct activities, 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 of research and technological development in the field of marine science and technology, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 228 million, including 6,7 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3)of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the fields directly covered by this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 forewarded to the Council, the European Parliament and the Economic and Social Committee.

Article 5

1. A work programme shall be drawn up by the Commission in accordance with objectives set out in Annex I and shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the programme and the proposed financial arrangements.

The work programme may also provide for participation in certain actions within the framework of Eureka.

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 of an advisory nature composed of representatives of the Member States and chaired by the representative of the Commission.

3. The Commission representative shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter, if necessary by taking a vote.

4. The opinion shall be recorded in the minutes; in addition, each Member State shall have the right to ask to have its position recorded in the minutes.

5. The Commission shall take the utmost account of the opinion delivered by the committee. It shall inform the committee of the manner in which its opinion has been taken into account.

Article 7

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

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

— the evaluation of RTD projects put forward for Community funding and of the estimated amount of project funding where this exceeds ECU 0,35 million;

— the measures to be taken to evaluate the programme;

— any adjustment to the indicative allocation of the amount appearing in Annex II which has not been the subject of a budgetary decision.

2. The Commission shall inform the committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is hereby authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

Introduction

The specific RTD programme on Marine Science and Technology (MAST III) fully reflects the approach embodied in the Fourth Framework Programme, applying its selection criteria and specifying its scientific and technological objectives.

Chapter 3 (introduction and paragraphs A and B) of Annex III, Activity 1 of the framework programme forms an integral part of this programme.

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—1992 and the MAST II programme 1991—1994. For the period considered, it is a step in a longer term strategy which will enable Europe to make a full contribution to the knowledge and management of the oceans.

The programme comprises four areas of activity: (1) marine science — while this topic generally covers all the seas surrounding the EEA (including the Arctic ocean), much of the research will be organized in a multidisciplinary approach to problems which are specific to each regional sea and to extreme marine environment, (2) strategic marine research, with emphasis on the coastal zone, on socio-economic impact and on risk, (3) marine technology and (4) supporting initiatives.

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).

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 initiatives, 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.

Whenever necessary, the programme will be implemented in close collaboration with other actions listed in the Framework Programme, i.e. the programmes and activities mentioned at 1 above, 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'.

GENERAL OBJECTIVE

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 and determine their role in global change.

Research Area I: Marine science

objective

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

(1) *Marine Systems Research*

objective

To study the physical, chemical, biological and geological processes and their interactions at basin scales, with emphasis on scientific problems relevant at the European level.

research tasks

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

2. Pelagic and benthic ecosystems of marginal seas and ocean basins: structure and functioning of their living communities; energy and element cycling through foodwebs; biodiversity patterns in relation to biotic and abiotic factors.

3. Biogeochemical processes and fluxes across the air/sea interface: linkage of water and atmospheric processes and quantification of fluxes of organic matter, nutrients, gases and metals involved in air/sea exchange.

4. 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.

5. Sedimentary processes in the deep sea and on the continental slope: transport and deposition on various time scales.

(2) *Extreme marine environments*

objective

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

research tasks

1. 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 and geophysical processes at active plate boundaries.

2. The ice-covered seas in the northern hemisphere:

   Physical dynamics of sea ice; 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 polar seas; vertical biogeochemical transfer processes and the impact of variability in pack ice coverage on the sea floor communities; sediment formation in ice-covered regions and the geological record as indicator of long-term ice cover change.

3. The surf and swash zone of European coasts:

   Study of sub- and intertidal ecosystems 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.

research tasks

1. The Mediterranean Sea:

   Investigation of the physical, 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.

2. The Baltic Sea:

   Quantification of contemporary fluxes of matter and energy 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 ecosystem in order 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 research tasks will be carried out in close cooperation with the Environment and Climate Programme.

3. The Canary-Azores region and Alboran Sea:

   Analysis and simulation of the exchange of energy, water, particulate and dissolved matter and organisms between the North Atlantic and the Mediterranean; work on the Strait of Gibraltar and adjacent seas will focus on analyses and simulations of fluxes and their climatic, geochemical and biological implications.

4. The north-eastern 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 II: Strategic Marine Research

objective

To study the dynamics of marine systems for application in the management of the marine environment as a resource. 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, biological and chemical processes in shelf seas and coastal environments; to enhance medium and long-term predictive capacity of coastal zone evolution with a view to sustainable use of the coastal and shelf environments.

research tasks

1. 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 integrated models for medium and long-term predictions of the coast and implementation of large-scale experiments for model formulation and evaluation.

2. 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 with a view to providing tools for management of shelf sea resources (research under this heading will be coordinated with IGBP-LOICZ activities and with those of the Environment and Climate Programme).

3. Methods for monitoring, forecasting and management of shelf seas and coastal zones:

   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.

(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 structures.

research tasks

1. 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, and numerical models for their simulation. Morphological changes in the vicinity of the structures.

2. Development of new spaceborne techniques, increased use of satellite imagery for the detection, monitoring and analysis of coastal processes (research in this area will be coordinated with the Environment and Climate Programme).

(3) *Risk and impact evaluation*

objective

To identify, estimate and forecast risks and adverse impacts on the marine environment resulting from the use of: (a) current and future marine technologies as well as research and monitoring techniques and instruments, and (b) methods of ocean use and management. Risks and impacts on the marine environment resulting from commercial activities such as mineral, oil and gas extraction, fishing, and transportation are not included.

research tasks

1. Risks and impacts associated with the installation of coastal structures and the use and management of coastal seas.
2. Risks and impacts associated with the use and management of the sea floor.
3. Risks and impacts on the marine environment associated with the exploitation of coastal resources.
4. Risks and impacts on marine life resulting from the application of current and future technologies for ocean observation.
5. Risks and impacts on the marine environment resulting from the use of intrusive methods for marine research.
6. Socio-economic impacts resulting from the adverse effects identified in tasks 1—5 above.

Research Area III: Marine technology

objective

To promote research on generic technologies 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. This objective must be achieved in a manner which will preserve the environment.

(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 or adaptation to the marine environment of technologies from other fields.

research tasks

1. 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.

2. Underwater communication and orientation:

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

3. Underwater viewing:

   Development of advanced underwater imaging and vision systems for biological, chemical, physical and geological/geophysical research.

4. 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, marine engineering, food technology and medicine.

(2) *Advanced systems*

objective

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

research tasks

1. Unmanned platforms for the deep sea and the Arctic:

   Development of advanced equipment and subsystems for unmanned platforms such as ROVs or untethered free-swimming vehicles, benthic landers, benthic laboratories and buoys for the deep sea and arctic ocean; this includes research on advanced materials, power sources and propulsion systems as well as mission management systems and research vessel based handling systems.

2. Oceanographic measurement and sampling equipment:

   Development of sensors, instruments and samplers with good long-term characteristics for use in harsh environments both in the water column and on the sea floor. The research will take into account the needs of the future GOOS [1] 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.

3. Biosensors:

   Development of biosensors for brackish and marine waters, especially for the monitoring of natural and artificial organic compounds and their degradation processes.

Area IV: 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.

[1] Global Ocean Observing System.

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, 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 heavy experimental equipment 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

Area I Marine science	33—37 %
Area II Strategic marine research	20—25 %
Area III Marine technology	33—37 %
Area IV Supporting initiatives	5—10 %
Total	100 % (1) (2) (3)

(1) Including 3,3 % for staff expenditure and 3,6 % for administrative expenditure.
(2) Including ECU 2 million for the dissemination and utilization of results.
(3) Including 20 % for basic research activities and 2 % for training.

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

Community funding for the utilization of heavy sea equipment will be limited to a maximum of 5 % of the total programme budget.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

The detailed rules for the participation of undertakings, research centres and universities and for the dissemination of results will be laid down as provided for in Article 130j of the Treaty. However, for the purpose of implementing this programme, participation in the programme within the meaning of Article 2 (2) of the Council Decision on the rules for participation in programmes is restricted to international organizations located in Europe and to the entities referred to in Article 2 (2) (c) of that Decision. International laboratories located in Europe may exceptionally be funded on the same basis as Community organizations.

The following will apply in the implementation of this programme:

— Generally speaking, proposals will have to provide for assessment of the potential risks to the marine environment posed by the proposed research or technological development activity.

— In order to step up the international cooperation necessary in oceanography and the major international environment programmes, the supporting initiatives and the accompanying measures may, with the exception of the advanced training, be carried out in cooperation with third countries.

2. This programme will be carried out in the form of:

2.1. Financial participation by the Community in RTD activities carried out by third parties or by JRC institutes in association with third parties:

(a) Shared-cost activities

— RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;

— technology stimulation to encourage and facilitate the participation of SMEs by means of awards covering the exploratory phase of RTD activity, including the search for partners, and through cooperative research. Such awards will be granted following selection of draft proposals, which may be submitted at any time;

— support for financing the infrastructure or installations necessary for coordinated action (closer coordination).

(b) Concerted action, which involves the coordination, particularly in the form of concertation networks, of RTD projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective through shared-cost RTD activities (cf. first paragraph of Section 2.1(a)).

(c) Specific measures such as action to promote standardization, and measures to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100 % of the cost of these measures.

With a view to focusing the Community's research effort and giving it a higher profile in the context of world research into global change, the research activities envisaged in this area will be carried out within the framework of the Enrich network [1]. Such activities will be pointed in a direction which ensures that the research effort will help meet the objectives of the IGBP [2], the WCRP [3] and the HDP [4] and certain aspects of the development of the GOOS [5].

[1] European Network for Research in Global Change.
[2] International Geosphere-Biosphere Programme.
[3] World Climate Research Programme.
[4] Human Dimensions of Global Environmental Change Programme.
[5] Global Ocean Observing System.

Programme implementation will include close linkage with the corresponding JRC activities and collaboration with the following Community research programmes: agriculture and fisheries, non-nuclear energy, environment and climate, measurement and testing, industrial and materials technologies, information technology. Appropriate collaboration will also be set up with other international bodies such as the IOC (1), the ICES (2) and the ICSCM (3) and the corresponding activities of the Eureka programme (Euromar) and the NATO (4) research centres.

2.2. Preparatory, accompanying and support measures

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

— 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 dissemination, promotion and utilization of results (in coordination with the activities conducted under the third area of activity);

— studies to assess the socio-economic consequences and any technological risks associated with all the projects under this programme;

— training activities related to research covered by this programme;

— independent evaluation (including studies) of programme administration and of the implementation of the activities;

— coordination and support for heavy infrastructure and equipment;

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD.

The activities relating to dissemination and utilization of results carried out under this programme will complement those of the third activity and will be closely coordinated with them. The RTD project partners constitute privileged networks for the dissemination and utilization of results. They will be enhanced by means of publications, conferences, promotion of results, studies of technical and economic potential, etc. In order to ensure optimum exploitation, account must be taken from the outset in RTD projects of factors that can encourage subsequent utilization of results.

These implementing arrangements for the preparatory, accompanying and support measures will apply, in particular, to Area IV of the programme.

(1) Intergovernmental Oceanographic Commission, Unesco.
(2) International Council for the Exploration of the Sea.
(3) International Commission for the Scientific Exploration of the Mediterranean.
(4) North Atlantic Treaty Organization.

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of biotechnology (1994—1998)

(94/C 228/08)

(Text with EEA relevance)

COM(94) 68 final — 94/0086(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by its Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities of research, technological development and demonstration (hereinafter RTD), for the period 1994 to 1998, specifying, in particular, the activities to be pursued in the field of biotechnology; and that the present decision is taken in the light of the reasons given in the preamble of the aforesaid Decision;

Whereas Article 130 I (3) foresees that the framework programme is to be implemented through specific programmes developed within each activity; and that each specific programme shall define the detailed rules for implementing it, fix its duration and foresee the means deemed necessary;

Whereas this programme is implemented mainly through shared cost and concerted actions and accompanying and support measures;

Whereas in accordance with Article 130 I (3), it is appropriate to make an estimate of the means deemed necessary for the realization of this specific programme; and that the funds effectively available shall be determined by the budgetary authorities according to the relative priorities given within the First Action of the Fourth Framework Programme;

Whereas the Decision . . ./. . ./EC (Fourth Framework Programme) foresees that the overall maximum amount available for the Fourth Framework Programme will be reviewed no later than 30 June 1996 in view of being increased, and that as a result of this review, the amount deemed necessary to implement the present programme could be supplemented;

Whereas research in biotechnology may lead to improvements in agricultural and industrial efficiency and viability, greater protection of the environment and health and a better quality of consumer products;

Whereas this programme is able to contribute usefully to the relaunch of the growth, to strengthening and competitivity and the development of employment in the Community, as indicated in the White Paper on 'Growth, Competitivity and Employment' [1];

Whereas the contents of the Fourth Framework Programme for Community RTD activities have been defined in conformity with the principle of subsidiarity; and that this programme sets out detailed contents of activities in conformity with this principle in the field of biotechnology;

Whereas the Decision . . ./. . ./EC (Fourth Framework Programme) foresees that a Community activity is required if, among other reasons, the research contributes to the economic and social cohesion of the Community and encourages the overall harmonious development of the quality of its science and technology and that the present programme is supposed to contribute to the realization of these objectives;

Whereas this programme and its implementation contributes to improving the synergies between the RTD activities in the field of biotechnology, by research centres, universities and industry, in particular small and medium-sized enterprises (SME), established in the Member States, and between these and the corresponding Community RTD activities;

Whereas the rules for the participation of firms, research centres (including the IRC) and universities, as well as the rules governing the dissemination of research results, are laid down in the measures foreseen by Article 130 J;

[1] COM(93) 700 final of 5. 12. 1993.

Whereas for the implementation of this programme, besides associating with the European Economic Area (EEA) countries other international cooperation activities might be necessary, in accordance with Article 130 M, with other third countries and international organizations;

Whereas the implementation of this programme also implies activities for the dissemination and exploitation of RTD results, in particular towards SMEs (small and medium-sized enterprises), and notably those located in Member States or regions which have the lowest participation in the programme, as well as activities to promote mobility and training of researchers carried out within this programme and in so far as necessary for its adequate implementation;

Whereas the implementation of this programme requires the provision of measures intended to encourage participation of SMEs, in particular technology stimulation measures;

Whereas basic research in biotechnology must be encouraged throughout the Community because it provides a source of innovation offering a large range of scientific opportunities to meet the real needs of society;

Whereas an assessment should be made of the socio-economic impact and of any technological risks, of the activities undertaken in this programme;

Whereas, on the one hand, this programme's state of implementation should be reviewed in a permanent and systematic way, in order to adapt it, where necessary, to the scientific and technological developments in this field; and on the other hand, an independent evaluation should be conducted, in due time, on the results achieved by the programme, in order to provide every appropriate information as necessary to determine the goals of the Fifth RTD Framework Programme; and that, a final evaluation will be necessary at the end of the programme to assess the results obtained in terms of the objectives defined in this Decision;

Whereas, on 23 April 1990, the Council adopted Directive 90/219/EEC on the contained use of genetically modified micro-organisms [1] and Directive 90/220/EEC on the deliberate release into the environment of genetically modified organisms [2];

Whereas the JRC may participate in the 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 of research, technological development and demonstration in the field of biotechnology as defined in Annex I is hereby adopted for a period beginning on (date of adoption) and ending on 31 December 1998.

Article 2

1. The funds estimated as necessary for the execution of the programme amount to 552 MECU, including 7,5 % for staff and administrative expenditure.

2. An indicative allocation of funds is set out in Annex II.

3. The funds estimated as necessary as indicated above may be increased. As a result of and in conformity with the decision mentioned in Article 1 of paragraph 3 of the Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall lay down the available appropriations for each financial year in agreement with the scientific and technological priorities fixed by the Fourth Framework Programme.

Article 3

Detailed rules for the implementation of the programme, besides those provided for in Article 5, are set out in Annex III.

Article 4

1. The Commission shall review in a permanent and systematic way, with appropriate assistance from independent external experts, this programme's state of implementation, considering the objectives set out in Annex I, and in particular whether the objectives, the priorities and the funds are still adequate to the changing situation. Where necessary, this review shall be accompanied by proposals to adapt or complete this programme, in accordance with the review's conclusions.

2. In order to contribute to the global assessment of the Communities activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, an evaluation of the management and the results achieved by the activities undertaken in the fields covered by this programme, during the five years preceding the evaluation, shall be conducted in due time for the Commission by independent experts.

3. At the end of this programme, the Commission shall conduct a final evaluation by independent experts of

[1] OJ No L 117, 8. 5. 1990, p. 1.
[2] OJ No L 117, 8. 5. 1990, p. 15.

the results obtained concerning the objectives defined in Annex III of the Fourth Framework Programme and in Annex I of this Decision. It shall submit the final evaluation report to the Council, the European Parliament and the Economie and Social Committee.

Article 5

1. A work programme shall be drawn up by the Commission in accordance with the aims set out in Annex I and updated where necessary. It shall set out the detailed scientific and technical objectives and define the implementation stages of the programme, as well as the financial arrangements for each type of implementation to be undertaken.

The work programme can also allow participation in some activities originating from the Eureka framework.

2. The Commission shall make calls for proposals of RTD projects, on the basis of the work programme.

Article 6

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

2. For measures foreseen 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.

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 provided for in Article 148 (2) of the Treaty as regards adoption 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.

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

When the measures envisaged are not in accordance with the committee's opinion, 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 qualified majority.

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

Article 7

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

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

— the assessment of the RTD projects proposed for a Community contribution and of the estimated amount of this contribution on a project basis, where this amount exceeds ECU 0,5 million,

— the measures to be undertaken to evaluate the programme,

— any adaptation of the indicative breakdown of the amount set out in Annex II, not having been decided through the budgetary procedure.

2. The Commission shall inform the committee, for each of its meetings, of the current state of implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the approach embodied in the Fourth Framework Programme, applies its selection criteria and specifies its scientific and technological objectives.

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

THE BACKGROUND

The Commission has presented in its White Paper on growth, competitivity and employment, an analysis of the potential of biotechnology to present certain promises based on the omnipresence of the bioprocesses and the competitiveness of sectors of application, but identifying weaknesses on which Community efforts should have priority. The economic sectors whose competitiveness significantly depends on biotechnology (pharmaceuticals, chemicals, agriculture, food) account for the employment of 16,4 million people in Europe and exports worth 132,8 billion ECU. Europe has roughly 600 companies involved in some aspect of modern biotechnology, including a number of world-class chemical and pharmaceutical companies. The sustained growth of these sectors depends on a strong and innovative science base; a highly trained and skilled workforce; the efficiency of technology transfer from the science base to industry; the rapidity with which novel and innovative techniques are incorporated into established practices; the adoption of a multidisciplinary approach to biotechnology-based processes; the validation of scientific principles to underpin a unified market of biotechnology-derived products; and the harmonious application of bioprocesses as beneficial alternatives to promote the environment, human health and welfare. Progress along these lines will ensure that the estimated sales of non-food biotechnology products of 26—41 billion ECU by the year 2000 can be realized with a prominent European participation and a high degree of social acceptance. This situation is historically unique, as it brings biotechnology into the present reality of scientists, policy makers and industry, whereas earlier research programmes had been based on future promise.

Particularly relevant to bringing the life sciences to play an increasing role in the society will be the arrival on the market, under the period covered by the Fourth Framework Programme, of the first generation of transgenic plants endowed with useful new properties, of safer and more efficient vaccines deriving from rDNA work or of natural antimicrobial substances preventing microbial spoilage of food products.

While two other programmes, on biomedical and health research and on agriculture and fisheries research, shall promote the applications of biotechnology within their respective sectoral activities linked to the provision of goods and services, the Biotechnology programme itself shall create further opportunities by deliberately penetrating the heart of living systems. The flow information between those three will be the key to success.

It will be the responsibility of Community to promote under this programme further research work where the society would expect the highest returns. This points to privileged areas for the exploitation of new knowledge, all of which do experience in common an acute need for cross-linking connected topics and/or integrating large groups of experts on an international scale. The same integrative effort will be required for putting safely living cells to work, for raising the profile of the European contribution to the international genome projects, for achieving the new deal of modern agriculture and environment via the genetic design of crops or animal health control, or overcoming academic distinctions between neurobiology, endocrinology and immunology until the principles of cell and molecular interactions are unravelled. International collaboration with the Human Frontier Science Programme will be strengthened, as will be the links with Eureka projects and national programmes within the Community. Throughout the programme, careful attention will be given to the delicate step which brings research results in the context of socio-economic needs. In specific instances, demonstration projects may be established, and competent monitoring of the ethical and social parameters of public acceptance will be pursued.

This programme is implemented, as appropriate, in coordination with the specific programmes Information technologies, Measurement and Testing, Environment, and Targeted Socio-economic research.

Measures intended to encourage participation of SMEs, in particular technology stimulation measures and links between science parks and biotechnology SMEs, as recommended by the White Paper on Growth, Competitiveness, Employment, will be implemented.

THE PROPOSED RTD ACTIVITIES

The centre of any biological process in nature or in systems domesticated by man really is the living cell, which functions as a minute factory.

Each cell consumes its raw materials, converts energy, produces high value molecules as well as wastes, and has learned through evolution how to carry out those constructive processes in equilibrium with its environment. An infinite number of cells in living organisms bred for agricultural purposes, or in fermenters conducted for the industrial supply of valuable molecules, all behave as populations of clean productive units which can be exploited in a sustainable manner. In an attempt to focus biotechnology where it genuinely differs from alternative technologies, all efforts must start with a thorough understanding of how the cell manages to be so successfully industrious.

OBJECTIVES REQUIRING CONCENTRATED MEANS

Area 1: Cell factories

Industrial and environmental exploitations of living cells would hardly be achievable without a global approach integrating contributions from biological disciplines, computer science and process engineering which they have to depend on. New interfaces between biotechnology and advanced technologies offer opportunities for the integration of biology also with other sciences and technological fields. A multidisciplinary vision of cell factories must be promoted, with the intertwined participation of academic and industrial laboratories.

The primary objective is to reach an understanding of how living cells, particularly microorganisms and animal cells, manage to be productive and how industry can learn from cellular processes in order to design and operate safe, specific and sustainable bioprocesses.

Optimal use should be made of relevant biological knowledge generated from studies on: cell biology and signalling, macromolecular interactions, protein folding and secretion, post-translational modifications, genetic stability, microbial physiology and biodiversity, the control of metabolic fluxes, extremophily, antimicrobials, etc. Support will be given where the combination of this biology with engineering approaches is most likely to realize the biotechnological potentials of cell factories, particularly in fields such as: the fundamental aspects of fermentation, biotransformation, biocatalysis, biosensors, process control with neural networks, of technologies cell culture and co-culture, downstream processing, etc.

The research tasks will be concentrated on relevant generic topics of interest to industry and other end-users of biotechnology. A typical project will require the integration of biological and bioengineering disciplines and will be aimed at solving gaps in basic knowledge as well as technological barriers which prevent the full exploitation of the cell's capability as a factory for the conversion or production of useful biomolecules.

The biosafety of vector systems, cell lines and microbial cultures will be an important consideration of any project selected for this action.

In order to optimize Community resources and exploitation of research results, bioprocess engineering activities will be synergistically and closely coordinated with the contributions invited under the programme on Industrial Technologies, or under the Agriculture and Fisheries Research Programme which covers interrelated work applying processing, end-use and scaling-up technologies adapted to industrial conditions.

The emphasis of cell factories is in the development and optimization of generic technologies potentially applicable to a large number of sectors.

Area 2: Genome analysis

The participation of European networks in the worldwide genome programmes will be facilitated via the further analysis and sequencing of model genomes, such as *Bacillus subtilis, Saccharomyces cerevisiae* and *Arabidopsis thaliana*. The mapping and sequencing projects will combine efforts to unravel new genes with attempts to study genetic function; they will make a new effort to encourage the development of novel software and other bioinformatic tools and, where appropriate, to integrate the development and extension of the methodological and instrumentation basis. Also relevant transcriptional and replicative mechanisms will be investigated, as well as higher levels of organization of the genomes, such as now made possible by the new knowledge of complete chromosome composition and structure becoming gradually available.

Methodologies will be set-up and applied to render possible the association of detailed biological functions with newly unravelled genes from any appropriate model genome. A systematic approach to function search will be allowed through networks of specialized laboratories which on the basis of mutated, deleted or over-expressing strains carrying uncharacterized genes, will rely on standardized tests pointing the way towards the associated functions. Conversely, targeted approaches to biotechnologically important functions will be encouraged through the submission of proposals by consortia willing to screen, in yeast for example, the collection of disrupted mutants against pre-defined phenotypic alterations with a view to identifying sets of genes coding for industrially relevant pathways.. Special attention will be given to additional innovative approaches (i.e.: based on mRNAs, gene structure or promoter similarities, etc.) exploitable for harvesting the maximum biological benefits from existing genome projects. By bridging the gap between sequencing activities and the functional characterization of sequences, another entry into the cell factory concept will be provided from the specific angle of the genetic control of metabolic pathways.

Comparative methods will be exploited across different genomes including the human genome. These approaches will include the development of new mapping procedures based on the use of homologous DNA probes from model genomes, heterologous expression through cDNAs in bacteria or fungi and development of new informatic software to improve detection of functional or structural homologies. The development and sharing of advanced technologies and a decentralized pool of exchangeable clones, probes and data will be organized.

With a view on possible medical applications, work on the human genome will be concentrated in the Biomedical and Health research programme. However, comparative approaches and related technology developments will include human DNA and, with respect to human cells, the same limitations will be applied, i.e. alteration of germ cells or any stage of embryo development with the aim of modifying human genetic characteristics in a hereditary manner is excluded from the programme objectives. The coordination with accompanying measures on the ethical, social and legal aspects, executed elsewhere in the programme, will be emphasized.

Area 3: Plant and animal biotechnology

Plant molecular and cellular biology

Plant molecular and cellular biology, including protein engineering, physiology and pathology, at the crossroads of agricultural, industrial and environmental issues, will be developed by stressing the need for an integrated research. Particular attention will be given to the molecular understanding and eventual modification of relevant plant processes as an approach leading to new tailor-made market-relevant agricultural or forestry products, and to production methods compatible with the environment, health and consumers' demand, which areas are included within the Agriculture and Fisheries Research Programme. Identifying, characterizing and exploiting useful biological traits of agricultural and industrial relevance, in terms of quality improvement and greater environmental acceptability, and their corresponding genes would be the main target for such activity.

These include: pest and disease resistance; stress tolerance; quality and quantity of starch, oils, valuable protein, pharmaceuticals in leaves, seeds, roots, etc., at the cell level; developmental pathways, reproduction and regeneration; improved enzymes and macromolecules for processing.

Underpinning science will have to be considered, such as that allowing control of heterologous expression and of stability of expression, cell structural analyses (to understand and regulate the traffic of molecules), or identification of nutritional and health properties of food and feed components (to fine tune molecular breeding objectives towards crops displaying healthy attributes), which is complementary to an important objective of the Agriculture and Fisheries Research Programme. A typical project will attempt to achieve the appropriate level of integration of plant science with end-user technology, and of target-oriented research with those areas of eukaryotic biology where key knowledge is stemming from (genome analysis, structural analysis of macromolecules and enzymes, signalling pathways, bio-informatics, etc.).

Animal physiopathology

Genetic linkage maps of the genomes of farm animals have already been completed, in particular under the earlier Bridge Programme. Gene mapping will be very useful to select animals for traits which are under the control of many genes (quantitative trait loci or QTL) such as the resistance to diseases, to eliminate genes with harmful effects or to transfer new genes of interest from various strains of animals by appropriate breeding. European networks will be established or extended to map the genomes of animals chosen for their agricultural or industrial importance. Such studies will greatly advance our knowledge on QTL analysis. Research activities on reproductive mechanisms of the farm animals will also be supported due consideration being given to animal welfare and animal genetic diversity principles.

It is essential for the understanding and control of severe human and animal diseases to develop transgenic and other animal models. Studies will be conducted to allow the development of new techniques to raise animal models with precise and predicted genetic characteristics designed to provide information of high quality and specificity in relation to pathological disorders. Research will be encouraged where it produces evidence on the physiological roles of regulated/deregulated pathways, or genetically-encoded factors during the evolution of any particular disease.

An equally important objective will be the development of new methods for somatic gene therapy, particularly vectors complementing weakened or missing gene functions potentially of medical importance. The programme will also consider other associated techniques to overcome barriers precluding the general applicability of somatic gene therapy protocols, with regard to recipient cells. Models which could be used for the evaluation of the method will also be considered.

Concerning the last two subjects which might impinge on future medical and veterinary applications, the emphasis of this programme will remain on the design and development of experimental tools giving rise to possible synergies with the Biomedical and Health or Agriculture and Fisheries Research Programmes.

Area 4: Cell communication in neurosciences

Cellular biology, molecular biology including molecular genetics and biochemistry, pharmacology will be combined with genetic engineering in order to promote multidisciplinary studies on cell physiology and cell communication of the nervous system and with a view to promoting neurosciences using the support of these disciplines. Special attention will be paid to the physiology of the development of the nervous system, the management of information (intra- and intercellular events) by the nervous cells, possible cellular dysfunctions such as those associated with human and animal degenerative diseases, the design of neurodrugs taking advantage of biotechnology, the development of *in vitro* tests for the pharmaco/toxicology of such substances.

Projects including definite steps towards a medical or a veterinary application would be regarded as better placed within the Biomedical and Health or the Agriculture and Fisheries Research Programme, whereas this programme tends to concentrate on approaches at molecular and cellular levels and the development of tools necessary for such detailed investigations.

The four actions above will benefit from a range of specific measures aiming at the achievement of increased harmony between scientific progress and realities of the economic world, namely: the systematic combination of advanced biotechnology with the whole spectrum of established disciplines and techniques, to increase the control which the practitioner may have over biological processes; the close interaction of scientific teams with the users of research results and with expert groups looking into new indicators of welfare; the accompanying assessment of lateral effects which arise with the recognition of economic and

social constraints (provisions for safety, ethical issues, education, public information, targeted training to link research and industry).

OBJECTIVES ADDRESSED BY CONCERTATION

Four other activities will be approached by setting up research projects or concertation networks. The objective in this case will be to share work and information in fast-moving fields, and to pool data or methods which may provide useful bases upon which science policy and regulatory measures could be developed further.

Area 5: Immunology and trans-disease vaccinology

In immunology, new biotechnology-derived substances in relation with the immune system (monoclonal antibodies, cytokines, growth factors, receptors, adhesion molecules etc.) may reveal a range of effects preventing or controlling major human and animal pathologies. Special attention will be given to the possibility to initiate mechanistic studies of the interaction of these substances with the physiology of the organism, in order to develop new pharmacological concepts which should be relevant to specific interests of the Biomedical and Health Research Programme.

Research on trans-disease vaccinology will be organized across Europe (live vectors for vaccines, their ability to induce immunity to normal or pre-immunised organisms, their safety in normal, immunocompromised hosts and in other species likely to be in contact — antigen delivery systems, particularly those giving the possibility to administer a unique dose — mucosal and peroral vaccination — induction of T and/or B immune responses, etc.). Model diseases used for the demonstration of the new methods will have to be chosen for their importance in human or veterinary medicine.

Area 6: Structural biology

The systematic determination of the three-dimensional structures of biomolecules will contribute to the knowledge of the relationships between primary structures and the tertiary structures of biologically active macromolecules and, even more, the quaternary structures of the multi-subunit complexes which mediate most biological activities. The accelerating accumulation of structural information underlines the need to store, retrieve and analyze this information (see Infrastructures).

The objective is the understanding of the structural basis of biomolecules and complexes (proteins, DNA, RNA, carbohydrates and lipids) which is essential to the discovery and refinement of new biochemical entities. The improvement of the resolution of the techniques and the growing size of structures that they can assess will be crucial. Such technical developments will allow work on subcellular structures, e.g., chromosomes, splicesomes, replisomes, with further implications for biological understanding.

Biological macromolecules that catalyze chemical reactions (enzymes, abzymes, ribozymes) are particularly of interest for industry. To obtain biocatalysts with new properties, two different and complementary ways are to be considered. The first is the rational design of biomolecules which requires a detailed understanding of, and control over biomolecular conformation and reactivity (position of functional groups, folding properties). The second way is *in vitro* directed molecular evolution. This technology useful alternative to true design consists of a large, heterogeneous pool of biomolecules subjected to multiple rounds of selection, amplification and mutation, and leading to biomolecules with the desired properties. RNA, acting as both a genetic message and an enzyme, are ideal molecules for the type of *in vitro* evolution experiments which are invited.

Finally, the emerging interface of biology and electronics will be stimulated with a view to allowing the integration of competences in structural biology, molecular engineering and nanolithographic patterning towards new possibilities of designing functional units which could incorporate modifications at the scale of the nanometre.

Area 7: Pre-normative research, biodiversity and social acceptance

Community efforts will be brought into closer harmony with national efforts when this leads to methods or data that would consolidate the rational basis of regulatory approaches and would support the development

of internationally accepted standards and systems of risk assessment. This activity will be encouraged in three fields: the development of toxicological/pharmacological *in vitro* tests, the biosafety evaluation of biotechnology-derived products, and the development of processes solving environmental problems.

As far as *in vitro* testing is concerned, priority interest will be in neurobiology, immunology and developmental pharmaco/toxicology as well as in the development of cultures or co-cultures of cells maintaining their normal metabolism, with a clear view to providing methods and data usable as alternatives to animal testing and eventually made available for prevalidation studies, such as the Biomedical and Health Research Programme has planned.

As far as the biosafety evaluation of transgenic organisms and derived products is concerned, special emphasis will be given to the risks possibly associated with releases of genetically modified organisms, including recombinant life vaccines, into the environment and to the scientific support to the implementation of the Community's regulatory framework ensuring safety for man and the environment.

This should be approached at two levels. First at the basic level of molecular ecology and, second, at the level of prenormative research, which gathers data of particular usefulness to regulatory authorities when carrying out risk assessments under Community legislation.

Most of these studies, and particularly prenormative research, should be complemented by field tests in order to take into consideration environmental factors.

Microbial ecology does not only serve prenormative research but it is an indispensable element for studies on environmental biotechnology and microbial biodiversity.

In order to lead environmental biotechnology to useful results, knowledge acquired from microbial ecology, microbial diversity and bioprocessing (see cell factories) should be appropriately combined, aiming at the prevention, detection of hazardous compounds and the remediation of the environment.

Microbial diversity should be better understood, with particular attention to microbial characterization in extreme habitats, isolation strategies and cultivation procedures, direct analysis of microbial communities through DNA sequencing, biosystematics using molecular techniques and markers, screening strategies and conservation.

Plant and animal diversity studies will also be part of the more general approach which consists in using molecular and cellular biology to bring about methodological improvements for the conservation of genetic resources or/and for exploring unexploited diversity.

Particular emphasis will be put on analyzing lateral issues such as public perception and the acceptance of biotechnology in general, in liaison with the horizontal activity on ethical, social and legal aspects of the life sciences and technologies, taking into account the European Bioethics Convention and environmental aspects.

Area 8: Infrastructures

Development of bio-informatics, of information infrastructures and resource centres (databases, biological collections, etc.) as a service and support to wider scale research by the Community or its Member States. The services shall aim to support and underpin the overall objectives of the Biotechnology Programme, particularly in the areas of genome sequencing, structural biology and biodiversity. Special attention shall be paid to ensure that these services match the research needs, including those of large industry and SMEs.

Necessary actions should be taken as to ensure proper publicity and wide spread distribution of collections and information contained in databases. In the case of biological collections, coupling of specimen distribution channels and related Information Systems will be fostered in order to ease access to repository catalogues and eventual ordering and delivery.

Large scientific and technical communities should be able to have simple and, as far as possible, unique access to deposit and retrieve information from diverse source of data, including bibliographic indexes. To achieve these objectives, following facilities should be provided by the information services: user-friendly interfaces; cross-reference and navigation mechanisms between data entries; interconnection of diverse national and Community-wide databases via European networks; extensive use of standards and, when

necessary, definition of new exchange formats. Close cooperation with existing R&D programmes in the field of Information Technologies should be encouraged in order to benefit of their findings and achievements.

Research activities on novel bio-informatics technics will be supported whenever they could contribute to improve the service aspect of the mentioned tasks.

OBJECTIVES TREATED BY MEANS OF HORIZONTAL ACTIVITIES

Demonstration activities in biotechnology

New biotechnologies stemming from forefront European research encounter specific difficulties and socio-economic barriers which preclude their full exploitation in the market place. European biotechnology researchers continuously produce a rich flow of opportunities that can benefit society in many different ways. However, a variety of techno-economic uncertainties, inherent to the adoption of these complex interdisciplinary processes (which are not easily understood by the technology users, or even, in some way or another, feared by the public), hamper the full exploitation of research efforts and increase the time and risks involved in the marked penetration of well established, new biotechnological concepts. Community support to carefully selected biotechnology demonstration activities will encourage European concerns to deploy the costly, critical-mass, interdisciplinary resources needed for overcoming those hurdles and will, therefore, facilitate the adoption of new biotechnologies by potential users in industry and services.

Biotechnology demonstrations can be linked to any scientific and technological research area considered within this specific programme and will be developed in close cooperation and synergy with the Agriculture and Fisheries, and the Biomedical and Health Research Programmes, integrating resources from all disciplines relevant to project implementation. A high thematic flexibility is needed for the bottom-up identification of demonstration activities from which the highest impact is to be expected, both in strengthening the competitiveness of European industries, and in promoting an objective public understanding of biotechnology. Particular focus areas might include, amongst others: novel cell technology and biochemical engineering approaches with the potential to maximize benefits from the cell factories; new vaccines; use of transgenic plants and animal models; bio-remedial application of micro-organisms for the removal of toxic wastes.

Ethical, social and legal aspects (ESLA)

The participation of the Community in a dialogue embracing all relevant socio-political and bioethical positions, taking into account cultural differences and existing national policies will be encouraged and, where appropriate, deliberately organized. Whilst recognizing existing national and international points of view, scientific studies will focus on transdisciplinary approaches of selected topics, of high relevance and possible impact within the biotechnology programme, and on the applications of their results (e.g. genome research, biodiversity, intellectual property, in particular research exemption for patents, introduction of new biotechnology products for industry and environment, transgenic animals, neurosciences). Where appropriate, these activities will also contribute to identifying areas for the application of common principles — the draft European Bioethics Convention of the Council of Europe will be taken into account — and for agreeing their best possible interpretation. The continuous updating of scientific data in support to regulatory processes will be facilitated.

Public perception

Specialized working groups will be established to prepare *ad hoc* initiatives, like workshops, conferences, reports and surveys important for the public perception of biotechnology. Appropriate and timely information about research objectives, scientific breakthroughs, knowledge obtained, obstacles are the key elements for the public perception of biotechnology which must be reviewed in an open discussion about

possible applications and implications of the results of this new technology. It is important that in addition to information dissemination, in particular through conferences and surveys, it could be demonstrated that suggestions and concern expressed from the public side are considered in strategic planning.

Socio-economic impacts

An important factor for the competitiveness of European industry and employment will be the adoption of up-to-date and sustainable production systems. Consequently the opportunities offered by biotechnology will be promoted. In large industrial areas (agro-industry, pharmacy, fine chemicals etc.) while new products and productions tend to be based on biotechnological research (for example new pharmaceuticals), the actual production will rely in general on traditional technologies. Efforts will be made to assess these indirect effects of the biotechnology research programme, by which new tools and methods get amalgamated with an existing background of established practices, to the benefit of industrial branches already in place. At the same time, questions will be asked on the rise of new industrial sectors based on opportunities offered to research SMEs, and on the specific related handicaps/chances experienced in Europe.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Objectives requiring concentrated means	
Area 1: Cell factories	15—21 %
Area 2: Genome analysis	13—19 %
Area 3: Plant and animal biotechnology	22—30 %
Area 4: Cell communication in neurosciences	4— 8 %
Objectives addressed by concertation	
Area 5: Immunology, trans-disease vaccinology	5— 9 %
Area 6: Structural biology	9—13 %
Area 7: Prenormative research, biodiversity, social acceptance	10—16 %
Area 8: Infrastructures	2— 4 %
Total	100 % (1) (2) (3)

(1) Including 3,5 % for expenditure on staff and 4,0 % for administration expenditures.
(2) Including 5,5 MECU for the dissemination and exploitation of results.
(3) Between 4 and 6 % of the funds will be allocated to horizontal demonstration activities; between 1 and 2 % of the funds will be allocated to horizontal activities on ethical, social and legal aspects; between 1 and 2 % of the funds will be allocated to horizontal activities on public perception and socio-economic impact studies; between 5 and 7 % of the funds will be allocated to horizontal training activities.

The breakdown between different areas does not exclude the possibility that projects could cover several areas.

ANNEX III

RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the fourth framework programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activites covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out 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:

2.1. Shared-cost activities covering the following means of action:

   — RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common objective;

   — basic research projects within thematic networks to be established, based on generic technologies of strategic importance, involving industrial companies, research centres and universities;

   — technology stimulation to encourage and facilitate participation by SMEs by granting an award covering the exploratory phase of an RTD activity, including the search of partners, and via cooperative research. The award will be granted following the selection of outline proposals which may be submitted at any time.

   — support for the financing of infrastructure or facilities necessary for the performance of a coordination action (reinforced coordination activity)

   — demonstration activities, as defined in Annex III of the Framework Programme, which may include feasibility awards and direct grants to technologists, intended to overcome specific hurdles preventing utilization of new technologies and to build bridges between producers and technology users.

2.2. concerted actions, which coordinate, in particular through concertation networks, RTD and demonstration projects already funded by public authorities or private organizations. The concerted actions may also perform the coordination needed for thematic networks which, through RTD shared cost actions (cf. 2.1, first indent), bring together producers, users, universities and research centres to focus on the same technological or industrial goal.

2.3. specific measures, such as those encouraging standardization, and those measures intended to set up general service tools for research centres, universities and firms. The Community contribution may be up to 100 % of the costs of these measures.

2.4. Preparatory, accompanying and support measures, including the following types:

— studies in support of this programme and in preparation of possible future actions;

— conferences, seminars, workshops or other scientific or technical meetings, including intersectorial or multidisciplinary coordination meetings;

— use of external expertise, including access to scientific data bases;

— scientific publications, including dissemination, promotion and exploitation of results (in coordination with the activities carried out in the Third Action);

— assessment studies of socio-economic implications and also of possible technological risks associated with all projects of this programme in coordination with the programme Targeted socio-economic research;

— training activities linked to the research carried out under this programme;

— independent evaluation (including studies) of management and results of programme activities;

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD.

The dissemination and exploitation of results obtained in this programme will be complementary to those carried out by the Third Action and will be implemented in close coordination with it. The networks of partners of RTD projects are the principal mechanisms for dissemination and exploitation of results. They will be reinforced with publications, conferences, promotion of results, studies of the techno-economical potential, etc. In order to ensure optimal exploitation all those factors which may facilitate the utilization of results will be considered at the start of the RTD projects and whilst they are in progress.

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of biomedicine and health (1994—1998)

(94/C 228/09)

(Text with EEA relevance)

COM(94) 68 final — 94/0087(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by its Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities of research, technological development and demonstration (hereinafter RTD), for the period 1994 to 1998, specifying, in particular, the activities to be pursued in the field of biomedicine and health research; whereas this Decision should be taken in the light of the grounds set out in the preamble to the aforesaid Decision;

Whereas Article 130 I, paragraph 3 of the Treaty stipulates that the Framework Programme is to be implemented through specific programmes developed within each activity; whereas each Specific Programme shall define the detailed rules for implementing it, fix its duration and provide for the means deemed necessary;

Whereas this programme is implemented mainly through shared cost, concerted actions, specific and preparatory measures as well as accompanying and support measures.

Whereas in accordance with Article 130 I (3) of the Treaty, it is appropriate to make an estimate of the means deemed necessary for the realization of this Specific Programme; whereas the final amounts shall be decided by the budgetary authorities according to the relative priority given to the domain forming the subject of this present programme within the First Action of the Fourth Framework Programme;

Whereas the Decision . . ./. . ./EC (Fourth Framework Programme) foresees that the overall maximum amount available for the Fourth Framework Programme will be reviewed no later than 30 June 1996 in view of being increased, and that as a result of this review, the amount deemed necessary to implement the present programme could be supplemented;

Whereas the research activities and technological developments in biomedicine and health should be encouraged in order to improve efficiency of political health within the Community;

Whereas the contents of the Fourth Framework Programme for Community RTD activities have been defined in conformity with the principle of subsidiarity; whereas this programme further sets out detailed contents of activities to achieve in conformity with this principle;

Whereas the Decision . . ./. . /EC (Fourth, Framework, Programme) foresees that a Community activity is required if, among other reasons, the research contributes to the economic and social cohesion of the Community and encourages the overall harmonious development of the quality of its science and technology and that the present programme is supposed to contribute to the realization of these objectives;

Whereas this programme and its implementation should contribute to improving the synergies between the RTD activities in biomedicine and health, by research centres, universities and industry, in particular small and medium enterprises (SME), established in the Member States, and between these and the corresponding Community activities;

Whereas the rules for the participation of undertakings, research centres (including the Joint Research Centre, JRC) and universities, as well as the rules governing the dissemination of research results, are laid down in the measures provided for in Article 130 J;

Whereas for the implementation of this programme, besides associating the countries which are members of the European Economic Area (EEA), other international cooperation activities might be necessary, in accordance with Article 130 M, with other third countries and international organizations;

Whereas the implementation of this programme also implies activities for the dissemination and exploitation of RTD results, in particular towards SME, as well as activities to promote mobility and training of researchers carried out within this programme and in so far as necessary for its adequate implementation;

Whereas the implementation of this programme requires to provide for measures intended to encourage participation of SME, in particular technology stimulation measures;

Whereas basic research in biomedicine must be encouraged to re-enforce the scientific and technological bases of the European health industry;

Whereas an assessment should be made of the socio-economic impact and of any technological risks, of the activities undertaken in this programme;

Whereas, on the one hand, this programme's state of implementation should be reviewed in a permanent and systematic way, in order to adapt it, where necessary, to the scientific and technological developments in this field; and on the other hand, an independent evaluation should be conducted, in due time, on the results achieved by the programme, in order to provide every appropriate information as necessary to determine the goals of the Fifth RTD Framework Programme; whereas, a final evaluation will be necessary at the end of the programme to assess the results obtained in terms of the objectives defined in this Decision;

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

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

HAS ADOPTED THIS DECISION:

Article 1

A specific programme of research, technological development and demonstration in biomedicine and health, as defined in Annex I is hereby adopted for a period beginning on (date of adoption) and ending on 31 December 1998.

Article 2

1. The funds estimated as necessary for the execution of the programme amount to ECU 336 million, including 8,5 % for staff and administrative expenditure.

2. An indicative allocation of funds is set out in Annex II.

3. The funds estimated necessary as indicated above may be increased, as a result of, and in conformity with, the Decision mentioned in Article I, of paragraph 3, of the Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall lay down the available appropriation for each financial year in agreement with the scientific and technological priorities fixed by the Fourth Framework Programme.

Article 3

Detailed rules for the implementation, besides those provided for in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I, and in particular whether the objectives, the priorities and the funds are still adequate to the changing situation. Where necessary, this review shall be accompanied by proposals to adapt or complete this programme, in accordance with the review's conclusions.

2. In order to contribute to the global assessment provided for in Article 4.2 of the Decision adopting the Fourth Framework Programme, an evaluation of the management and the results achieved by the activities undertaken in the field covered by this programme, during the five years preceding the evaluation, shall be conducted in due time for the Commission by independent experts.

3. At the end of this programme, the Commission shall conduct a final evaluation by independent experts of the results obtained concerning the objectives defined in Annex III of the Fourth Framework Programme and in Annex I of this Decision. It shall submit the final evaluation report to the European Parliament, the Council and the Economic and Social Committee.

Article 5

1. A work programme shall be drawn by the Commission according to the objectives set forward in Annex I which can be, if necessary, updated. It shall give in detail the scientific and technological objectives and specify the phases of implementation and the financing planned for each mode of realization.

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

Article 6

1. The Commission shall be charged with the execution of the programme.

2. In the conditions laid down in Article 7, paragraph 1, the Commission shall be assisted by a committee of a consultative nature composed of representatives of the Member States and chaired by the representative of the Commission.

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, taking a vote thereon should the need arise.

The opinion shall be entered in the minutes; moreover, each Member State shall have the right to request that its position be recorded in the said minutes.

The Commission shall take the greatest account of the opinion delivered by the Committee. It shall take the greatest account of the opinion delivered by the Committee. It shall inform the Committee of the way in which it took the said opinion into account.

Article 7

1. The procedure laid down in Article 6, paragraph 2 shall apply to:

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

— the assessment of the projects and concerted actions provided for in Annex III and the estimated amount of the Community's contribution to them where this amount exceeds ECU 0,1 million per year,

— the measures to be undertaken to evaluate the programme,

— any adaptation of the indicative breakdown of the amount set out in Annex II, not having being decided through the budgetary procedure.

2. The Commission shall inform the committee, for each of its meetings, of the current state of implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNICAL CONTENT

This specific programme fully reflects the approach embodied in the Fourth Framework Programme, applies its selection criteria and specifies its scientific and technological objectives.

Paragraph 4.B of Annex III, first activity of the abovementioned Framework Programme, is an integral part of this programme.

This programme will be implemented in synergy between other specific programmes in the field of life sciences and technologies, as well as in such fields as Telematics, Measurement and testing, and targeted socio-economic research.

CONTENT

Health is of the highest value for every European citizen. Health care is a first economic sector absorbing 7,25 % of the GDP and creating work for more than 6 million people or 7 % of the active population. There are more than one million qualified nurses, 850 000 medical doctors, 3 million hospital beds and 0,8 % of the population per day is in a hospital bed.

Research is essential to any strategy to improve health of the citizens and the competitiveness of the health industry. It is important to target the research towards projects of interest to the Community and consumers, and promote the transfer of research to clinical practice.

The challenge for health research is to combat the great scourges such as cancer, AIDS, cardio-vascular diseases, neuro-mental diseases and problems linked with age and handicaps. Rising health care costs have become a concern for all EC countries, while the European citizen is demanding more and more high-quality health care. New health technologies and health care systems are expected to face these common problems. The development of new medicines has become more and more expensive in both time and money, mainly due to the need to satisfy increasingly complex regulatory requirements which need to be streamlined with an international context.

Certain fundamental health problems the health industry of which the competitivity must be safeguarded and improved. Rather than adding a supplementary tone to substantial investments already made by the Member States and European industry, the Community research will bring added value by an integration action, by synergy of national efforts and by interaction of all disciplines from basic to clinical research towards problem-solving activities.

Measures intended to encourage participation of SMEs will be implemented, in particular technology stimulation measures and interactions between science parks and biomedical and health SMEs, as recommended by the White Paper on Growth, Competitiveness, and Employment.

With the launching of the Biomedical and Health Research Programme Biomed 1 within the Third Framework Programme, more than 6 000 research teams are collaborating within 400 networks designed to encourage cooperation between teams from all EC and EEA countries and between complementary disciplines, with a view to tackling health-related problems not readily solved in a narrower context.

Within the Fourth Framework Programme it is intended to go beyond concertation only and to participate in cost-sharing research where indicated only for specific task-oriented research. There are numerous priorities to establish taking into account the large variations in national health systems, research structures, health industries, clinical practices and therapeutic procedures. Only those proposals with a sound scientific concept, a high likelihood of success, a clear Community added value and contributing to the health and wealth of the European citizen will be selected.

RTD ACTIVITIES PROPOSED

The objectives on AIDS, tuberculosis and other infectious diseases; cancer; pharmaceutical research; brain research and research on the human genome will be realized by concentration of means whereas other objectives will mainly be dealt with concertation.

Research on AIDS, tuberculosis and other infectious diseases

Important progress in the battle against AIDS has been made through concertation of AIDS research at European Community level. Nevertheless the number of seropositives is growing. The immuno-suppression caused by HIV in infected people provides an opportunity for the occurrence of old diseases, already drug resistant in some areas, and for opportunistic cancers.

In a continuously changing industrial society which is characterized by a new permeability of borders, mobility of persons, immigration and a change of social behaviours, AIDS, tuberculosis and other infectious diseases will have an impact on the health welfare and quality of life in the European Union.

Focus will be placed on the integration of basic and clinical research in the following areas:

— Viro-immunological research, the genetics, molecular and structural biology of HIV and its variability.

— Contribution to the development of a safe and effective vaccine against AIDS and the establishment of markers to evaluate vaccine efficiency and to follow up the evolution of disease.

— The identification, synthesis and evaluation of antiviral compounds and drugs against AIDS.

— Clinical research, mainly focused on clinical trials, treatment of AIDS and opportunistic diseases, prognostic and progression of these diseases and the impact of therapeutic practices.

— Studies on the host response, pathogenesis, experimental models and new pathologies such as prions, and resistance mechanisms to conventional therapy, including the problem of hospital infections.

— Disease prevention, including the development of new specific monitoring systems to determine the distribution patterns of old and new infectious diseases, analysis of risk factors for the development of AIDS, opportunistic diseases and novel infectious agents.

— Socio-economic and health services research: requirements for caring and prevention, analysis of socio-economic consequences and forecasts in cooperation with public health research.

Cancer research

Improvements in cancer diagnosis, therapy and prevention require integrated fundamental and clinical approaches to research. It is particularly important to bring new advances in cellular, molecular and developmental genetics into contact with oncology and epidemiology, in order that new biological insights into the underlying causes of cancer allow for the development of novel approaches. The study of host-tumour interaction in the context of immune response and of somatic gene therapy targeted at cancer cells are fundamental together with epidemiological studies for investigating possible causative factors in carcinogenesis.

Subjects to be pursued in the field of cancer research

— Molecular mechanisms of tumorigenesis and metastasis, including characterization of the genes and proteins responsible. Together with human genome research, genetic factors of cancer predisposition.

— The control of normal cellular growth, differentiation and death, and abnormalities which can alter this to predispose to cancer, including the development of accurate cellular and transgenic models suitable for cancer research.

— Specific anti-tumour immune responses and possibilities for early detection and curative intervention.

— Research to support the effectiveness of systemic treatment modalities including cytotoxic agents as well as biological response modifiers.

— Research to improve the therapeutic ratio of radiotherapy as well in the domain of ballistic selectivity, as in the manipulation of radiation response in tumours and normal tissues.

— Quality of life as a parameter for treatment assessment including terminal care and rehabilitation.

Pharmaceuticals research

The general objective is the development of the scientific and technical bases required for the evaluation of new drugs, notably for the treatment of neurological, mental, immunological and viral diseases.

These actions should also underpin the activities of the European Medicines Evaluation Agency and provide it, at the international level, with the research-based background necessary to achieve harmonization of technical requirements for drug development. Research will be conducted through collaboration between industry, research centres, hospitals, universities, and the authorities responsible for verifying the efficacy, safety and quality of new drugs.

Research will be conducted mainly in the following areas:

— Pharmacotoxicology: Prevalidation research of *in vitro* alternative methods, possibly using human cells and tissues, and where unavoidable animal models, in the general aim of reducing, refining and replacing animal experimentation. Preference will be given to those tests which have reached the most advanced stages towards validation as those developed within the Biotechnology Programme. Prevalidation research on these tests should ideally provide the European Centre for the Validation of Alternative Methods with the best candidates for proper validation studies. The contribution of functional imaging to neuropharmacology research will also be explored.

— Pharmacovigilance: Development of systems for high performance surveillance networks for early detection of possible undesired effects of new drugs, in accord with the existing regulatory framework and with particular attention to the international harmonization efforts. It will include research on the exposure of patients to drugs, into harmonization of diagnostic terms and criteria, approaches to assess adverse drug reactions signals, analysis of vital statistics, transnational case-control studies, transnational registers and cohort studies.

— Clinical trials: To support intra-European collaboration in large, randomized clinical trials of high scientific quality, in order to stimulate better opportunities for improved diagnostic procedures, for therapies treatments as well as for their pharmacoeconomic aspects. The development of European clinical trials networks of high scientific standard would help an objective evaluation of new diagnostics of therapeutics in a shorter time while preserving its scientific value.

  Research in this field will be mainly directed towards the establishment of clinical trials registries, research into meta-analysis methodologies and randomized clinical trials for rare diseases, including a depository of orphan drugs available for clinical research at European level.

Brain research

The high prevalence of mental illnesses and the increasing incidence of neurodegenerative diseases represent an immense economic and social burden in the EU Member States, absorbing more than 20 % of all health care costs.

The new opportunities created by molecular biology and genetics, novel instrumentation and information technology will contribute to major advances in neurosciences and improvement in prevention and

treatment. Research which integrates fundamental aspects with clinical applications and industrial development will be encouraged.

In the field of brain research mainly the following areas will be promoted:

— Research on the physiopathology and basic mechanisms leading to nervous system diseases which should integrate molecular, cellular and clinical approaches.

— Research on central nervous system damage, regeneration and plasticity, development of therapeutic strategies for damage limitation, re-growth promotion and repair.

— Transdisciplinary research on the understanding of the genetic and immunological basis of nervous system diseases, in close cooperation with activities under human genome analysis and biotechnology programmes. Establishment of cell cultures and where necessary animal models of the human diseases of the brain for pathogenicity and development of therapeutic agents.

— Contribute to the development of better methods of brain imaging which combined with computer science will allow a better understanding of brain structures, functions and metabolisms, to map the distribution of proteins and other structures throughout the brain and to characterize the anatomical structures and psychological mechanisms interacting with cognitive function and dysfunction.

  This approach will integrate the contribution of several disciplines, together with biomedical engineering, and bring together the most advanced technologies and infrastructures scattered over Europe.

— Research into the mechanisms of pain including the development of new therapies and the conduction of clinical trials to evaluate the effectiveness of currently available therapies.

— Research on addiction behaviour which should integrate basic and clinical approaches, with the general aim of reducing drug demand.

— Development of combined epidemiologic and long-term prevention programmes to evaluate the impact of neurological and psychiatric diseases and the benefits of their treatment also in minorities and high risk groups.

— Research on cognitive sciences including development of models of neuronal behaviour, learning, memory and psycholinguistics.

Human genome research

The achievements, activities and infra-structure established in preceding programmes have to be consolidated and — where appropriate — to be modified, to serve future needs. Fundamental research, with its emphasis on functional studies in order to ensure that advances in genetics are used to enhance human health, will be supported. Development of appropriate technologies and applications which contribute to the well-being of patients will be stimulated. In particular, attempts will be made to develop somatic gene therapy where the conditions/acceptance in Europe justify a targeted effort, e.g. cystic fibrosis.

Sharing and harmonization of genetic databanks comprising European Community participation in the management of the international database of the human genome (GDB) will be promoted. Links will be maintained with appropriate international organizations or forums (e.g. the Human Genome Organization, HUGO).

The confidentiality of any personal information collected in the course of the research must conform to the best data protection practice. No research modifying, or seeking to modify, the genetic constitution of human beings by alteration of germ cells or of any stage of embryo development which may make these alterations hereditary, will be carried out under this programme.

Subjects to be studied in the field of human genome research

— Gene mapping and genome analysis, including construction of integrated transcriptional maps; sequencing of specific chromosomal regions; exploitation of comparative approaches.

— Analysis of gene function, including the improvement of techniques for gene targeting and the development of animal models, e.g. the mouse.

— Analysis of gene regulation, including identification of regulatory sequences; analysis of mechanisms of regulation of expression of specific genes, notably those involved in disease.

— Diagnosis of genetic disease, including non-genetic factors and development of protocols for risk estimation and for genetic counselling, with an emphasis on possible prevention.

— Somatic gene therapy, including development of vectors to transfer genetic material into cells *in vitro*; development of methods to deliver corrected genes *in vivo* effectively and safely; coordination of clinical trials on somatic gene therapy.

— Databases, including experimental data collection, storage, analysis and development of an integrated genome database.

— Technology development, including promotion of research aiming at the development of methods suitable for the achievement of any one of the abovementioned objectives.

Research on occupational and environmental health

The objectives are to improve the scientific knowledge needed to increase the safety and health protection of the workers in order to avoid accidents at the workplace and prevent work-related diseases and to reduce the environmental risks for the population.

The matters to be considered will be:

— identification and control of risk factors at the workplace and quantification of the exposure with an emphasis on biological and chemical hazards in short and long-term effects

— development of techniques of safety management, including the definition of good safety practice and the evaluation of its effectiveness in reducing morbidity

— health education and preventive measures to reduce accidents at work and exposure to risk factors

— the interaction between risk factors at the workplace and in the environment and the aetiology of occupation and environment related diseases.

Research on other diseases with major socio-economic impact

From all horizontal activities such as molecular biology, physiology, genetics, statistics, epidemiology and generic technologies, the ultimate measure stick for the European citizen is the benefit for him as an individual. The population expects basic answers by integration of basic and clinical research to improve the prevention, diagnosis and treatment of these illnesses with major socio-economic impact and the around 5 000 'orphan' illnesses which can be tackled optimally at an international level.

Cardiovascular research

In order to accelerate the pace of unravelling the physiopathological mechanisms leading to cardiovascular disease development and translate these findings into prevention and treatments, multidisciplinary research will be stimulated by combining the expertise of physicians and scientists with different backgrounds in basic and clinical cardiovascular research and in molecular genetics.

In the field of cardiovascular research mainly the following subjects will be addressed:

— Analysis of the cellular and molecular mechanisms leading to diseases of the heart and blood vessels, including research on cardiac and vascular cell growth, injury and repair; cardiovascular-associated inflammation.

— Development of clinically useful agents for injury or excessive growth prevention, damage limitation and repair.

— Research on the understanding of the genetic basis of cardiovascular diseases, including identification and decoding of genes, research on expression pattern, gene function and modification; where unavoidable development of animal models and therapeutic strategies.

— Clinical research including assessment, verification and definition of the exact contribution of current basic knowledge in order to understand the onset and development of clinical pathologies; validation of preclinical screening programmes as well as multi-center clinical trials for testing devices and therapeutic procedures.

— Research on imaging and non-interventional techniques that will enable studies of the structure, metabolism, and function of the heart and blood vessels.

— Research on combined epidemiologic and long-term prevention programmes including evaluation of possible differences in risks factors, impact of psychosocial factors on incidence and prevalence of cardiovascular diseases and the benefits of their treatment in high risks groups.

Research on chronic diseases and age-related problems

In view of the social and economic importance of the management of chronic diseases specific research will be focused on auto-immune diseases and immuno-genetics, T-cell disorders and priorities to transdisciplinary, integrative research in the specific domains of chronic arthritis, diabetes mellitus, asthma and respiratory problems.

Orphan illnesses research

'Orphan' illnesses are these rare diseases (some 5 000) where the subsidiarity principle is obvious. No country in itself can afford to spend the necessary resources and case mix to implement basic and clinical research at the low number of cases occurring at national level. Nevertheless at an EC level as well as at a general scientific level these 'exceptional' cases turn out to be quite similar and to offer exceptional experiments by nature to do in-depth research on the basic mechanisms of diseases and handicaps and to offer opportunities to link genetic research with biochemical and physical expression of disease. Examples are thallassemia; inborn metabolic diseases due to defective peroxisomes, etc. Actions will include an inventory of rare disorders and together with the section on pharmaceutical research a depository of orphan drugs for clinical research.

Public health research, including health services research

More than 110 000 deaths under age 65 from 21 common diseases would be avoided annually, if only each European region could attain the optimal death rates reported nationally for each of those diseases.

Traditions, practices and the legal and administrative organization of public health services and systems are so varied in Member States as to render impractical any harmonization of services in this domain. However, objectives of research should be to assist Member States in strengthening their coverage of public health issues, assist in the formulation and implementation of objectives, policies and strategies, and contribute to continuity of health protection provision across the European Union.

Subjects to be pursued in the field of public health research

— Research on health education and prevention, primary care, asessment of health needs, including the needs of emerging dependency groups, performance measurements of health policy initiatives and the evaluation of health technologies.

— Coordination and comparison of European health data.

— The impact of the Internal Market on supply of health care across internal frontiers; regulations and de-regulations as well as the balance between health systems financed by the private and public sectors.

— Health economics and organizational aspects of health systems.

— Defining a European approach for the introduction of new technologies in health systems.

Research on biomedical technology and engineering

Health technology assessment and prenormative research become more important in a European-wide market with its directives concerning medical devices and accompanying standardization activities. For industry as well as for decision-makers at all levels, to safety, it is essential to have an addition to needs for safety, timely access to objective information on efficacy and efficiency of medical devices, before introducing these on the health market.

Research and development will be promoted mainly in the following areas:

— Minimal intervention techniques and robotics: robotics, three-dimensional imaging, micro structure technology and 'nanotechnology' to support surgical therapy, and widen the range of clinical indications

for minimal medical interventions; new ergonomic approaches of the operating theatre for minimally invasive surgery.

— Imaging techniques: magnetic resonance, ultrasound, biomagnetism, positron emission tomography, etc., as well as microwave imaging and near infrared spectroscopy and imaging; comparative and integrated evaluation of different biomedical imaging technologies.

— Research on biosensors, especially with regard to their clinical value, as among others is the case of glucose monitoring for diabetes, oxygen monitoring and ion sensing for critical care.

— Meeting the needs of the increasing population of elderly and handicapped persons calls for more research on rehabilitation technology in coordination with the relevant parts in the Telematics Programme. The powerful trend towards replacement in medicine requires more research in biomaterials, especially towards improved mechanical properties and biocompatibility of polymers, as well as on artificial organs, such as on artificial heart and artificial pancreas. Research aiming at the modelling of human functions, as well as in biomechanics, haemodynamics and bio-rheology, is also required in that respect.

— Cellular engineering: synergistic benefits would accrue by combining cell and molecular biology with chemical, mechanical and electrical engineering, opening new possibilities for clinical applications.

Research on biomedical ethics

Research on biomedical ethics, being of a horizontal nature, will address general standards for the respect of human dignity and the protection of the individual in the context of biomedical research and its clinical applications. The social impact and the public awareness of the problems associated with biomedical progress will be addressed.

Topics to be considered more specifically are:

— Medically assisted procreation, including gender selection, preimplantation- and prenatal diagnosis, research on embryo, use of foetal ovarian tissue, post-menopausal pregnancy, sperm and egg donation.

— Human genome analysis and its clinical applications, including testing, screening and somatotherapy.

— End of life, including palliative care, euthanasia, artificial prolongation of life by advanced medical techniques, resuscitation.

— Research allocation: ethical and social dimensions of the choices to be made in health budgets and resource allocation.

— Organ and tissue transplantation including the use of human organs and tissues, as well as the functioning of tissue and organ banks.

— Patient's consent: informed consent of the individual for diagnosis, therapy, prevention or research, including the consent of vulnerable populations like e.g. prisoners and cognitively impaired patients.

— Confidentiality and privacy considering medical data, genetic and non-genetic, with an emphasis on the specific problem raised by modern information systems such as computerization with automatic data transfer.

Objectives dealt with horizontal activities

Research activities on biomedical ethics carried out within biomedical and health research and the activities on the ethical, legal and social aspects carried out by the horizontal unit 'legal and ethical aspects' will be performed jointly in order to benefit from interdisciplinary competences.

In order to improve dialogue and mutual understanding between the main national, sociopolitical and bioethical positions, whilst recognizing the cultural differences which exist in Member States, working groups will be organized to prepare reports and surveys of interest also to the European Parliament and the Council. Targeted workshops to identify and debate areas of national and international divergences and, where appropriate, research activities with multidisciplinary approaches to such topics will be carried out. Public awareness activities on new biomedical technologies will also be funded. This horizontal activity takes into account the European Bio-ethics Convention and its draft Protocols.

Wherever possible, experimentation and testing on animals should be replaced by *in vitro* or other methods. No research modifying, or seeking to modify, the genetic constitution of human beings by alteration of germ

cells or of any stage of embryo development which may make these alterations hereditary, nor research seeking to replace a nucleus of a cell of an embryo with a nucleus taken from a cell of any person, embryo or subsequent development of an embryo, known as cloning, will be carried out under any of these three Specific Programmes.

Demonstration activities within biomedical and health research will facilitate comparative European multi-centre trials of new drugs, new therapeutic approaches, and ready-for-testing prototypes of new medical devices. Special attention will be given to demonstration of the latest technologies in clinical diagnostics and imaging technologies, implantable sensors for the monitoring or rehabilitation of pathological conditions, artificial organs, biocompatible materials, new cancer therapies and irradiation technologies. A bottom-up approach will be used, in cooperation with other life sciences programmes, to identify the best opportunities for pre-competitive demonstration, in order to prove the technical viability of these new technologies, together with, as appropriate, their economic advantage at a pre-competitive level. The early involvement of hospitals and clinicians in these demonstrations will allow for an efficient dissemination of knowledge and a quick realization of the benefits to be derived from the adoption into practice of such innovative approaches, drugs and devices. While keeping as a first priority the benefits for patients, demonstrations in these areas will take into account the specific needs of the biomedical engineering and pharmaceutical industries and health care delivery organizations, and will be implemented by partnerships involving these manufacturing industries, the health profession, the health-care providers and health authorities.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Areas of budget priority A:	approximately 85 %
Research on AIDS, tuberculosis and other infectious diseases	13—20 %
Cancer research	16—20 %
Pharmaceutical research	12—18 %
Brain research	13—19 %
Human genome research	11—17 %
Areas B:	approximately 15 %
Research on occupational and environmental health	
Research on other diseases with major socio-economic impact	
Public health research, including health services research	
Research on biomedical technology and engineering	
Research on biomedical ethics	
Total	100 % (1) (2) (3)

(1) Including 3,5 % for expenditure on staff and 5,0 % for administration expenditures.
(2) Including 3 MECU for the dissemination and exploitation of results.
(3) Between 3 et 6 % of the funds will be allocated to horizontal demonstration activities; between 1 and 2 % of the funds will be allocated to horizontal activities on ethical, social and legal aspects; 5 % of the funds will be allocated to horizontal training activities.

The breakdown between the different domains does not exclude projects which cover several sectors.

ANNEX III

RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results, will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

   Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

   — in the Community, or

   — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre

1.1. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations

1.2. Participation in the area of 'Human genome analysis' is open, without Community financial support, to any legal entity, on condition that its participation is in the interests of Community policies.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be implemented through indirect actions, i.e. Community funding of RTD activities carried out by third parties or by JRC institutes associated with third parties.

   2.1. Shared cost actions including the following types:

   — industrial RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects which work on a common subject;

   — the basic research projects within the thematic networks to be created around genetic technologies of a strategic importance for the European industry, involving enterprises, research centers and universities;

   — technology stimulation which should encourage and faciltiate the participation of SMEs by supporting the exploratory stage (including the search for partners) of RTD actions and by cooperative research. This award will be granted after selection of outline proposals which may be submitted at any time;

   — support of financing infrastructures or facilities necessary for the performance of a coordination action (reinforced coordination activity)

   — demonstration activities, as defined in Annex III of the Framework Programme, intended to overcome the obstacles hindering the utilization of new technologies and to build the bridge between technology producers and users. Feasibility awards and direct assistance to those who get involved in these technologies may also be included;

   2.2. Concerted actions, which coordinate, in particular through concertation networks, RTD and demonstration projects already funded by public authorities or private organisms. The concerted

actions may also perform the coordination needed for thematic networks which, through RTD shared cost actions (cf. 2.1. (a), first indent), bring together, focusing on the same technological or industrial goal, producers, users, universities and research centres.

2.3. Specific measures, such as those encouraging standardization, and those measures intended to set up general service tools for research centres, universities and enterprises. Community contribution will be up to 100 % of the costs of these measures.

2.4. Preparatory, accompanying and support measures, including the following types:

— studies in support of this programme and in preparation of possible future actions;

— conferences, seminars, workshops or other scientific or technical meetings, including intersectorial or multidisciplinary coordination meetings;

— use of external expertise, including access to scientific data bases;

— scientific publications, including dissemination, promotion and exploitation of results (in coordination with the activities carried out in the Third Action);

— assessment studies of socio-economic implications and also of possible technological risks associated with all projects of this programme and in coordination with the programme targeted socio-economic research;

— training activities linked to the research carried out under this programme;

— independent evaluation (including studies) of management and results of programme activities;

— measures of support to the operation of networks for increasing awareness and for decentralized assistance in favour of SMEs, in coordination with the Euromanagement RTD audits actions.

The diffusion and valorization of results obtained in this programme will be complementary to those carried out by the Third Action and will be implemented in close coordination with it. The networks of partners of RTD projects are the principal mechanisms of dissemination and valorization of results. They will be reinforced with publications, conferences, promotion of results, studies of the techno-economic potential, etc. In order to ensure optimal exploitation all those factors which may facilitate the utilization of results will be considered at the start of the projects and whilst they are in progress.

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development)

(1994—1998)

(94/C 228/10)

(Text with EAA relevance)

COM(94) 68 final — 94/0088(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by its Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities of research, technological development and demonstration (hereinafter RTD), for the period 1994 to 1998, specifying, in particular, the activities to be pursued in

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

Whereas this Decision should be taken in the light of the grounds set out in the preamble to the aforesaid Decision;

Whereas Article 130 I (3) of the Treaty stipulates that the Framework Programme is to be implemented through Specific Programmes developed within each activity; whereas each Specific Programme shall define the detailed rules for implementing it, fix its duration and provide for the means deemed necessary;

Whereas this programme is implemented mainly through shared cost and concerted actions and accompanying and support measures;

Whereas in accordance with Article 130 I (3) of the Treaty, it is appropriate to make an estimate of the means deemed necessary for the realization of this specific programme; whereas the funds effectively available shall be determined by the budgetary authorities according to the relative priorities given within the First Action of the Fourth Framework Programme;

Whereas the Decision . . ./. . ./EC (Fourth Framework Programme) foresaw that the overall maximum amount available for the Fourth Framework Programme will be reviewed no later than 30 June 1996 in view of being increased, and that as a result of this review, the amount deemed necessary to implement the present programme could be supplemented;

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:

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

— the evolution of community policies (especially agriculture and fisheries);

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

— contributing to sustainable development, the preservation and improvement of rural and coastal development.

Whereas this programme can contribute markedly to the stimulation of growth, to the reinforcement of competitiveness and to the development of employment within the Community as indicated in the White Paper 'Growth, Competitiveness and Employment' [1].

[1] Doc. COM(93) 700 final of 5. 12. 1993.

Whereas the contents of the Fourth Framework Programme for Community RTD activities have been defined in conformity with the principle of subsidiarity; whereas this programme further sets out detailed contents of activities to achieve in conformity with this principle in the field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development);

Whereas the Decision . . ./. . ./EC (Fourth Framework Programme) foresees that a Community activity is required if, among other reasons, the research contributes to the economic and social cohesion of the Community and encourages the overall harmonious development of the quality of its science and technology and that the present programme is supposed to contribute to the realization of these objectives;

Whereas this programme and its implementation should contribute to improving the synergies between the RTD activities in the field of agriculture and fisheries (including agro-industry, food technologies, forestry, aquaculture and rural development), by research centres, universities and industry, in particular small and medium-sized enterprises (SME), established in the Member States, and between these and the corresponding Community RTD activities;

Whereas the rules for the participation of industry, research centres (including the JRC) and universities, as well as the rules governing the dissemination of research results, are laid down in the measures provided for in Article 130 J;

Whereas for the implementation of this programme, besides associating the countries which are members of the European Economic Area (EEA), other international cooperation activities might be necessary, in accordance with Article 130 M, with other third countries and international organizations;

Whereas the implementation of this programme also implies activities for the disseminaton and exploitation of RTD results, in particular towards small and medium sized enterprises, particularly those located in Member States or regions which have the lowest participation in the programme, as well as activities to promote mobility and training of researchers carried out within this programme developed in this present programme and in so far as necessary for its adequate implementation;

Whereas the implementation of this programme requires to provide for measures intended to encourage participation of SME's, in particular technology stimulation measures;

Whereas an assessment should be made of the socio-economic impact of activities undertaken in this programme;

Whereas, on the one hand, this programme's state of implementation should be reviewed in a permanent and

systematic way, in order to adapt it, where necessary, to the scientific and technological developments in this field; and on the other hand, an independent evaluation should be conducted, in due time, on the results achieved by the programme, in order to provide every appropriate information as necessary to determine the goals of the Fifth RTD Framework Programme; whereas, a final evaluation will be necessary at the end of the programme to assess the results obtained in terms of the objectives defined in this Decision;

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

Whereas the JRC shall also contribute through its own direct actions programme to the implementation of the research included in the present programme;

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

HAS ADOPTED THIS DECISION:

Article 1

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) as defined in Annex I is hereby adopted for a period beginning on (date of adoption) and ending on 31 December 1998.

Article 2

1. The funds estimated as necessary for the execution of the programme amount to ECU 607 millions, including 7,3 % for staff and administrative expenditure.

2. An indicative allocation of funds is set out in Annex II.

3. The funds estimated as necessary as indicated above may be increased. As a result of and in conformity with the Decision mentioned in article 1 of paragraph 3 of the Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall lay down the available appropriations for each financial year in agreement with the scientific and technological priorities fixed by the Fourth Framework Programme.

Article 3

Detailed rules for the implementation, besides those provided for in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I, and in particular whether the objectives, the priorities and the funds are still adequate to the changing situation. Where necessary, this review shall be accompanied by proposals to adapt or complete this programme, in accordance with the review's conclusions.

2. In order to contribute to the global assessment provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, an evaluation of the management and the results achieved by the activities undertaken in the field covered by this programme, during the five years preceding the evaluation, shall be conducted in due time for the Commission by independent experts.

3. At the end of this programme, the Commission shall conduct a final evaluation by independent experts of the results obtained concerning the objectives defined in Annex III of the Fourth Framework Programme and in Annex I of this Decision. It shall submit the final evaluation report 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 outlined in Annex I and will, as required, be implemented. It will define in detail the scientific and technological objectives and identify the steps for the implementation of the programme as well as the necessary finance for each method of implementation.

The work programme can also allow participation in some activities originating from the Eureka framework.

2. The Commission shall make 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. For measures foreseen in Article 7 (1), the Commission shall be assisted by a Committee, composed of representatives of the Member States and chaired by a representative of the Commission.

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 provided for in Article 148 (2) of the Treaty as regards adoption 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.

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

When the measures envisaged are not in accordance with the committee's opinion, or if no opinion is delivered, the Commission shall withut delay submit to the Council a proposal relating to the measures to be taken. The Council shall act by qualified majority.

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

Article 7

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

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

— the assessment of the projects proposed for a Community contribution and of the estimated amount of this contribution on a project basis, where this amount exceeds ECU 0,5 million,

— the measures to be undertaken to evaluate the programme,

— any adaptation of the indicative breakdown of the amount set out in Annex II, not having been decided through the budgetary procedure.

2. The Commission shall inform the committee, for each of its meetings, of the current state of implementation of the programme as a whole.

Article 8

The Commission is hereby authorized, in accordance with Article 228 (1) of the Treaty, to open the necessary negotiations for the conclusion of international agreements with European third countries, with a view to associating them with all, or part, of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

OBJECTIVES AND SCIENTIFIC AND TECHNOLOGICAL CONTENT OF THE SPECIFIC PROGRAMME

The Specific Programme fully reflects the approach embodied in the Fourth Framework Programme in terms of the selection criteria and the scientific and technical goals which it pursues.

Paragraph 4.C of Annex III, first activity of the abovementioned Framework Programme is an integral part of this programme.

The economic sectors encompassed by this programme can be divided into four groups: the primary sector (agriculture, horticulture, forestry, fisheries); the 'input' industries (e.g. seeds, juveniles for aquaculture, fishing technology and inputs for fisheries, machinery, chemicals, fertilizers, feed, etc.); and the processing industries (wood, paper, pharmaceuticals, food, sugar and starch industries, bioenergy, etc.) and other rural and coastal activities. These large sectors include large companies 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.

The major Community policies of agriculture, rural development, fisheries, environment, and the Internal Market apply to primary production and to the final transformation industries. The developments which will arise from activities under this programme will contribute to these policies and the improvement of

European primary production in agriculture, fisheries, forestry and the downstream industries and users. The major challenge in this area is to contribute to a better match between the production and utilization of biological raw materials in Europe, in particular through the improvement of their original quality. New markets and products will have to be developed for raw materials produced by agriculture, forestry and fisheries which meet the demands and requirements of the end users.

Research in this aera will provide a strong scientific research base for a competitive, efficient and sustainable primary production and agro-industrial sector; to support the evolving Community policies (especially the major Community policies of agriculture, rural development, fisheries, environment and the Internal Market) and to respond to societal needs for a wide range of healthy and nutritious food, and new non-food products which are produced compatible with the environment.

Research should seek to increase competitiveness, efficiency and viability of the agricultural, fishery sectors and related industry sectors, promote rural development and 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 environmentally safe 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, health and environmental implications of new food and non-food products for which it is clear there is a demand from the public.

Prenormative research will be initiated and supported in order to provide a sound scientific base for the setting of standards and regulations relating to the production 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. In order to reduce project costs, the scale of operations for demonstration projects will be the minimum scale required to obtain reliable practical information about the performance of new systems 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 inter-disciplinary 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 manufacturing companies, user services, and related public bodies.

An integrated approach in biomass-bioenergy will be used covering the whole bioenergy chain including production and combined processing of agricultural raw materials, conversion and use of these materials for energy purposes.

In order to improve dialogue and understanding between the main national and sociopolitical bioethical positions, whilst recognizing the cultural differences which exist in Member States, research will be undertaken to investigate ethical, legal and social aspects of the sectors included in this programme.

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.

Objectives requiring concentrated means

Integrated production and processing chains:

There is the potential in the agro-industrial sector to create significant new markets which will utilize biological raw materials from Europe. Bio-based non-food products will often have to compete with established products and it is essential to optimize the complete production chains in order to develop economically feasible opportunities and to generate the optimal qualities.

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 higher value-added novel bio-based 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 which will focus on all aspects of major crop group chains. These projects will encompass the primary production of the crop group (for example cereals), the processing to food and/or non-food end-use products. It should bring together the necessary critical mass so as to create a significant impact, within the short to medium-term, on the development of new technologies and products within each major crop group chain.

There are 5 lines envisaged: Industrial uses for cereal crops; Industrial uses for vegetable oil crops; industrial uses for protein crops; forestry-wood-chain; and biomass for energy and non-food uses.

An integrated approach in biomass-bioenergy is necessary to ensure consistency and relevance of Community RTD activities covering the whole bioenergy chain in its technical and non-technical aspects (including e.g. energy balance, cost effectiveness, policy aspects, etc. . .): production and combined processing of agricultural raw materials, conversion and use of these materials for energy purposes.

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.

Scaling-up and processing methodologies:

The transfer from laboratory to industrial scale is characterized by major problems and bottlenecks, such as homogeneity of raw material supply, fluid dynamics, heat transfer, flocculation, product recovery, equipment, etc. Improved methodologies will be developed for designing and testing innovative agro-industrial processes and for the application of biotechnology, while reducing the economic risks currently associated with investing in new technology.

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. In particular the development and improvement of methodologies (e.g. specialized instrumentation, structured models, and simulation methods) used for scale-up, design and testing of agro-industrial processes will be jointly developed.

The upstream 'green' bio-based 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 by-products from fermentations and other processing industries will be undertaken.

These activities will be complementary to and synergistic with the fundamentally oriented bioprocessing activities within the Biotechnology programme and the more applied activities within the Industrial Technologies Programme.

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 higher quality, more nutritious and health promoting diet.

Generic technologies will be developed by the application of biotechnology to produce commercial crops with enhanced performance, improved production efficiency and nutritional 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 a multidisciplinary, molecular and cellular physiological approaches which will support new advanced technologies for the food quality, safety and wholesomeness, including freshness and spoilage of seafood.

Community activities will concentrate on methods for the quantification of quality, origin identification, wholesomeness attributes, control methods, basic food science (structures, interactions), food functionality *in-vivo* and *in-vitro*, novel processing technologies, equipment and products (emphasizing biotransformation/biotechnology), and implications of these for consumer behaviour. 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.

Agriculture, forestry, rural development, and fisheries and aquaculture:

The research in this area has the goal of accompanying and evaluating the Community policies and the identification of solutions to face the changing rural and coastal world. The need is to develop new production systems which are economically viable, which are both protective of 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 and non-food products and farming activities, and by cost-reductions.

In the forestry sector, research should contribute to an overall achievement of the objectives for the protection and the long-term development of forests adopted at the World Summit at Rio de Janeiro in 1992 and on the occasion of Ministerial Conferences on the protection of forests in Europe (Strasbourg 1990 and Helsinki 1993) and a better utilization of forests production and the divers functions of the forest. Finally, research should improve the scientific base which underpins the implementation of the rural development policy.

An improvement of the economic situation of aquaculture and fisheries will be sought by means of quality of products, diversification of products (food and non-food) and activities and by a reduction of costs.

Agriculture, forestry and rural development

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 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 also be found.

In this context the priorities should be: evaluation of environmental impact of agricultural practices, reduction and optimal use of inputs, uses for set-aside lands, adaption of production chains.

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

These activities, of which the results should be directly applicable to agriculture will be complementary to those of a more fundamental character within the 'Biotechnology' programme and also to those of commercial 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 drops, creation of new genotypes or varieties leading to a reduction in use of inputs, by means of biotechnology and use of micro-organisms and resulting in reduced costs of production. 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 analysis of the ex-ante and ex-post impact of instruments of the CAP, the elaboration of economic forecasting models or other instruments of quantitative analysis, of information systems and decision support for farmers and decision makers.

Quality policy: In the area of quality 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 as high as possible income for primary producers.

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 the consumer behaviour, on the scientific bases for the promotion of agricultural primary products.

Diversification of production, farming sector activities and new land uses: Diversification of production and the farming sector activities as well as new uses of agricultural land require a research effort for the identification and analysis of all possibilities, without exception (food and non-food). Likewise the technical and economic references will be equally defined and contribute to the highest possible development, favouring a multidisciplinary approach in this context.

It will be necessary to strengthen the scientific base relating to diversification and re-orientation of production towards food and non-food products (including renewable energies) and well as the development of complementary activities for farmers (e.g. agri-tourism, farm crafts, agri-forestry, etc.). Particular attention will be given to the economic viability and the compatibility of these new primary productions and activities which regard to respect for the environment.

Animal and plant health, animal welfare: Research should provide scientific and technical support for the development and management of Community norms and regulations especially in the context of the large Internal Market and the responsibilities 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.

Utilization of biotechnology should also contribute to the development of detection tests and diagnostic methods to combat animal and plant diseases.

Multifunctional management of forests: Following the United Nations Conference on the Environment and Development, the Community is resolutely committed to the protection and sustainable development of forests. At the Ministerial conferences on the protection of forests in Europe (Strasbourg 1990 and Helsinki 1993) it is committed to actively contribute to a series of co-ordinated activities at European level leading to improved protection and an ecologically viable management of forests resources. 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.

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—1999. Themes which will be important are the following: tool methodologies for the assessment, monitoring and evaluation of rural development programmes and measures, analysis of policies to improve agricultural structures and rural development, 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, 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.

Fisheries and aquaculture

The overall objective is to allow a better knowledge and understanding of the marine ecosystem, especially the interactions between the environment, fishing activities and aquaculture (including the development of technology which reduces environmental impact), in order to establish conditions leading to a balanced exploitation of the fisheries and aquaculture resources of the Community. 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.

Work in this sector will be targeted on five areas:

— Impact of environmental factors on marine resources: The objective is to generate a better understanding of the influence of environmental factors on key biological parameters (recruitment, distribution, natural mortality etc.). This work, where appropriate, will link with activities within the Marine Science and Technology Programme.

— Environmental impact of fisheries and aquaculture activities: The objective is to generate a better knowledge and understanding of the effects that fisheries and aquaculture have on the ecosystem 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) with the aim of ensuring the conditions for a balanced exploitation of fisheries and aquacultured resources at the Community.

— 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 to make the industry economically profitable without being detrimental to the environment. Special emphasis will be put on the genetic adaptation of aquacultured species, together with pathological issues and multi-disciplinary approaches. Furthermore, investigation of 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 connected industries. Particular emphasis will be placed on multi-disciplinary studies.

— Improved methodology: The aim is the improvement of existing methodologies with emphasis on the collection of data and the development of new instruments and techniques.

Objectives addressed by concertation

In areas where Member States have extensive programmes, the focus will be on concertation of these efforts in order to optimize the overall efficiency. 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;

— Rural and coastal development: The RTD activities at Member State level, which could be relevant to rural and coastal development, are quite disperse. 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, safety, health and socio-economic aspects 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 and costal development.

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.

In certain areas of competence, complementary activities will be implemented by the JRC, in close collaboration with national laboratories, particularly in the areas of analysis and technical support to the CAP and CFP.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT AMONG THE AREAS

Objectives requiring concentrated means	
Area 1: Integrated production and processing chains	14—16 %
Area 2: Scaling-up and processing methodologies	6— 8 %
Area 3: Generic sciences and advanced technologies for nutritious foods	15—17 %
Area 4: Agriculture, forestry and rural development	36—38 %
Area 5: Fisheries and aquaculture	16—18 %
Objectives addressed by concertation	
Area 6: (of which 2 % to fisheries, 3 % to agriculture and 3 % to agro-industrial research)	8 %
Total	100 % (1) (2) (3) (4)

(1) 3,3 % will be allocated to personnel costs and 4,0 % to administration costs.
(2) 6 MECU will be allocated to dissemination activities and valorization of results.
(3) Between 4 and 8 % of credits will be allocated to horizontal demonstration activities; between 1 and 2 % of credits will be allocated to the horizontal activities on ethical, social and legal aspects; between 5 and 7 % will be allocated to training activities.
(4) An amount of 77 MECU which is the difference between the estimated amount necessary for this programme and the amount foreseen within the Fourth Framework Programme of RTD for agriculture and fisheries (including agro-industry, food-technologies, sylviculture, aquaculture and rural development), is specified in the 'specific programme of RTD to be realized by means of direct actions and support activities for S/T, which form part of a framework of competitive approach'.

The breakdown above does not exclude that projects could cover more than one area.

ANNEX III

RULES FOR IMPLEMENTING THE PROGRAMME

1. The rules for the financial participation by the Community are set out in Annex IV of the Decision adopting the Fourth Framework Programme. The rules for the financial participation of undertakings, research centres, and universities, as well was the rules governing the dissemination of research results, are specified in the measures foreseen in Article 130 J of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Communities policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be implemented through:

2.1. Shared cost actions including the following types:

   — the RTD projects carried out by enterprises, research centres and universities, including consortia for integrated projects which work on a common subject;

   — the basic research projects within the thematic networks to be created around generic technologies of strategic importance, involving enterprises, research centres and universities;

   — technological stimulation which should encourage and facilitate the participation of SMEs by supporting the exploratory stage (including the search for partners) of RTD actions and by cooperative research. This award will be granted after selection of outline proposals which may be submitted at any time;

   — support of financing infrastructures or facilities necessary for the performance of a coordination action (reinforced coordination activity);

— demonstration activities, as defined in Annex III of the Framework Programme, intended to overcome the obstacles hindering the utilization of new technologies and to build the bridge between technology producers and users. Feasibility awards and direct assistance to those who get involved in these technologies may also be included.

2.2. Concerted actions, which coordinate, in particular through concertation networks, RTD and demonstration projects already funded by public authorities or private organisms. The concerted actions may also perform the coordination needed for thematic networks which, through RTD shared cost actions (c.f. 2.1, first indent), bring together, focusing on he same technological or industrial goal, producers, users, universities and research centres.

2.3. Specific measures, such as those encouraging standardization, and those measures intended to set up general service tools for research centres, universities and enterprises. Community contribution will be up to 100 % of the costs of these measures.

2.4. Preparatory, accompanying and support measures, include the following types:

— studies in support of this programme and in preparation of possible future actions;

— conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings;

— use of external expertise, including access to scientific data bases;

— scientific publications, including dissemination, promotion and exploitation of results (in coordination with the activities carried out in the Third Action);

— assessment studies of socio-economic implications and also of possible technological risks associated with all projects of this programme and in coordination with the programme Targeted Socio-economic Research;

— training activities linked to the research carried out under this programme;

— independent evaluation (including studies) of management and results of programme activities;

— measures of support to the operation of networks for increasing awareness and for decentralized assistance in favour of SMEs, in coordination with the Euromanagement-RTD audit actions.

The dissemination and exploitation of results obtained in this programme will be complementary to those carried out by the Third Action and will be implemented in close coordination with it. The networks of partners of RTD projects are the principal mechanisms of dissemination and valorization of results. They will be reinforced with publications, conferences, promotion of results, studies of the techno-economic potential, etc. In order to ensure optimal exploitation all those factors which may facilitate the utilization of results will be considered at the start of the projects and whilst they are in progress.

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of non-nuclear energy 'Technologies for cleaner and more efficient energy production and use' (1994—1998)

(94/C 228/11)

(Text with EEA relevance)

COM(94) 68 final — 94/0089(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—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 130 i (3) of the Treaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted activities and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130 i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the area covered by this programme within activity I under the Fourth Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas the promotion of energy technologies, including the demonstration of those technologies and pursued by Regulation (EEC) No 2008/90 [1], ends on 31 December 1994, it is desirable to assure that the demonstration activities continue after this date;

Whereas the objective of the Community's activities 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 (competitiveness and economic and social cohesion);

Whereas the employment situation in the Community and the competitiveness of the European industry may be substantially improved by the development and by a wider utilization of efficient energy technologies;

Whereas the Council resolution of 16 September 1986 stipulates that one of the horizontal objectives of the energy policy of the Community is continuous and reasonably diversified promotion of technological innovations and appropriate dissemination of the result throughout the Community; 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 the Community's 1973, 1977, 1983 and 1987 action programmes on the environment stress the

[1] OJ No L 185, 17. 7. 1990.

importance of reducing and preventing air pollution; whereas climate change is one of the central issues covered by the 1993 Community programme of policy and action in relation to the environment and sustainable development, which places the accent on the need for action in the relevant branches of the economy to limit emissions of CO_2 and other greenhouse gases;

Whereas at its meeting in Dublin in June 1990 the European Council called for the earliest possible adoption of objectives and strategies to limit emissions of greenhouse gases;

Whereas RTD projects to harness the potential indigenous energy resources of individual regions, particularly of the less-developed regions, helps to strengthen the economic and social cohesion of the Community, an objective which, pursuant to Article 130 b of the Treaty, must be taken into account in the implementation of the Community's policies and of the internal market;

Whereas the present programme can contribute significantly to the economic growth, to the re-enforcement of the competitiveness and to the development of employment in the Community as stated in the White Paper 'Growth, Competitiveness, Employment' [1];

Whereas the content of the Fourth Framework Programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this Specific Programme sets out the content of the activities to be carried out in accordance with this principle in the field of non-nuclear energy;

Whereas Decision .../.../EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

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 small and medium-sized enterprises, in the Member States and between the latter and the corresponding Community RTD activities;

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

Whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular targeting small and medium-sized enterprises, and in particular those in Member States or regions which participate least in the programme, as well as activities promoting the mobility and training schemes for researchers within this programme to the extent necessary for proper implementation of the programme;

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

Whereas basic research in the field of non-nuclear energy must be encouraged because of the particularly long lead time for energy technologies between discovery and characterization of a process or product and technical application of marketing thereof, plus the time to gain acceptance by the public at large and economic circles;

Whereas it is necessary, as the Fourth Framework Programme indicates, to assure the synergy between research and development and the demonstration and that the two phases of the RTD are integrated into the same energy RTD strategy on the Community.

Whereas an effective policy on non-nuclear energy must take account of the various regional dimensions and must be conducted in concertation with the Community policy instruments likely to affect the energy scene, such as the Structural Funds, international cooperation (including the Eureka programme) or regulatory and fiscal measures;

Whereas financial support should be granted, in appropriate cases, to projects to demonstrate advanced energy technologies;

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

Whereas the JRC will also contribute, through its own programme of direct activities, to the attainment of the

[1] Doc. COM(93) 700 final of 5. 12. 1993.

Community RTD objectives in the areas covered by this programme;

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this programme;

Whereas progress with this programme should be continuously and systematically monitored with a view to adapting it, where apprpriate, 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 Scientific and Technical Research Committee (Crest) has been consulted,

HAS ADOPTED THIS DECISION:

Article 1

A specific research, technological development and demonstration programme in the field of non-nuclear energy, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

It covers both the research and technological development phase and the demonstration phase of the programme.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 967 million, including 5,3 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objective set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activity provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the fields directly covered by this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 for each one of the two phases of the programme: research and development and demonstration. This programme shall be updated where appropriate. It shall set out the detailed scientific and technological objectives and specify the stages in the implementation of the programme and the corresponding financial arrangements.

The work programme may also, where appropriate, include specific arrangements to improve interaction with the preparatory phases of certain Eureka projects.

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, regarding the R&D programme, by an advisory committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The representative of the Commission shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the Chairman may lay down according to the urgency of the matter, if necessary, by taking a vote.

The opinion shall be recorded in the minutes; in addition, each Member State shall have the right to ask to have its position recorded in the minutes.

The Commission shall take the utmost account of the opinion delivered by the committee. It shall inform the committee of the manner in which its opinion has been taken into account.

3. Regarding the demonstration part of the programme the Commission shall be assisted by a committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The representative of the Commission shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit which the chairman may lay down according to the urgency of the matter. The opinion is by majority vote taken as laid down in Article 148 (2) of the Treaty for the adoption of the Council Decisions when called to take a vote at the request of the Commission. The votes within the committee are weighted according to the weights defined in the article above. The chairman has no vote.

The Commission shall execute the Decisions that can be implemented immediately. However, if they are not in accordance with the opinion expressed by the Committee, the Commission must inform the Council of these measures.

In that event:

The Commission may defer application of the measures which it has decided for a period of not more than one month from the date of such communication.

The Council, acting by a qualified majority, may take a different decision within the time limit referred to in the previous paragraph.

Article 7

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

— the conception and setting-up of the R&D work programme referred to in Article 5 (1),

— the evaluation of the R&D projects proposed for funding by the Community and the Community contribution deemed necessary, whenever the cost of the project exceeds 0,5 MECU.

— the measures to be undertaken to evaluate the R&D programme,

— any changes to the indicative breakdown of the amount allocated as in Annex II regarding R&D not provided for by a budgetary decision.

2. The procedure laid down in Article 6 (3) shall apply to:

— the conception and setting-up of the work programme for the demonstration (including dissemination activities) as laid down in Article 5 (1);

— the selection of the demonstration projects proposed for funding by the Community and the Community contribution deemed necessary whenever the costs of the project exceeds 0,5 MECU.

— the measures to be undertaken to evaluate the demonstration part of the programme.

— all adjustments to the indicative breakdown of the amount allocated in Annex II regarding the demonstration programme which is not provided by a budgetary decision.

3. The Commission shall inform the committees, at each of its meetings, of the progress with the implementation of the programme.

In order to ensure synergy between the R&D and the demonstration activities, the two committees stated in Articles 6 (2) and 6 (3) shall meet jointly at the Commission's initiative, at least once a year, to discuss the strategy and common objectives and to ensure coherence in the implementation of the programme.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

OBJECTIVES AND SCIENTIFIC AND TECHNICAL CONTENTS

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. Paragraph 5 of Annex III (first activity) of the framework programme is an integral part of this programme.

BACKGROUND

The proposed agenda for energy RTD is built on the following main considerations:

The use of energy, its supply, its trade and technologies relevant to all these aspects are interacting 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. the one assuring reliable energy services at affordable cost and conditions is the main reason for concern and must provide the principal motivation for supporting RTD at an European level.

The growing concern regarding the environment due 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 the main driving force for change.

Finally, technology although it is vital, it is not by itself enough. Therefore an effective RTD policy must consider the complete cycle embracing research, development, demonstration and diffusion of knowledge, the introduction of technologies in 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', the 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 of society as a whole.

One of them is to assure sustainable energy supply for all compatible with environment and with the operation of society. This is a global challenge that must be supported if conflict is to be avoided.

The Community RTD action addresses the following distinct areas:

— improved conversion and use of energy;

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

— safety of nuclear energy;

— pursuit of thermonuclear fusion as a long-term option.

Regarding the demonstration phase, the first area will specifically distinguish between the rational use of energy from the conversion and production of fossil-fuel energies.

The present programme proposal addresses the first two areas, together with a specific research activity which supports Community action in the inter-disciplinary areas of energy-environment-economy. Strategic analyses will tackle medium and long-term issues from the technological and socio-economic aspects viewpoint; they will consider energy and environmental specificities of EC countries 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 separated specific programmes.

THE PROPOSED RTD ACTIVITIES

A RTD Community strategy will be set up in order to assure the integration and coherence of all activities with the energy RTD programme. The proposed RTD activities will be deployed along two distinct phases: The R&D phase and the demonstration one. They are presented below following this structure. 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 social-economic research, connected with the utilization 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. The projects adopted along these research lines will be designed in a manner as to harmonize results across the Community and to enable international comparisons. 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.Furthermore, additional 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 completed 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 diffusion into the market; in this connection, 'social' cost-benefit analysis, associated with the elaboration of various forms of energy, (possibly) forming a part of an European 'green accounting' framework) would help to improve the definition of such instruments; the development of RTD 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.

Further these efforts will aim at the dissemination of knowledge, in terms of RTD, and of these technologies as well as to the industrial cooperation with Third World Countries.

In addition, in these areas of competence complementary actions will be carried out by the JRC, especially in section 1.7: Energy savings in industry and buildings, section 2.2: Solar photovoltaic electricity and section 2.3: Buildings here stated [1].

RTD activities will include both research and development, demonstration and dissemination actions. The work planned in either 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.

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

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

[1] A more detailed description of these research activities of the JRC defined in a separate Council Decision, will be repeated for information in Annex IV, in order to ensure transparence regarding their complementarity with the correspondent indirect actions.

those of the security of supply). They will be formulated such that the whole RTD substantially contributes to the re-enforcement of the competitiveness of the European industry (SME included) and to the economic and social cohesion. This will be achieved through the development of regional and local resources.

Different technologies (particularly the combustion, the gasification, the 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.

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

This joint development action will enable an efficient mobilization of the entire programme ressources in obtaining the global allocation of the amount, indicated in Annex II (60 % towards renewables, 40 % for the other activities of RTD).

A. RESEARCH AND DEVELOPMENT

1. Improved conversion and use of energy

The world energy economy is predominantly fossil-fuel based and it is likely to remain so for a long time. This is particularly true for coal where worldwide reserves will guarantee several hundred years of supply. Natural gas is continuing its penetration in the energy market, but its transport from distant places (i.e. North Africa, North Sea, Siberia) in gas form makes it a severe handicap to its utilization.

A major problem for fossil-fuels use is the emission of CO_2 and other pollutants. So, the Community action should, as a matter of priority, provide guidance and incentives to reduce pollution emission and to increase the efficiency of energy conversion and use.

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 of indigenous resources of hydrocarbons.

In addition to these specific activities of R&D, 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.

1.1. *Clean coal technologies*

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

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 conventional power plants to efficiencies above 40 % with reduction of all pollutants, even with coal/biomass/waste blends. The medium-term option aims primarily at IGCC (integrated gasification combined cycles) processes with efficiencies above 45 % and further reduction of pollutants. The long-term option aims at the development of the after 'IGCC generation' processes (efficiency higher than 50 %).

The current programme 'coal' consists of all the solid fuels, linked to coal, such as oil, lignite, peat, orimulsion and other heavy fuels produced by the refineries. These fuels can be used in separately or in combination with biomass, urban, industrial or agricultural waste, on the condition that the

missions remain at the same level and that the main component remains a solid fuel. Furthermore, synergies between solid fuels and natural gas processes will be considered.

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—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. The development and evaluation of methods for CO_2 capture and disposal will be carried out in collaboration with IEA's Greenhouse Gas R&D Programme.

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

— integration of fuel cells using a gas from solid fuels in combined cycles (demonstration on existing fuel cells in the framework of RTD as mentioned in section 1.3);

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

1.2. *Combustion*

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 as a cooperation between major European manufacturers, oil companies utilities and uses with a view to ensure technology transfer from the research community to the users. This action will take into account the EPEFE (European Programme on Engines, Fuels and Emissions) project — mentioned in paragraph 1.5 — launched by the Community in collaboration with European oil and car manufacturer associations.

1.3. *Fuel cells*

The work on fuel cells (FC) will focus on complete systems and pilot plants for different applications (electricity production, co-generation, road traction, ships and trains) by addressing the following topics:

— stationary applications (particularly co-generation in buildings and industry): development of 200—400 kW systems with solid oxide (SOFC) and molten carbonate fuel cells aiming at 55—60 % efficiencies, 1 500 ECU/kW long-term costs and 10—100 times emission reduction of No compared to gas turbines and diesel engines. For cogeneration in buildings, SPFC systems will be developed. The phosphoric-acid, solid polymer and molten carbonates technologies will be subject to pilot plants in connection with demonstration, with a view to open the market for stationary applications.

— road traction (electric): development of the solid polymer fuel cell (SPFC) for electric vehicles. The goal is a fuel cell with an efficiency of 45—50 %, a cost of 100—200 ECU/kW in the long-term and 100—1000 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 co-generation in buildings and industry, will be subject to 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. The extension of fuel cell research to electrolyzers should lead to the clean and economical production of hydrogen (an electrolyzer is the inverse of a fuel cell and basic research is similar). SOFC technology may lead to high temperature electrolyzers producing electricity with 30—40 % savings over conventional electrolyzers. As a spin-off, the work planned for SPFC could enable us to obtain the solid-polymer electrolyzers also very economically.

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 1.6). Emphasis will 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. The standardization of battery test procedures will be investigated within a network of battery and car manufacturers. Other forms of energy storage such as flywheels, super-capacitors and heat storage will also be explored.

1.5. *Hydrocarbons and new fuels in transport*

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 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, we will consider the global socio-economic impacts and the security of supply, related to the utilization of alternative fuels such as the methane.

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 EPEFE project, previously mentioned in paragraph 1.2.

1.6. *Energy optimization in urban transport*

Sections 1.2 and 1.5 address a range of themes related to transport. These activities together with others arising in other lines 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 technical solutions to specific transport problems and support the rationale on which to base urban transport policy decisions.

Research and development will address the integration of systems for energy strorage, 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.

The diffusion of the technologies tested in selected locations in the Community should also be extended to cover the entire European market.

1.7. *Energy saving in industry and buildings*

The mechanisms aimed at improving the economics of energy in the industrial and building sectors are not limited to technology alone, but are also dependent on a series of obstacles and distorsions of social, economical and legal character or on the behaviour of consumers, which should be better understood. Moreover, the technological research indicated below will be followed by socio-economic research, in the same line of action of 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.

In industry, R&D will focus on a limited number of generic technologies that are of major importance for energy, environment and possibly water resources, for example 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 paragraph 1.2) integrating solar energy. Projects on more efficient use of electricity would also be considered. Agricultural related engineering will also be examined with regard to energy efficiency and pollution aspects. The participation of industry will be strongly encouraged.

Within the building sector, priority will be given to 'system' approaches and these will be carried out closely to the ones regarding 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 heat pump systems, etc. Pre-normative type of work will also be considered.

In addition, RTD will focus on the development of integrated energy concepts for both industry, buildings and agriculture, in particular cogeneration (including small CHP units of G 10 KWe) and other systems (equipment systems including turbines, fuel cells, Diesel engines, heat pumps, batteries, etc.).

Particular attention will be given to the more efficient end use of electricity in both buildings and industry, including better transportation, distribution and storage of energy. R&D will be targeted to 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.

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

1.8. *Exploration and production of hydrocarbons*

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.

The research will focus on:

— development of efficient technologies leading to improved reservoir characterization and management and to more accurate prediction of reservoir production;

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

— identification of both smaller and more complex deep structures using advanced geophysical and geochemical exploration methods;

Furthermore, it is planned to follow concerted research action on Earth Science. This action will provide not only the information needed for the exploration of hydrocarbons, but it would also improve considerably the scientific knowledge base of other research programmes such as the one of geothermal energy in dry rock, storage of radioactive waste, raw materials or on the exploitation of marine resources.

2. Renewable energies

Renewable energies, in their new and modern form which go beyond the classical usages of hydraulic power and wood for heating, are far from having realized their full potential because they lack development. Nevertheless, these clean and indigenous energy sources appear as the best 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, they are probably the only sources which will in future allow a sustainable increase in energy consumption, based on total economic growth, while respecting the environment.

The activities of this chapter will be carried out in close conjunction with those of the chapter on 'Improved conversion and use of energy' (in particular combustion, storage, fuel cells, energy savings in buildings) which have a direct interest in obtaining the technical and economical objectives regarding the introduction and utilization of renewable energies.

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

In this line of action, the accent will be put on state-of-the-art R&D, except in a few cases, still far from the market. Research and Development activities will be undertaken in order to obtain priority goals with scientific, technological and industrial character. A link will be established with non-technologic 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).

The financial efforts should be concentrated on the following priority areas:

2.1. *Development of technological integration of renewable energies*

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 analyzed. 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 sub-networks, major European electric utilities, leading architects and building engineers, specialized research centres, pilot towns, regions and islands.

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

2.2. *Solar photovoltaic electricity*

The accent will be put on a 'three stage' vertical approach which will consist first on 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.

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

2.3. *Buildings*

The best approach in this sector is also vertical and as far as R&D is concerned, it will consist in the pursuing the efforts on components and integration procedures for active and passive solar, natural lighting and others. The research will be pre-normative but oriented towards the possibilities of standardization.

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 bio-climatic 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.

These actions will take place in a complementary and coherent way to the ones regarding the rational use of energy in buildings as stated in section 1.7.

2.4. *Wind*

The activities will be vertically integrated as follows: first, new materials and components will be developed, particularly blades in advanced composities. 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 MW and using new ultra-light blades and other novel components. Highly innovative wind turbines of smaller sizes could also be considered.

Finally, the programme will aim to promote alternative installation sites, especially 'off-shore' in complex terrain and those with lower wind regimes.

2.5. *Biomass*

This sector is particularly important for R&D actions and for their links with the environment and the 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.

This strategic action will be implemented in conjunction with the AIR and TEPE programmes. 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 solid biomass, in particular, 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 waste and waste from woodlands will be considered in connection with activities described in section 1.1.

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

In addition, the production of pyrolytic oils will also be pursued, together with their conversion to marketable fuels.

2.6. *Geothermal energy*

The remaining element of geothermal energy R&D which merits 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. The activities linked to the conventional geothermal energy will be treated in the demonstration phase.

2.7. *Other options*

Some concerted actions 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. Technologies associated with renewables will also be considered, notably storage of thermal or electrical energy.

B. DEMONSTRATION

(including dissemination and valorization)

Demonstration activities including dissemination and valorization, will concern three areas: rational use of energy, renewable energy sources and fossil fuels.

1. Rational use of energy

Rational use of energy covers action 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 four areas:

Energy efficiency in buildings;

Energy efficiency in industry;

Energy industry, electricity and heat;

Transport and urban infrastructure.

1.1. *Energy efficiency in buildings*

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

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.

Activities will also cover retro-fitting 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.

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 consumption in order to increase the competitiveness of European industries or lead to new products.

Actions will cover demonstration of innovative technologies to improve or replace the manufacturing processes leading to a substantial reduction in the energy consumption of the product; to an improved exploitation of residuals or waste heat, to restrict or prevent an increase in energy consumption as a result of the implementation of environmental protection.

1.3. *Energy industry, electricity and heat*

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

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

1.4. *Transport and urban infrastructure*

The objective is a substantial improvement in the overall energy efficiency of public transport systems, a more coherent transport management and an increased awareness of public transport.

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. Activities will also cover energy efficiency improvements on new type of traction systems for vehicle using alternative or conventional fuels.

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 realised their full potential because of lack of development.

Nevertheless, these clean and indigenous energy sources appear to be best 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, they are probably the only sources which will in future allow a sustainable increase in energy consumption, based on total economic growth, while respecting the environment.

The present 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.

In this line of action, the emphasis will be on targeted demonstration ventures in order to achieve in the short and mid term significant energy objectives.

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

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 chapter 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 economical objectives regarding the introduction and utilization of renewable energies.

Financial support will focus on the following priority areas:

Energy from biomass and waste;

Solar energy;

Wind energy;

Hydroelectric energy;

Geothermal.

2.1. *Energy from biomass and waste*

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

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.

2.2. *Solar energy*

2.2.1. Photovoltaics

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

2.2.2. Thermal applications

Activities will cover 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 applications.

2.3. *Wind energy*

Activities will concentrate on the demonstration of technologies which will improve performance, efficiency, reliability and achieve cost reductions. The maximum exploitation of wind potential will be achieved by the largest application of medium sized wind turbines, offshore wind farms, especially design machines for low wind potential, new application in individual installations or in wind farms of larger sized machines (> 1 MW).

2.4. *Hydroelectric power*

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, espacially 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 technical or administrative lives, by the use of high performance of state-of-the-art technologies, will also be covered.

2.5. *Geothermal*

Activities will cover improvement of the techniques in the drilling sector, well-head equipment, corrosion, scaling, automation and the treatment systems for brine waters, the exploitation of geothermal fields where the resources are proven, and the development of geothermal applications in agriculture and aquaculture.

3. **Fossil fuels**

The use of fossil fuels dominates the world economy of energy.

Also, in the Member States of the European Union, the consumption of fossil fuels, as coal, petroleum and natural gas, represents, at present, 82 % of the global consumption. This part will grow regularly in the coming decades, with some variations among the different sources of energy.

The natural gas, for example, will continue its penetration into the European market, even if its transportation over long distances (Africa, Siberia, North Sea) under liquid form (LNG) or as gas, has a number of technical and economic constraints.

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. As for coal, for which the world-wide reserves are sufficient for some centuries, its contribution will be maintained over the years in spite of the environmental constraints linked to its utilization.

One of the critical problems related to the use of fossil fuels is the CO_2 emissions and other pollutants. From this fact, the Community actions to demonstrate the technical and economic viability of new technologies should, in priority, lead to a reduction of the pollutant emissions and to the increase of the conversion and of the utilization efficiencies of fossil fuels.

3.1. *Solid fuels*

According to the current regulation, the term 'solid fuels' includes coal, lignite, peat, orimulsion and other heavy fuels produced by the refining of petroleum. These fuels can be used separately or mixed with urban or industrial waste, or biomass providing that the emissions are of the same level and that the main part of the energy is produced by the solid fuels.

The objective will be the reduction of the emissions produced by the utilization of solid fuels, in particular the sulphur oxides, combined nitrogen oxides and the CO_2 through the improvement of production and of gasification processes and by the elimination of urban, industrial or other waste, when combined.

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

3.1.1. Electricity and heat production

The activities in this sector will include circular atmospheric fluidized bed combustion; fluidized 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 financed.

3.1.2. Valorization of by-products

The activities in this sector will include the valorization, the treatment or the enrichment of gaseous, liquid of solid waste produced by the utilization of solid fuels.

3.1.3. Production of raw materials

The activities in this sector will be concentrated on the liquefaction of solid fuels, namely to investigate the synergies between this technique and the refining of oil and of the new processes of pyrolysis.

3.2. *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 PECO's and CIS markets.

Demonstration, dissemination and optimization activities are particularly important in this area to assist market penetration of new technologies in the industry together with important strategic implications for the Union's economy, competitiveness and energy supply.

Beneficiaries will be mainly oil and gas-related companies which are developing innovative and effective technologies to improve the exploration, production and use of hydrocarbons.

Activities will cover both 'upstream' and 'downstream' sectors:

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

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

3.3. *Fuel cells*

The objective 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. The actions will concentrate on the demonstration of sulphuric acid, solid polymer and molten carbonate fuel cells. The progress in the 'Balance of the Plant' and the technology transfer will get special attention.

MODES OF IMPLEMENTATION FOR THE PROGRAMME

The programme will be implemented through both cost-shared and concerted actions, specific measures, preparatory, support, accompanying actions and activities towards the diffusion and valorization of the results as stated in Annex III of the programme.

Cost-shared projects will receive EC financial support at different rates according to the nature of the project, the domain and the readiness for commercialization of the results, i.e. according to the technical field and to the economic and technical risk involved. In absolute terms, the size of the projects would be such as to allow for substantial innovation and technological breakthroughs, in the spirit of concentration

of efforts. Whenever appropriate, projects will be grouped into clusters so that better synergy of resources and results can be achieved. Furthermore, special consideration will be given to integrated projects which would tackle social, economic or purely technical problems with a multi-disciplinary approach and/or address issues taking into consideration the path from research to demonstration and to market development. Integrated projects could be carried out in fields such as integrated applications of renewable energies, combustion and urban transport.

These projects will be completed by concerted actions restricted to those fields where a simple coordination of the activities of Member States and of relevant industries would render those actions more effective at EC level. Stimulation actions based on CRAFT activities and feasibility awards will be implemented in order to facilitate the participation of SME's.

Cooperation activities in many fields of energy technologies will be established whenever appropriate both at international level (e.g. Intenational Energy Agency, United Nations) and at national and regional level (e.g. eastern and central Europe, Mediterranean, developing countries) in conjunction with other Community policies.

In order to assure consistency and favour the synergies between RTD and the market, a reinforced action of dissemination will be followed. Such an action aims at spreading, at large, the information on the technologies emerging from RTD and to promote them on the market. The instruments that can speed up the deployment of the technologies on the market will be studied and taken advantage of. Use of the OPET network (Offices for the Promotion of Energy Technologies) established not only in Europe, but also in eastern Europe, the CIS and the developing countries will be given priority by this action. Other instruments may be tested and deployed depending on their efficiency. Opportunities for training and mobility of researchers will be created in the course of the programme through financial grants and research secondment schemes at major RTD projects.

ANNEX II

INDICATIVE ALLOCATION OF SUPPORT

A. **Research and development**	45—55 % (A) (1) (2) (3)
Domain 1: Improved conversion and use of energy	30—40 % (*)
Domain 2: Introduction of renewable energies	60—70 %
B. **Demonstration**	45—55 % (B) (1) (2) (3)
Domain 1: Rational use of energy	20—30 % (*)
Domain 2: Renewable energies	40—50 %
Domain 3: Fossil fuels	30—40 % (*)
Total	100 % (**)

The allocation between different domains does not exclude that projects may overlap between them.

In the implementation of the programme as a whole, the aim will be a global allocation of the budget leading to 60 % for the renewable energies and 40 % for the other RTD activities.

(*) Certain activities of the domaines which have a direct interest from the viewpoint of the renewable technologies (e.g. combustion of coal, of biomass and of waste, fuel cells using biofuels, energy efficiency in buildings, batteries and storage systems for renewable energies) will be charged to the renewable energies (R & D and demonstration).

(**) The sum of 35 MECU, which is the difference between the amount deemed necessary for the present programme and the amount budgeted within the IV Framework Programme in non-nuclear energy RDT, is assigned to the 'specific programme on RTD on direct actions and S/T support activities within a framework of competitive approach'.

A. R + D

(1) 5—10 % of the budget 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.

(2) 3,6 % for staff costs and 1,8 % for administrative overheads.

(3) About 5 MECU for dissemination and valorization of the results of the programme.

B. Demonstration

(1) 1—1,5 % of the budget to support the definition and implementation of the RTD energy strategy activities and of the programme.

(2) 2,5 % for staff costs and 2,5 % for administrative overheads.

(3) About 20 MECU for dissemination and valorization of the results of the programme.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities and for the dissemination of results will be laid down in the measures provided for by Article 130j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country.

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided that participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out in the form of:

2.1. Financial participation by the Community in RTD activities carried out by third parties or by JRC Institutes in association with third parties:

   (a) Shared-cost activities:

      — RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;

      — 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 % (normally 25 %) of the eligible cost of the project, the rate decreasing for projects closer to the market;

      — technology stimulation to encourage and facilitate participation by SMEs in the form of an award to cover the exploratory phase, including the research effort of the partners, of an RTD activity and of joint research. These awards will be granted after selecting outline proposals which may be submitted at any time;

      — support for financing the infrastructure or installations necessary for coordinated action (closer coordination).

   (b) Concerted action, which consists of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective under shared-cost RTD activities (cf. first paragraph of Section 2.1 (a)).

(c) Specific measures such as action to promote standardization and measures to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100 % of the cost of the measures.

2.2. Preparatory, accompanying and support measures:

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

— 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 (in coordination with the activities conducted under the third area of activity);

— studies to assess the socio-economic consequences and any technological risks associated with all the projects under this programme;

— training activities related to research covered by this programme, excluding training grants;

— independent evaluation (including studies) of programme administration and of the implementation of the activities;

— participation in the activities carried out under agreements with the international organizations working in the energy field (International Energy Agency, United Nations, etc.);

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity of RTD.

The activities relating to the dissemination and utilization of results carried out under this programme will complement those carried out under the third area of activity and will be implemented in close coordination with the latter. The partners in RTD projects are excellent vehicles for the dissemination and utilization of results. Back-up will be provided via publications, conferences, promotion of results, studies of technical and economic potential, etc. To ensure optimum exploitation, factors liable to encourage the subsequent utilization of results should be taken into account from the outset and throughout the RTD projects.

ANNEX IV

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 development 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 membrances for advanced ceramic filters, ceramic alloys and composite materials for high-temperature applications (turbines and heat exchangers).

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of transport (1994—1998)

(94/C 228/12)

(Text with EEA relevance)

COM(94) 68 final — 94/0090(CNS)

(Submitted by the Commission on 30 March 1994)

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,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of transport; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130i (3) of the Treaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost activities, concerted activities and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the areas covered by this programme within activity I under the Fourth Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas this programme may make a significant contribution to growth, strengthening competitiveness and the development of employment in the Community, as indicated in the White Paper on 'Growth, Competitiveness and Employment' [2];

Whereas the Commission communication to the Council on the future development of the common transport policy [3] states that the prime objective of research for a European transport policy is to contribute to the development, integration and management of a more efficient and safer transport system that respects the environment and the quality of life, in order to promote sustainable mobility of people and goods;

Whereas the development of trans-European transport networks facilitating network access, interconnection and inter-operability will have a predominant role in creating an open, competitive market; whereas the research activities must be concentrated on the conditions necessary to network inter-operability and interconnection, particularly as regards intermodality and access possibilities; whereas they must promote the design and management of infrastructures compatible with a safer environment for the user and with a better quality/price ratio;

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

Whereas, in order to optimize trans-European transport networks, the research activities must contribute to developing the efficiency of transport modes and of individual operators, enhancing the scope for intermodal operations, improving accessibility for users and supporting the development of multimodal transport at the urban, rural, regional and trans-European levels;

Whereas the achievement of these objectives requires a European approach to research activities in the field of

[1] OJ No C 230, 16. 8. 1993.

[2] COM(93) 700 final of 5. 12. 1993.

[3] COM(92) 494 final, 2 December 1992.

transport, particularly with a view to exploiting the synenergies between the various specific activities, at national and Community level, and those conducted by other international organizations;

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

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

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

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

Whereas the content of the Fourth Framework Programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this specific programme sets out the content of the activities to be carried out in accordance with this principle in the field of transport;

Whereas Decision .../.../EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

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

Whereas the rules for the participation of undertakings, research centres (including the 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, in accordance with Article 130m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular targeting small and medium-sized enterprises, and in particular those in Member States or regions which participate least in the programme, and schemes for promoting the mobility and training of researchers within this programme to the extent necessary for proper implementation of the programme;

Whereas provision should be made for measures to encourage the involvement of SMEs in this programme, in particular through technology promotion measures;

Whereas an assessment should be made of the economic and social impact and any technological risks arising from the activities carried out under this 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 Scientific and Technical Research Committee (Crest) has been consulted;

Whereas the JRC may participate in the indirect activities covered by this Programme;

HAS ADOPTED THIS DECISION:

Article 1

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

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 240 million, including 8,5 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3) of Decision .../.../EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. It shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the field directly covered by this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the programme and the proposed financial arrangements.

The work programme may also make provision for participation in certain Eureka activities.

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) below the Commission shall be assisted by an advisory committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The Commission representative shall submit to the Committee a draft of the measures to be taken. The Committee shall give its opinion on this draft within a period which the chairman may determine on the basis of the urgency of the issue, if necessary by taking a vote.

The opinion shall be recorded in the minutes; in addition, each Member State shall have the right to request that its position be recorded in the minutes.

The Commission shall take the utmost account of the opinion delivered by the committee. It shall inform the committee of the manner in which its opinion has been taken into account.

Article 7

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

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

— the evaluation of the RTD projects proposed for a Community contribution and of the estimated amount of this contribution on a project basis, where this amount exceeds ECU 0,4 millions.

— the measures to be taken to evaluate the programme,

— any adjustment to the indicative breakdown of the amount shown in Annex II, which has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

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 technological objectives set out in that programme.

Paragraph (. . .) of Annex III (first activity) of the Framework Programme is an integral part of this programme.

GENERAL CONSIDERATIONS

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

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

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

The demand for transport has risen in spectacular fashion (70 % since 1970) and this trend is continuing. The growth has resulted in increased congestion, inefficiency and lower safety performance. The consequent cost to the European economy is estimated to be at least ECU 50 billion per year for road and ECU 4 billion for aviation growing to ECU 10 billion by 2000. Transport is the second largest consumer of non-renewable energy and, unlike industrial and domestic users, its level of consumption is steadily increasing.

The results of transport research will therefore have a direct effect on the economy and quality of life in the Community. In addition to the direct effect on the transport equipment industries, it will contribute to the development of the whole European industrial fabric.

(b) The general objective of research under this Specific Programme is to arrive at prenormative or prelegislative conclusions making it possible to incorporate into the transport sphere the development of new generic technologies and further the development of the European Union by establishing an efficient transport system.

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

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

Two types of approach are needed:

— strategic research into the general functioning of the transport system,

— specific research concerning the optimization of each mode.

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

The two approaches must take into account:

— general policy concerns: competitiveness, safety, energy, and environment, the different geographical levels: European, national, regional, urban.

(c) The exploitation opportunities provided by new technologies, economic development and environmental improvements now make it possible to break down the barriers separating different modes of transport (and those between transport and information and communication systems) and establish an integrated approach.

This research programme therefore has two priorities: to provide the basis for a strategy for a trans-European multimodal network and for the optimization of networks.

The first priority will provide industry and authorities with the appropriate decision-making instruments based on better knowledge and understanding of traffic flows (by establishing appropriate forecasting models for European transport developments), their interactions and interdependencies for an assessment of transport demand, developing effective transport network scenarios, determining the impact of changes in transport demand, modal split, economic, social, environmental, energy and institutional influences based on statistical information making it possible to define the needs and constraints to orientate future actions. These tools are essential before large amounts of public and private money are committed by the political authorities for long-term investments in infrastructure projects, and the application of new management and communication systems to transport services.

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

The research activities will be conducted within a coherent and coordinated framework taking account of the activities under other themes: industrial technologies, telematics, environment and energy, where they relate to the objectives of the common transport policy. Work focusing on generic technologies will be carried out under the relevant themes within the first activity, with the result that the demonstration activity will address the integration and systematic validation of the results via an integrated approach aimed at achieving the objectives of the common transport policy.

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

Technology stimulation measures, based on the experience of CRAFT activities and feasibility awards, will be carried out to encourage and facilitate participation by SMEs.

Outline proposals may be submitted at any time (a continuously open call for proposals) and those proposals selected will receive a feasibility award to search for partners and to prepare a detailed proposal. That proposal will then be evaluated in order to decide on the funding of the research project itself.

A. STRATEGIC RESEARCH FOR A TRANS-EUROPEAN MULTIMODAL NETWORK

The purpose of this research is to improve the efficiency of the European transport system regarded as a whole with different modal components. The research is subdivided into five areas of investigation:

Understanding mobility. An understanding of mobility (of passengers and goods) and foreseeable developments in mobility at European level is a prerequisite for improving European transport policy.

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

This database should make it possible to highlight links and types of flows for which modal switching can be considered, and should make it possible to provide information for a European flow forecasting model.

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

The above research concerning the present situation and medium-term developments should be supplemented by research aimed at establishing long-term forward planning scenarios.

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

Economics of the transport system. The transport system does not have an intrinsic purpose in itself but is intended to enable other activities to take place (production, consumption, leisure, etc.). It is increasingly becoming a burden for household budgets and, more generally, for the economy as a whole. Efforts must be made to combat or even reverse this trend. Two possibilities should be explored as a matter of priority: new infrastructures and funding.

The choice of new infrastructures has major budgetary consequences and has a lasting effect on the modal split between flows. It is a virtually irreversible act necessitating solid guarantees.

The system should be funded at the lowest cost by spreading the burden between the direct and indirect beneficiaries so that, as far as possible, the sum total of individual choices approximates to the optimum.

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

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

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

Forward studies. In addition to research aimed at acquiring a better understanding and ensuring an improvement in the European network in the short and medium terms, it is necessary to prepare for the longer-term future through appropriate research.

Incorporating and applying new generic technologies in the transport sphere, including strategies for using the global positioning systems by satellite developed under the telematics specific programme, in order to improve network efficiency and safety, remain major concerns. Appropriate scientific and technical research should make it possible to find out which are the most promising in terms of matching means and processes to the general objectives of European transport policy.

Lastly, a better understanding of the European transport system and its probable developments should make it possible to highlight the main dysfunctions.

Research aimed at resolving them should be carried out, in particular concerning the establishment of economic and policy instruments, covering both the development of new technologies and institutional, organizational and socio-economic changes.

In particular, the aim will be to maximize system synergies and compatibilities to develop the interoperability and interconnection of individual transport modes for their integration in the trans-European transport network through a full knowledge and understanding of the European transport system, its individual elements, their inter-relationships and interdependencies. Within these objectives national initiatives will undoubtably play a role, but research at Community level is also essential to:

— coordinate and reinforce research to maintain technological development, and to face up to competition from America and Asia;

— control the development of international traffic, which requires a strategy and initiatives;

— enable the common transport policy to be supported through Community research.

This work will help achieve a full understanding of the European transport system, by providing the necessary elements for the development of a multi-modal trans-European network, through socio-economic and technological research to guide the development of the common transport policy, taking account of social benefit (welfare economics), external costs and economic instruments.

This knowledge (expertise) includes exploring the new technological means for gathering and processing data on European transport, the comprehension of modelling techniques and techniques for developing scenarios of mobility needs at urban, regional and international level; common methodologies for accessing technological innovation or new transport concepts in relation to economic efficiency, safety performance and environmental impact; common criteria for evaluating the capacity of each transport mode to contribute effectively to the total trans-European transport network and, lastly, validation parameters, implementation strategies and economic instruments.

This work will make it possible to assess the nature and volume of transport flows, develop common methodologies for assessing the contribution of new technologies and the growing constraints of environmental impact, safety performance, energy efficiency and the impact of economic instruments. It is necessary at the same time to define development strategies, experimental programmes including pilot projects making use of existing infrastructure and technological innovations.

This information system will be further developed through new technologies (e.g. EDI) to facilitate and accelerate the data-collection process, improve the quality and reliability of information collected and improve user access. The statistics will also benefit from the progress made in spatial representation and modelling systems (geographical information systems) which will permit a better interpretation of data as a function of topographical elements.

In the course of this work it will be necessary to ensure the coherence of the activities within theme 6 of the first activity as well as with all other transport-related activities of the Fourth Framework Programme to guide the initiatives of the common transport policy.

B. NETWORK OPTIMIZATION

In addition to the above research aimed at overall optimization of the European transport system, it is also necessary to carry out research into the internal optimization of each mode (air, rail, road, urban, inland waterway and maritime transport). Of course, the specific optimizations must be compatible with the

overall optimization which remains the priority objective. It will be necessary to iron out any contradiction between sectoral optimization and overall optimization.

The research in question will take into account areas of investigation common to all modes but which need to be specified in terms of the features of each individual mode.

Railways

The work will basically be aimed at removing obstacles to the compatibility of the national rail systems and, to this end, should provide economic and technical solutions to the problem of the interoperability of the rail network as a subsystem and part of a European intermodal system.

Firstly, one of the priority issues is the compatibility of train traffic control systems, on which research was started in the framework of the EURET programme. This research has the objective of developing a European rail traffic management system and its principal functionalities through the integration of the results of research on generic technology in other programmes. It was developed with the collaboration of the railways and industry. This work needs to be continued so as to develop a common architecture for the European rail traffic management system, before moving on to the stage of pilot projects to validate the technology through specific applications.

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

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

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

Thirdly, with regard to the interconnection and interoperability of rail networks, the work will concentrate on the elimination of obstacles to rail traffic, especially at frontiers, due to national equipment and requirements, entailing new common solutions to overcome them. This research using the results of other Community research activities, will result in the development of interoperability specifications, and mandatory requirements foreseen in Community drafts in the framework of the trans-European high-speed and conventional rail networks, and their associated sub-systems (infrastructure, electrical power systems etc.).

Integrated transport chains

With the opening of single market, the future extension of the European Community and the progress of the central European countries towards market economies, the international transfer of goods will inevitably grow strongly. It is generally expected that traffic will double in 20 years. Faced with such a growth in

demand, the public authorities need to try to modify the supply structure radically, otherwise the major part of this growth will fall to current dominant mode: road transport.

It is generally recognized that road transport causes significant external costs. In effect, considerable nuisance such as atmospheric pollution, lack of safety, network congestion and noise arises from road transport and is currently borne collectively.

Multimodal transport therefore appears to be a promising solution. Through its development, it could contribute to a reduction in road transport and an improvement in the quality of the environment.

The work will be based on existing research in technological, economic, social and environmental fields and analyze the costs/benefits of transfers between modes through an evaluation of effective transfer options (e.g. short sea shipping). It has four main priorities:

— improving the interfaces between transport modes and transfer points to ensure a rapid and reliable transfer of goods or transport equipment, taking account of technical, logistic and economic aspects as well as the access of small and medium-sized enterprises to multimodal transport;

— for multimodal loading units, including those more specifically intermodal, the work will also consider unit loads adapted not only to the needs of industry but also to infrastructure constraints;

— for existing and planned infrastructure, modal interoperability will be addressed, notably to ensure links with peripheral or isolated regions of the Community;

— for logistics, applied to the whole multimodal chain, the work will address the management and use of integrated data-processing and communication media.

Air transport

Firstly the work will address air traffic management (ATM) as part of an overall European strategy developed in close cooperation with Eurocontrol and the Member States. Building upon existing work defining a consolidated ATM concept, it will evaluate and demonstrate the integrated elements, both operational and technological, for a future ATM system foreseen for 2006 — having at least double the existing capacity, with enhanced safety and at a minimum cost. This work will contribute notably to the definition of the European application of the work carried out in the framework of the ICAO (CNS/ATM).

In particular, a strategic approach will develop an overall ATM concept including integration of airport management systems through appropriate modelling and simulation to enable the definition of the system requirements and high-level functional architecture.

This work will also integrate the results of generic technology research developed under other programmes, identify the application-related technologies necessary to develop an effective system from the technological, operational and organizational viewpoint.

Operational consolidation will also address the specific aspects, such as the role of human intervention, automation of the planning and executive control functions, the use of an experimental aeronautical telecommunications network (ATN), using, and adapting as necessary, the innovations developed in the context of other activities. The integration of these elements will be validated initially on experimental test benches to enable the improvement in capacity and safety of the overall ATM system to be quantified. To facilitate the integration and validation process a validation plan will be developed together with the methodology to be used in the process. Suitable certification methods will be developed and validated for such failure-critical ATM systems.

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

In particular it will model and assess the airworthiness and operational factors that affect the safety of air transport, determine possible solutions to safety shortcomings and support future standardizaton and regulatory activities in the field of certification and inspection of airworthiness.

Through strategic research, including modelling of the influence of critical factors, the work will address: passenger survival criteria; external hazards (icing, collision with the ground, electromagnetic integrity, engine ingestion, etc.); as well as aircraft reliability and safety standards (airworthiness requirements) linked with noise, emissions etc.

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

Urban transport

Urban transport poses three types of problems, namely energy efficiency, transport-system efficiency and environmental protection.

The technical responses to these problems are not necessarily the same but together they must contribute to resolving these three problems. To this end, the action undertaken in the telematics, energy and transport spheres must be developed in a coherent fashion.

The work will address the solutions able to improve the 'attractiveness', efficiency and capacity of urban transport systems, to rationalize traffic management and transport demand by improving the conditions of urban life and contributing to the creation of a real citizens network. In particular, the work will address:

— ecological traffic management,

— safety management, including unprotected users,

— optimization of road use,

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

— design of transfer points between local and long-distance traffic to improve town accessibility.

In addition, it will also analyze on the one hand the financing and charging systems for urban transport and in particular public transport as advocated in the White Paper on a common transport policy, and on the other hand the external costs entailed by the different modes of transport in built-up areas (public/private, level of responsibility). In particular, the effects of different systems of financing public transport will be looked at.

With the coming of the internal market, all Member States are today looking for new forms of organization and new financing modes for urban transport systems. This involves the application of new technologies, namely use of telematic tools, new energy sources, use of new means of transport, traffic regulation, urban tolls, planning of transfers and management of parking. It will be necessary to integrate these elements taking account of the individual conditions in urban areas, and to proceed to a large-scale evaluation of this integration through pilot projects.

Most built-up areas will have to introduce a range of measures (road pricing, modal split, . . .), but little is known about the complex interactions which will arise in these different combinations and their interfaces with inter-urban systems. A progressive introduction of selected measures could be carried out in towns, chosen for the purposes of research, to validate them and ensure their gradual implementation.

A validation of procedures by simulation and tests on the ground is, in effect, necessary to evaluate their environmental and socio-economic effects as well as the contributions of new technologies and types of organization (industrial or telematic innovations, regulatory measures or new transport organizations) necessary for the achievement of sustainable mobility.

Maritime transport

The research has the objective of increasing efficiency, improving safety and processing the environment of maritime transport through the development of common solutions to the major problems, not only strategic but also technological, for the development of operational systems which integrate new generic technologies, organizational factors and human resources.

Firstly, the work will address, amongst other things, the evaluation and modelling of maritime transport supply and demand and flows of goods, at both world and intra-European levels. In particular, the role of short-sea shipping in maritime transport will be analyzed within the framework of the logistics chain and the need for harmonization of procedures. This will include the development and evaluation of sea/inland waterway systems and analysis of competitiveness between operators (both Community and non-Community) for the whole operation (land and maritime), management structures, the chain of human resources and the quality of service (total quality control, . . .).

Secondly, the work will evaluate (particularly through simulations) the contribution of new technologies, notably those developed under the telematics programme, to the improvement of maritime traffic management. In particular, information exchange between ports and port communities will help the flow of goods, improve safety and the interface role of ports. It is also necessary to analyze and develop new techniques for the whole operation (ships and ports), notably taking into account the problem of standardization of cargo unitization.

It is also necessary to analyze the options for improving the provision of maritime transport through the application of new technologies, notably new rapid transfer systems for goods and passengers and by the analysis of their impact on professional qualifications and infrastructure capacity. This will address the definition of a new generation of operating systems and higher-performance ships, able to ensure more efficient, safer and environmentally friendly operations (e.g. higher speed, reduced emissions and fuel consumption); in particular the conceptual and design requirements resulting from safety measures linked with the transport of dangerous goods must be analyzed. The use of alternative, more environmentally friendly energy sources will also be examined, as well as the treatment of refuse from ships and in the ports.

Thirdly, the work will also evaluate the factors having an influence on maritime safety. Simulation methods for traffic scenarios will be developed. The application of integrated telematic tools will be evaluated. The impact on safety of the whole chain of human factors will be assessed (e.g. ship operation, traffic management and control, shore-based operations). Common criteria for establishing the level of training of crews, as well as procedures for the whole operation (ship and shore-based), communications and traffic management will be developed.

Finally, the work will address specific research such as:

— a common methodology to investigate and determine accident causes, and the means and tools to remedy them,

— the provision of an operational solution for a working European 'electronic chart display and information' system,

— the harmonization of common procedures at European level to facilitate the flow of goods,

— a common approach to evaluate the problems of pollution and sedimentation in ports and remedy them.

Inland waterways

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

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

In particular, the work will enable the transfer of the results of generic technology research to inland waterways with respect to cost-benefit, safety and environmental impact criteria, notably to improve the

whole operation of ships and ports. It will also be necessary to examine the evolution of barge construction and characteristics as a function of increased speed, reduced emissions and energy consumption. Similarly, human factors with regard to safety on barges and inland infrastructure need to be analyzed, particularly the requirements for certification, training and the operational use of information and communication means. Finally, the work will address restrictions to navigation, low-depth hydrodynamics, infrastructure, ports, traffic management and organization, and goods information flows.

Road transport

Research in this area should contribute to greater efficiency of road transport, enlarged capacity of road infrastructure and rationalization of movements.

Many technologies have been developed independently and now have to be subjected to comprehensive assessment in relation to the objective of sustainable mobility.

Assessment will be done through modelling, simulation and field tests, including pilot projects.

This work will serve as an instrument for identifying appropriate applications, their interaction and their socio-economic effects.

This involves pre-normative and legislative activities in support of a common policy for road safety.

In particular it will address, amongst other things, the integration of infrastructure, vehicles, human beings and telematic tools with the objective of improving traffic circulation and safety.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

1. Strategic research for a trans-European multimodal network (definition, demonstration and validation)	18—22 %
2. Network optimization	78—82 %
2.1. Rail transport	16—18 %
2.2. Integrated transport chains	5— 7 %
2.3. Air transport	16—18 %
2.4. Urban transport	10—12 %
2.5. Maritime transport and inland waterways	19—21 %
2.6. Road transport	8—10 %
Total	100 % (1) (2)

(1) Including 4,75 % for staff expenditure and 3,75 % for administrative expenditure.
(2) Including a sum of about ECU 2 million which will be allocated to dissemination and utilization of the programme results.

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

      — in the Community, or

      — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country,

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

   (c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out in the form of:

2.1. Financial participation by the Community in RTD activities carried out by third parties or by JRC institutes in association with third parties:

   (a) Shared-cost activities:

      — RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common theme;

      — technology stimulation to encourage and facilitate participation by SMEs by granting an award covering the exploratory phase including research by partners of an RTD activity and via cooperative research. The award will be granted following the selection of outline proposals which may be submitted at any time;

      — support for financing the infrastructure or installations necessary for coordinated action (closer coordination).

   (b) Concerted action, which consists of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies. Concerted action can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective under shared-cost RTD activities (cf. first paragraph of Section 2.1 (a)).

   (c) Specific measures such as action to promote standardization, and measures to provide general tools to research centres, universities and undertakings. The Community's contribution covers up to 100 % of the cost of these measures.

2.2. Preparatory, accompanying and support measures:

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

— 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 (in coordination with the activities conducted under the third area of activity);

— studies to access the socio-economic consequences and any technological risks associated will all the projects under this programme. Close cooperation will be ensured between the socio-economic impact studies and socio-economic research programme, to ensure that the results of the studies are exploited and used;

— training activities related to research covered by this programme;

— independent evaluation (including studies) of programme administration and of the implementation of the activities.

— measures in support of the operation of networks to provide information and decentralized assistance to SMEs in coordination with the Euromanagement auditing activity on RTD.

The activities relating to dissemination and utilization of results carried out under this programme will complement those of the third activity and will be closely coordinated with them. The RTD project partners constitute privileged networks for the dissemination and utilization of results. They will be enhanced by means of publications, conferences, promotion of results, studies of technical and economic potential, etc. In order to ensure optimum exploitation, account must be taken right from the outset in RTD projects of factors that can encourage subsequent utilization of results.

Proposal for a Council Decision adopting a Specific Programme in the field of targeted socio-economic research (1994—1998)

(94/C 228/13)

(Text with EEA relevance)

COM(94) 68 final — 94/0091(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of targeted socio-economic research; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130 i (3) of the Treaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through indirect activities and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130 i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the final

amounts will be decided upon by the budgetary authority in accordance with the relative priority assigned to the area covered by this programme within activity I under the Fourth Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that the overall maximum amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to its being increased; whereas, as a consequence of this re-examination, the amount deemed necessary to carry out this programme could increase;

Whereas the content of the Fourth Framework Programme for Community RTD activities was established in accordance with the subsidiarity principle; whereas this Specific Programme sets out the content of the activities to be carried out in accordance with this principle in the field of targeted socio-economic research;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its overall harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

Whereas this programme will help to strengthen synergy between the RTD activities carried out in the field of targeted socio-economic research by research centres, universities and enterprises in the Member States and between the latter and the corresponding Community RTD activities;

Whereas the activities carried out under this programme must stimulate, utilize and supplement the activities carried out to evaluate the socio-economic impact in the other Specific Programmes implementing the Fourth Framework Programme; whereas to this end the measures necessary to ensure mutual information and coordination must be taken;

Whereas the rules for the participation of undertakings, research centres and universities and the rules governing the dissemination of research results specified in the measures provided for in Article 130 j of the Treaty apply to this Specific Programme;

Whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the European Economic Area (EEA) Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results and schemes for promoting the mobility and training of researchers to the extent necessary for its proper implementation of 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 will also contribute, through its own programme of direct activities, to the attainment of the Community RTD objectives in the first area covered by this programme;

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

HAS ADOPTED THIS DECISION:

Article 1

A Specific Programme of targeted socio-economic research, as set out in Annex I, is hereby adopted for the period from (data of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 105 million, including 25,70 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of and in accordance with the Decision referred to in Article 1 (3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the scientific and technological priorities set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out in the fields directly covered by this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out the detailed scientific and technological objectives and specify the stages in the implementation of the programme and the corresponding financial arrangements.

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 an advisory committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The Commission representative shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on this draft within a period which the chairman may lay down according to the urgency of the matter, where necessary by taking a vote.

The opinion shall be recorded in the minutes; in addition, each Member State shall have the right to request that its position be recorded in the minutes.

The Commission shall take the greatest possible account of the committee's opinion. It shall inform the committee of the manner in which its opinion has been taken into account.

Article 7

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

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

— the evaluation of the RTD projects proposed for Community funding and of the estimated amount of project funding where this exceeds ECU 0,2 million;

— the measures to be undertaken to evaluate the programme,

— any changes to the indicative breakdown of the amount allocated set out in Annex II that has not been the subject of a budgetary decision.

2. The Commission shall inform the committee, at each of its meetings, of progress with the implementation of the programme.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements wih European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

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 technological objectives set out in that programme.

Paragraph 7 of Annex III (first activity) of the Framework Programme is an integral part of this programme.

I. GENERAL OBJECTIVES AND CONTEXT

The White Paper approved by the European Council in December 1993 started discussions at European level and contributed to the decision-making required at decentralized, national or Community level to lay the foundation for sustainable development of Europe's economies enabling them to withstand international competition and create jobs.

These targeted socio-economic research activities aim at elucidating decision-making in future by developing shared knowledge based on the challenges facing Europe, based on research and other work in three areas:

— evaluation of science and technology policy options;

— research on education and training;

— research into social integration and social exclusion in Europe.

Evaluation of science and technology policy options for Europe will provide a common knowledge base for decision-makers in the fields of science and technology policy at regional, national and European level and for all those responsible for other areas of activity in which science and technology play a role, with the ultimate objective of encouraging greater consistency and closer coordination of RTD efforts and policies in Europe.

These activities will follow up the Monitor programme (FAST, SAST and SPEAR) and will build on the work done by the JRC's Institute for Prospective Technological Studies, the VALUE, Sprint or Eurostat programmes and the experience acquired from the Specific Programmes (evaluation of the socio-economic impact of research), as decided at the time of adoption of the Third Framework Programme.

The JRC's Institute for Prospective Technological Studies will contribute to the Community's RTD activities in this field and coordinate its work closely with this programme [1].

The objective of the Community's *research activities on education and training* must be to support the efforts made by the Member States to strengthen the links between research, education and training and to improve their education and training systems by stepping up research and disseminating the results and innovations which it produces. The objective is to help to promote the development in Europe of a society in which lifelong training and education permanently play a central role.

In line with the subsidiarity principle, this research will supplement the Member States' activities. It will also be coordinated with the technological research on the same subject under the telematics programme and with the Community's activities in the field of education and training, i.e. the work on the Socrates and Leonardo programmes, the successors to the Comett, Erasmus, Lingua, PETRA, FORCE and Eurotecnet programmes in particular. In this context, account will also be taken of the basic data-gathering and systems analysis work conducted within the Eurydice network and of the work of the Cedefop.

Poverty and social exclusion are major problems facing the Member States. *Research into social integration and social exclusion in Europe* is necessary in order to gain a fuller understanding of these problems so that remedies can be found.

[1] A more detailed description of the JRC's research activities, which are defined in a proposal for a separate Council Decision, is given in Annex IV for information in order to ensure the transparency in relation to their complementarity with corresponding indirect actions.

There are two objectives in this field: to study how far the actual process of European integration (single market, economic and monetary union, world context, etc.) itself gives rise to particular causes of social exclusion and integration, as opposed to factors specific to the changes at national and local level, and to allow all Member States to benefit from successful social integration schemes, by conducting comparative research and by joint application of the results of evaluations of the most innovatory projects.

Research under this heading is closely linked to Community initiatives (notably the new medium-term action plan against social exclusion) and national initiatives aimed at combating social exclusion in Europe.

* * *

As well as these horizontal targeted research activities, socio-economic research will be carried out within each Specific Programme under the first activity (evaluation of socio-economic impact and risks) and also under the second activity (socio-economic conditions for international scientific and technical cooperation and links with the Community's external policy), the third activity (more efficient uptake of RTD results) and the fourth activity (training and mobility of researchers in the social and economic sciences). This programme will be designed and implemented so as to ensure stronger synergy and support for research extending, bringing to fruition or stimulating similar work within other Specific Programmes. Close contacts will be maintained with the COST projects in the field of social sciences and with European organizations working in the areas covered by this programme.

II. COMMUNITY ACTIVITIES

1. Evaluation of science and technology policy options in Europe

(a) *Specific objectives*

The immediate specific objectives of the programme, defined in line with the subsidiarity principle, are:

— to bring together at European level the efforts of the various individuals and institutions involved in the evaluation of science and technology policy options; to encourage the development of networks of scientists, heads of parliamentary offices and governmental departments responsible for the evaluation of science and technology options, together with experts on socio-economic evaluation of technologies from industry and experts from other areas of socio-economic life;

— on the basis, and in particular at the request, of these networks, to produce specific elements of analysis allowing evaluation of different science and technology policy options at regional, national or European level. These will take the form of reports, sets of indicators, information files or periodic publications and will use new media (computer systems, multimedia products, etc.).

(b) *Themes*

The Community research on this topic will concentrate on three principal inter-related themes.

(i) Analysis of the RTD situation in Europe in the world context

The primary objective of the research will be to generate facts allowing evaluation of the strengths and weaknesses of RTD in Europe, compared with the other leading regions of the world:

— the RTD situation in Member States, in non-Community countries, in individual regions or in inter-regional associations;

— policies pursued at regional, national, European and world level: objectives, implementing procedures, regulatory and budgetary aspects and impact on the scientific and technical base and on socio-economic development, including the macroeconomic level;

— strategies of the industrial and business circles concerned by sector or type of firm; globalization and transnational cooperation; inertia and changes observed in the producing system and constraints on the development and take-up of new technologies.

(ii) Evaluation of the inter-relations between short- and medium-term needs and socio-economic changes and new scientific and technological developments

Strategic short- and medium-term (five to ten year) forward analyses of the major economic, social and cultural challenges and of scientific and technological developments will provide firm guidance for the discussions on the direction to be taken by research efforts in Europe (at national, Community and European level). In particular, efforts will be made to identify the science and technology policy options with the most favourable impact on growth, competitiveness and job creation in Europe.

The following challenges will therefore be analyzed:

— the economic, industrial and financial challenges. This work will concentrate on an in-depth analysis of the changes under way or in prospect in the world economy and in the European production system in Europe and of their consequences for research, particularly the consequence of the emergence of new regional free-trade zones (the North American Free Trade Association, . . .), of fast-growing regions (South-East Asia) or of regions in transition (eastern Europe and the CIS), the major worldwide problems (environment, health and ageing, mobility, energy, food, etc.) and changes in production processes and forms of economic organization;

— the socio-cultural challenges. Europeans' growing awareness of the environment, ethical problems and safety in all its forms, including health and safety at work, the emergence of new leisure pursuits or new cultural activities, the social implications of the emergence of an 'information society', adaptation of mentalities to the changes in production methods and the impact of these factors on consumption patterns will be evaluated with regard to the design, production and dissemination of new knowledge, products and processes. Special attention will also be paid to the relationships between technological development, employment and the organization of society.

The potential impact of new scientific and technological developments will be evaluated in the light of:

— the potential benefits of RTD and the advantages which it can offer from various points of view — scientific (e.g. new insights into natural phenomena, new methods), economic (e.g. improving the competitiveness of companies in various sectors) or social (e.g. job creation, new forms of work, consumer protection, etc.);

— the potential costs and risks: from the economic point of view (e.g. widening of the gaps between regions) and from the social point of view (e.g. destruction of jobs, marginalization of technically illiterate sections of society, psycho-sociological effects, etc.).

These strategic forward analysis activities will focus on general socio-economic issues, emerging fields of science and technology or fields developing at the interface between different areas of research (e.g. work to identify technologies of major importance for industry and other sectors of activity in Europe).

(iii) Methods, tools and approaches

Finally, a limited proportion of the resources for the programme will be allocated to funding work on methods and tools for socio-economic evaluation of science and technology (work on scientific and technological indicators, on various methods of strategic forward analysis such as scenario building, structural analysis, consultation of experts and new forms of consultation of the players involved and of the public, etc. and on methods of evaluating research programmes).

* * *

To provide material for the work in these three fields, an open information system generating and providing access to RTD statistics and indicators will be developed with the cooperation of Eurostat. The system must contain information on RTD resources (inputs) and results (outputs) and on Europe's competitive position, must cover both the public and private sectors and must contain data allowing comparisons at world level. It will be built around the statistics and indicators generated at national, Community (Eurostat and the JRC's Institute for Prospective Technological Studies) and OECD level or by international organizations (Unesco, UNIDO, FAO, etc.) and original studies. The relevant tasks will be included in the statistical Framework

Programme. This open information system must allow regular publication of a situation report on RTD in Europe in particular. The data-collection activities and the analyses will be coordinated closely with those carried out in the programme on cooperation with third countries and international organizations.

The activities in this field will draw on the European Technology Assessment Network (ETAN) which brings together the leading players involved and users of evaluations of science and technology policy options in Europe and provides a means of circulating information on the research and other work in progress in the European Union.

2. Research on education and training

(a) *Specific objectives*

The specific objectives of the programme, defined in line with the subsidiarity principle, are:

— to provide the knowledge base, tools and references necessary for the development of research on education and training in Europe. To help to develop a common knowledge base, infrastructure and instruments which can be used for specific activities;

— to bring together at European level the efforts of the various individuals and institutions involved in research on education and training; to encourage the development of networks of specialists in educational science (pedagogics, didactics, educational sociology, etc.), the heads of education and training departments in administrations and businesses, those responsible for educational systems and the two sides of industry; to shape the intellectual structure of the multidisciplinary field of research on education and training at European level.

(b) *Themes*

The themes covered by these activities can be subdivided into two main categories:

(i) Methods, tools and technologies: innovation and quality in education and training

— New technologies in education and training and methods of learning: Principles and comparison of the effects of new technologies and tools in education and training (educational software, multimedia and hypertext systems; audiovisual and multimedia methods; virtual reality, etc.). Cognitive bases and operating mechanisms for these technologies; comparison of various methods of learning and interaction with traditional methods and aids;

— Dissemination of innovations in teaching methods: processes for dissemination (whether spontaneous or planned) of innovations in teaching methods in educational systems and economic life; intellectual bases and organizational mechanisms for the transfer and dissemination of technological innovations by means of training schemes; social and cultural aspects of the dissemination of innovations in education and training;

— Quality of education and training systems: Evaluation methods and quality criteria for tools, programmes and branches; establishment of quantitative criteria; cost-benefit analyses, etc.

— Teachers and trainers as the key components of education and training systems: new forms of interactions between teacher and pupil; methods of assessing knowledge and representations of teachers and trainers; comparison of attitudes to traditional methods and teach-yourself systems using new technologies, etc.

(ii) Policies, action and needs

— New or emerging education and training needs of industry and European society: needs for knowledge, skills and qualifications arising from completion of the internal market, development of economic and social potential at regional level, the globalization of trade, new methods of production and business organization, the calls for greater competitiveness, etc.

— Impact of the action taken at regional, national and European level; effects of the introduction of new training schemes in educational systems and of the development of continuous education and training; impact of greater mobility, increased trade, closer contact, etc.

— Comparison of the situation and policies on education and training; social and cultural bases of the Member States' policies; roots and impact of the diversity of the education and training systems in Europe.

3. Research into social integration and social exclusion in Europe

(a) *Specific objectives*

The immediate specific objectives of the programme, defined in line with the subsidiarity principle, are:

— to provide the knowledge base, tools and reference necessary for the development of research on social integration and socal exclusion in Europe. To help to develop a common knowledge base, infrastructure and instruments which can be used for specific activities;

— to bring together at European level the various researchers into economic and social sciences and the humanities specializing in this field so that they can work together and with the other players involved (government agencies, non-governmental organizations, trade unions, trade associations, etc.) in order to gain a fuller understanding of social integration and of the various forms of social exclusion and of the causes and options for solutions.

(b) *Themes*

Taking account of the changes in progress throughout the European continent on the whole, the exploratory activities will centre on four topics:

(i) Forms and processes of social exclusion:

This comparative targeted research will analyse the multidimensional processes of social exclusion. For society as a whole, social exclusion takes the form of disintegration and fragmentation of social relations and, hence, of loss of control thereof (e.g. violence, interethnic tensions, crises of group identity). For individuals and particular groups, social exclusion means deprivation or discrimination.

Particular attention will be paid to the spatial dimension of social exclusion, i.e. the geographical concentration of excluded groups (for example, urban segregation), and to the processes of exclusion associated with living in deteriorated and devalued areas.

Finally, the analysis should help to cast light on the pathways to exclusion and integration, *inter alia* by analyzing demographic changes (age and family structures, etc.). To give one example of the issues to be covered, one change forming part of the exclusion process is the increasingly precarious position of sections of the population on the fringes of exclusion, for example those who continuously enter and leave the welfare systems at brief intervals or who lose one job after another.

(ii) Causes of social exclusion, particularly unemployment:

This work will concentrate on:

— the impact of the economic changes affecting Europe in terms of aggravation or reduction of unemployment;

— the consequences of European integration for the national forms of welfare State;

— the development of the black economy in Europe and the consequences thereof.

(iii) Migration

The growing flood of immigrants from the less-developed countries outside Europe and from central and eastern Europe must be taken into account in the tradition models for explaining migratory flows and the impact thereof in order to assess the possible implications in terms of potential social conflicts, destabilization of labour markets and legal restrictions on the rights of entry and asylum.

(iv) Evaluation of the impact of social integration policies:

The research on the development and impact of social integration policies will concentrate on:

— comparative evaluation of the approaches taken by the existing social policies (e.g. switch from welfare policies to active integration policies, promotion of equal treatment, particularly for men and women) and of the role of the various players involved (the two sides of industry, non-governmental organizations, etc.) taking account of changes in the forms and processes of social exclusion in Europe; in these comparisons particular attention will be paid to the socio-economic factors concerning protection of the health and safety of workers. These activities will take account of the results of the research conducted in other programmes, particularly if they could contribute to structural improvements in this field. This includes the programmes on biomedicine and health (particularly the research on occupational and environmental health), telematics applications of common interest (particularly telematics for improving employment and the quality of life) and industrial and materials technologies (particularly the reliability of production systems). In particular, socio-economic consequences of protection of the health and safety of workers on the conditions of competitiveness in the

Community or other regions will be analyzed. Account will be taken of the conditions associated with the special nature of small and medium-sized enterprises.

— taking account of in the dimension of social cohesion and citizenship the process of European integration, of development of its institutions and the specific activities at Community level.

The research in this third area will require preliminary work on the methods for constructing data which can be compared Europe-wide and the establishment or reinforcement of common research infrastructure (databases on the parties involved and research results; directories and manuals, glossaries and thesauruses, etc.). A limited proportion of the resources allocated to this field will therefore be earmarked for the definition of a strategy for carrying out this work and developing such infrastructure and to the associated pilot projects.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Area 1	45—51 %
Area 2	20—27 %
Area 3	25—32 %
Total	100 % — ECU 105 million (1) (2) (3)

(1) Including 20,10 % for staff expenditure and 5,60 % for administrative expenditure.
(2) An amount of approximately ECU 1 million is deemed necessary for the dissemination and utilization of the results of the programme.
(3) A sum of ECU 33 million, the difference between the amount deemed necessary for this programme and the amount foreseen in the Fourth RTD Framework Programme for targeted socio-economic research, is earmarked for 'the RTD specific programme to be carried out through direct action and S/T support activities in the framework of a competitive approach'.

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

The detailed rules for the participaton of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

However, for the purpose of implementing this programme, the following specifications shall apply:

1.1. Participation in this programme is open, which financial support from the Community:

(a) to all legal entities, established and regularly carrying out RTD activities

— in the Community, or

— in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policy:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

2. This programme will be carried out in the form of:

2.1. Indirect activities, i.e. financial participation by the Community in RTD activities carried out by third parties, mainly in the form of:

— Shared-cost activities, i.e. RTD projects carried out by undertakings, research centres and universities with a common theme;

— Concerted action, which consists of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies;

— Measures appropriate to the characteristics of the programme such as thematic studies, measures to encourage the establishment and standardization of databases on the players and research projects involved and schemes to provide general tools to research centres, universities and undertakings (thesauruses, directories, etc.). The Community's contribution covers up to 100 % of the costs of the measures.

2.2. Preparatory, accompanying and support measures:

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

— conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings;

— use of external expertise, including access to scientific databases and visits by scientists;

— scientific publications, including the dissemination, promotion and utilization of the results;

— training activities related to research covered by this programme;

— independent evaluation (including studies) of programme administration and of the implementation of the activities.

The activities relating to the dissemination and utilization of results carried out under this programme will complement those carried out under the third area of activity and will be implemented in close coordination with the latter. The partners in RTD projects are excellent vehicles for the dissemination and utilization of results. Back-up will be provided via publications, conferences, promotion of results, studies of technical and economic potential, etc. To ensure optimum exploitation, factors liable to encourage the subsequent utilization of results should be taken into account from the outset and throughout the RTD projects.

3. The measures taken to implement the programme will depend on the specific nature of the activities concerned.

However, in order to coordinate the Community's research closely with the national work and, in the process, develop a joint information and analysis infrastructure accessible to all, the activities concerning the evaluation of science and technology policy options will be based on the European technology assessment network (ETAN), which will be funded from this programme. This network will bring together the main regional, national and European bodies actively involved in evaluation of science and technology policy options (including the European Parliament's STOA, the European Parliamentary Technology Assessment Network and the two sides of industry in Europe), including the Commission departments most directly involved (particularly, the management team for this programme, the JRC's Institute for Prospective Technological Studies and the Forward Studies Unit). The Commission will provide the secretarial services. The network will be responsible for advising the Commission, via a steering committee appointed by the member organizations, on the work programme for this first part of the programme, on application and utilization of the results or on the national, transnational or European work which the members of the network wish to share at Community level. The activities will also be coordinated with the work of the other Commission departments most directly concerned with RTD activities in Europe and special attention will be paid to making the best use of the expertise available from the various socio-economic circles in Europe.

The operation of this network will ensure that the work programme includes the research topics of greatest relevance to the work in progress at regional, national and international level and of greatest use to the end-users of the results.

Wherever possible the research projects will allow participation by experts and by working parties representing the interests of the end-users of the results. Their involvement will ensure the cooperation of the players and users concerned by the objectives of the project, follow-up work and real-time dissemination of the results as they are generated.

4. International organizations in Europe may exceptionally be funded on the same basis as Community organizations.

Cooperation with organizations in third countries outside Europe (e.g. the National Science Foundation or the Office of Technology Assessment in the United States and the National Institute of Science and Technology Policy in Japan) will be organized where this enables the objectives of this programme to be achieved more effectively.

ANNEX IV

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 European Science and Technology Observatory of the Institute for Prospective Technological Studies of the JRC will provide an information service on progress in science and technology and ensure surveillance of scientific developments and technological innovation.

In order to improve communications and to avoid duplication of effort, the Observatory will work in close cooperation with Eurostat and establish close links with European organizations and the OECD, but also with ESA, CERN, Eureka, etc. Its activities will be conducted in close cooperation with those foreseen under the heading for the corresponding shared-cost action programme.

It will act within the ETAN network, whose creation is foreseen in the shared-cost actions programme as the focal point within, on the one hand, a network consisting of various similar observatories in the Member States, and on the other, university and industrial experts responsible for evaluating the relevance, development and impact of scientific technological breakthroughs.

In a Community perspective, it will contribute by gathering information for the regular evaluation of the state of RTD in Europe and comparing it with the situation in other developed countries.

The aim of the technological watch system will be to detect new scientific breakthroughs and technological innovation at an early stage and to alert those responsible in the Community to the implications and consequences, notably for technological research and for the industrial world.

Proposal for a Council Decision adopting a specific research, technological development and demonstration programme in the field of cooperation with third countries and international organizations (1994—1998)

(94/C 228/14)

(Text with EEA relevance)

COM(94) 68 final — 94/0092(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field 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 130 i (3) of the Treaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through indirect activities, concerted activities and accompanying measures;

Whereas, in accordance with Article 130 i (3), an estimate should be made of the financial resources needed to carry out this Specific Programme; whereas the definitive amounts will be decided by the budgetary authority in accordance with the breakdown fixed by the Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) provides that the maximum overall amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to being increased; whereas the amount deemed necessary for implementation of this programme may be increased as a result of this examination;

Whereas the strengthening of the S&T 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 contribute to the implementation of Community policies vis-à-vis third countries; whereas cooperation on research and technological development with third countries will help to boost the Community's scientific and technological capability; whereas cooperation should be improved with other fora for cooperation in the field of science and technology; 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; 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 the European Union can contribute to solving regional and global problems calling for international

cooperation; whereas a contribution should also be made to strengthening S&T cooperation between third countries, in particular countries of the same region;

Whereas complementarity with other Community activities and coordination with Member States should be increased; whereas it is necessary to concentrate international S&T cooperation activities, including those formerly conducted outside the Framework Programme, in a single programme in order to ensure a coherent approach; whereas this programme should focus on activities complementing those carried out by the Member States;

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 cooperation with third countries and international organizations;

Whereas Decision .../.../EC (Fourth Framework Programme) lays down that Community action is justified if *inter alia* the research helps to reinforce the economic and social cohesion of the Community and to encourage its harmonious development while at the same time meeting the objective of scientific and technical quality; whereas this programme is intended to help meet these objectives;

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 the Member States and between the latter and the corresponding RTD activities of third countries and international organizations;

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

Whereas the countries covered by the EEA Agreement will be involved in the implementation of this programme; whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with other third countries and international organizations;

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

Whereas this programme comprises activities for the dissemination and utilization of RTD results and activities to stimulate the mobility and training of researchers;

Whereas this programme also includes basic research, in order in particular to safeguard and develop the scientific potential of the countries of central and eastern Europe and the new independent States of the former Soviet Union;

Whereas provision should be made for measures to encourage the involvement of European industry, including SMEs, in this programme;

Whereas an assessment should be made of the economic and social impact of the activities carried out under this 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 and to the development of the Union's relations with these third countries; 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 the indirect activities covered by this programme;

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

HAS ADOPTED THIS DECISION:

Article 1

A specific research, technological development and demonstration programme in the field of cooperation with third countries and international organizations, as set out in Annex I, is hereby adopted for the period ... to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 540 million, including 10,1 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of, and in accordance with, the Decision referred to in Article 1 (3) of Decision .../.../EC (Fourth Framework Programme).

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the breakdown set in the Fourth Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continuously and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. Where appropriate, it shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out under this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out the detailed objectives and specify the stages in the implementation of the programme and the corresponding financial arrangements.

2. For the purposes of cooperation with the countries of central and eastern Europe, the new independent States of the former Soviet Union and the developing countries, the Commission shall issue calls for proposals for projects on the basis of the work programme. Cooperation may also be carried out through other structures.

3. The Commission shall take all initiatives that may be necessary to implement the objectives of the programme in the other geographical regions.

Article 6

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

2. In the cases provided for in Article 4 (1) the Commission shall be assisted by a committee of an advisory nature consisting of representatives of the Member States and chaired by the representative of the Commission.

The Commission representative shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on this draft within a period which the chairman may lay down according to the urgency of the matter, where necessary by taking a vote.

The opinion shall be recorded in the minutes; in addition each Member State shall have the right to request that its position be recorded in the minutes.

The Commission shall take the greatest possible account of the committee's opinion. It shall inform the committee of the manner in which its opinion has been taken into account.

Article 7

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

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

— the evaluation of the RTD projects proposed for Community funding and of the estimated amount of such funding, by project, when this is more than 0,2 MECU,

— the measures to be undertaken to evaluate the programme,

— any changes to the indicative breakdown of the amount allocated set out in Annex II that has not been the subject of a budgetary decision,

2. The Commission shall inform the Committee, at each of its meetings, of progress with the implementation of the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

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 technological objectives set out in that programme.

This programme implements the second activity of the Framework Programme.

BACKGROUND

This activity is the vehicle for international 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 Community activities, to improve the Community's scientific and technological base and to support the implementation of other Community policies. It will also aim at stepping up coordination of the S&T cooperation between Member States and third countries in order to avoid duplication and to better define the Community's areas of activity on the basis of the subsidiarity principle.

Cooperation will be based on the principle of mutual benefit, which 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 its industrial competitiveness and external relations.

The activities involved in cooperation will be accompanied by systematic monitoring and analysis of developments in the policies and in the machinery for implementing R&D in third countries in order to adapt Community cooperation policy and to derive maximum benefit for the Community and its partners. The collection of data and information and analyses will be closely coordinated with the corresponding activities to be carried out in the programme on targeted socio-economic research. Other accompanying measures include activities relating to the study, dissemination and utilization of results, training and coordination and the organization of conferences, seminars, etc.

Non-nuclear cooperation activities and activities developed in the earlier Framework Programmes and the APAS, will be incorporated into this programme. The geographical scope covers all of Europe, including the independent States of the former Soviet Union, the non-European industrialized countries and the developing countries. Moreover, greater opening-up of the specific programmes of the other activities to third countries will provide new opportunities for cooperation.

In cases where intellectual property is involved, the guidelines adopted jointly by the Council and Commission in June 1992 [1], will be respected.

THE PROPOSED RTD ACTIVITIES

A. Scientific and technological cooperation in Europe

The Agreement setting up the European Economic Area (EEA) will enable six of the seven EFTA countries to become involved in all the specific non-nuclear programmes under the Third Framework Programme. Suitable adaptation of the EEA Agreement is planned in order to permit their full involvement in the Fourth Framework Programme. Other western European countries outside the EEA may become associated via bilateral agreements.

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 organizations and with relevant bodies at world level.

[1] RECH 74 7613/92, 26. 6. 1992.

COST

The COST projects, which supplemented the projects under Community programmes, are expanding vigorously and will continue to pave the way towards identifying new areas for scientific cooperation in Europe, a recent example of which is socio-economic research. The essential role of COST in integrating scientists from central and eastern Europe into a broader European context will assume increasing importance. The assessment of the current COST projects and the practical application of their results have been pinpointed as priorities for the years ahead.

The Commission intends to continue 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 experts 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. 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 pre-competitive parts of the Eureka projects could be dealt with under the Framework Programme, and the results of Community projects could be taken into account in Eureka projects closer to the market.

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 coordinators, set up earlier.

— more efficient use of the existing counselling and information-distribution networks, at Community level (VALUE, Stride, 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 could be selected and financed by the specific programmes of the first activity, in accordance with the procedures for these specific programmes.

International organizations

The aim is to strengthen the coherence of research in Europe via closer coordination with the European and international scientific organizations and with the networks of research workers they have frequently set up. Links with the ESF, CERN, ESA, EMBL, ESO, etc. will be stepped up and Member States should coordinate their position more closely within the international political organizations (UN, FAO, WHO, OECD, ITU, etc.).

The intention is to negotiate cooperation agreements with relevant European scientific organizations 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, to redirect research towards social needs, and thus restore their production systems, and also to 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 R&D potential: it is first of all a question of safeguarding human resources and existing equipment. The current earnings of research workers in these countries are low and the lack of hard currencies suggests a difficult future leading to isolation of east European researchers whose access to equipment is difficult and who have little contact with their foreign counterparts. One of the main consequences is that, if the opportunity arises, researchers leave 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, especially via the use of computerized communications networks, in order to promote the integration of these countries into European and world markets.

— To help solve problems specific to the east European countries by means of targeted R&D.

— To widen and deepen cooperation via involvement in specific Community programmes: identification of R&D areas where these countries are in the forefront at world level, and the introduction of balanced cooperation. 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. Thus a reform of science and technology structures in favour of a more decentralized, flexible and open approach is urgent in order that research and development may play an effective part in the transition of these countries towards a market economy and their integration into the Community environment. In order to better 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 activities with the countries of central and eastern Europe and with the new independent States of the former Soviet Union will be conducted via:

— specific actions to meet specific needs. 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, and climate change; (2) it is important that the information infrastructure established in the East develops in compatible fashion to that in the European Union and that research conducted in this area is complementary and convergent; (3) action to combat environmental and public health problems in the new independent States of the former Soviet Union, in particular as a result of major accidents;

— 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.

— the opening-up of the specific programmes of the Fourth Framework Programme to these countries, notably the associated countries [1].

This activity will supplement that of the Member States and synergy with the PHARE and TACIS programmes will be guaranteed. At the same time it will help to coordinate Member States' activities in this area.

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

[1] Other Community instruments could help to finance such participation.

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. To some extent, the reasoning behind cooperation between the Community and those countries on RTD is the same as that underlying intra-Community cooperation.

In other instances cooperation with these countries is a basic prerequisite for the implementation of 'megascience' research projects such as fusion, the human genome and global change. This is the background to such multilateral cooperation and consultation as, for example, within the OECD or multilateral projects such as the 'Human-Frontier Programme' and 'Intelligent Production Systems'. 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 could 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 projects or complete research programmes.

A closer link is planned between scientific and technical cooperation and education and training.

These activities also underpin the Community's external policy activities and offer all of the Member States the advantage of equal access to foreign sources of science and technology.

Activities facilitating access to, and dissemination of, such information will be encouraged.

C. Scientific and technological cooperation with the developing countries

The main aim of this activity is to enable the DCs, whose levels of development can differ widely, to be associated with developing the knowledge and innovative technologies needed to solve the problems arising from their own sustainable economic development. This general aim has two results: one is to harness training and the relationships that will be established between research workers and their institutions in order to maintain and even boost DC research and technological development capacity in particular at the human-resource and institutional level. The other will be to enable the European scientific community to maintain and improve excellence in the scientific areas that are relevant to DC problems. In order to achieve this general objective, dissemination and utilization activities 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 inter-related and of major importance in most of the DCs and emphasize, where necessary, interdisciplinary aspects.

— the sustainable management and use 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 namely policy and demographic factors, development of human settlements will also be covered.

— improvement of agricultural production within this framework of 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; aquaculture, in order to facilitate the development of this activity and its environmental integration; improvements in the conditions of product storage and processing, areas in

which losses are considerable in the DCs; analysis of production systems and the scope for intensifying rural systems.

— health and population, focusing on control of the predominant diseases in the DCs, improving health-care systems and the impact on the environment and on health of demographic change 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, 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 Directorates-General concerned, these 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 situation and the European Union's development and economic cooperation policies.

In order to strengthen the research capabilities of the DCs, in particular those which are the most advanced as regards science and technology, it is also necessary to organize cooperation in other areas of science and technologies, e.g. communications technologies, industrial technologies, materials technologies, and biotechnology. RTD cooperation activities should be pursued to promote the gradual, harmonious integration of those countries into the world economy, while helping to bring them out of their isolation, provided that such activities are not already the subject of other activities under the Framework Programme.

Improving the conditions for science and technology depends in particular on setting up advanced information and communication networks and systems, and access to European networks is relevant to the development of these countries and should be taken into account in technology transfer activities in the framework of the various policies of the European Union.

Another aim of this activity is to make it easier for DCs to participate in the major Community research actions on topics of global importance. Some of the topics are highly relevant to the DCs (desertification, demographic growth, uncontrolled urban growth, economic and social imbalances), while others that also affect the future of the planet as a whole are common to the DCs and the industrialized countries (greenhouse effect, pollution, communicable diseases, pandemics). It is therefore important that the scientific community in the DCs and in Europe should work together to solve these problems, using to best effect the resources available in both (human resources, skills, technologies, natural resources, etc.).

The research activities undertaken in order to achieve the second aim are, by their very nature, global and must be dealt with in a global rather than regional manner. They are often defined in international fora in which the EU is active. Among the more urgent topics are global change, communicable diseases of a pandemic character and the social dimension of health-care provision, Earth observation in cooperation with other bodies, including the JRC, and the assessment and conservation of natural resources.

Finally, for the most technically advanced of the DCs, research topics of mutual interest to them and the EU may be identified within the specific programmes of activity I open to them [1].

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 the specific cases of topics of mutual interest, 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.

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[1] Other Community instruments could help to finance such participation.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Area A1: Cooperation with other fora for scientific and technological cooperation in Europe	7—8,5 %
Area A2: Cooperation with the countries of central and eastern Europe and the new independent States of the former Soviet Union	39—47 %
Area B: Cooperation with non-European industrialized third countries	6—7,5%
Area C: Cooperation with the developing countries	39—47 %
Total	100 % (1) (2)

(1) Including 4,6 % for staff expenditure and 5,5 % for administrative expenditure.
(2) A sum of ECU 4 million will be allocated to the dissemination and utilization of the results of the programme.

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

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities, established and regularly carrying out RTD activities

   — in the Community, or

   — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

   (b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

   (a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

   (b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified areas.

1.4. Cooperation with other fora for European cooperation involves stimulation and coordination activities, in particular with Eureka, in the framework of COST and with European organizations.

1.5. The exchange of information, coordination and stimulation of activities of mutual benefit are planned with regard to cooperation with non-European industrialized third countries. The programme resources may also be used for Community participation in the exploratory phase of a joint project, whereas the financing of a possible operational phase of the project would have to be covered by the programme concerned.

1.6. This programme cannot cover the cost of participation of third countries, in particular associated countries to whom the specific programmes of the Framework Programme are open.

1.7. Cooperation with the countries of central and eastern Europe, the new independent States of the former Soviet Union and the developing countries in specific areas not covered by the programmes of activities 1, 3 and 4 will normally take the form of shared-cost activities or concerted action. A balance will be ensured between cooperation with the central and eastern European countries and the new independent States on the one hand, and with the developing countries on the other. The financial contribution for the partners from the central and eastern European countries, the new independent States and the developing countries may exceed 50 %.

1.8. The pilot phase of the International Association for the Promotion of Cooperation with Scientists from the New Independent States of Former Soviet Union (INTAS) expires at the end of 1994. The Commission will transmit a proposal to the Council in due course regarding the future of this association and the geographical areas and themes to be covered.

1.9. Cooperation with the countries of central and eastern Europe, the New Independent States of the Former Soviet Union and the developing countries will be implemented in close liaison with other Community initiatives such as PHARE and TACIS, 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.

2. This programme will be carried out in the form of:

2.1. Financial participation by the Community in RTD activities carried out by third parties or by JRC Institutes in association with third parties

(a) Shared-cost activities:

— RTD projects carried out by undertakings, research centres and universities, including consortia for integrated projects with a common thematic objective;

— support for financing the infrastructure or installations necessary for the implementation of a coordinated action (strengthening of coordination).

(b) Concerted activities, which consist of coordinating, particularly with the aid of concertation networks, RTD projects already funded by public authorities or private bodies. Concerted activities can also include the requisite coordination of thematic networks bringing together manufacturers, users, universities and research centres to work on the same technological or industrial objective under shared-cost RTD activities (cf. first paragraph of Section 2.1 (a)).

(c) Specific measures such as measures in support of the Community's external policies and measures to provide tools for general use in research centres, universities and undertakings. The Community's contribution covers up to 100 % of the costs of the measures.

2.2. Preparatory, accompanying and support measures:

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

— 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 (coordinated with the activities conducted under the third activity);

— study and monitoring of the developments in the science and technology policies of the third countries and of the socio-economic conditions of international cooperation;

— training activities related to research covered by this programme;

— recourse to the energy centres set up in certain countries under the Thermie programme;

— concertation and coordination activities, e.g. exchange of information to improve coordination with the Member States;

— independent evaluation (including studies) of programme management and of the implementation of its activities.

Proposal for a Council Decision adopting a specific programme for the dissemination and exploitation of the results of activities in the field of research, technological development and demonstration (1994—1998)

(94/C 228/15)

(Text with EEA relevance)

COM(94) 68 final — 94/0093(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by their Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme of Community activities in the field of research, technological development and demonstration (hereinafter referred to as RTD) for the period 1994—1998, laying down in particular the activities to be implemented in the field of dissemination and exploitation of results, and that this Decision was taken in the light of the considerations set out in the preamble to the above Decision;

Whereas Article 130 i (3) lays down that the Framework Programme shall be implemented through Specific Programmes developed within each activity, and that each Specific Programme shall define the detailed rules for implementing it, fix its duration and provide for the means deemed necessary;

Whereas the implementation of this programme involves various procedures, in particular shared-cost projects and preparatory, accompanying and support measures;

Whereas, in accordance with Article 130 i (3), the funding required for implementing this specific programme must be estimated; whereas the definitive amounts are adopted by the budgetary authority in accordance with the quota laid down in the Framework Programme;

Whereas Decision . . ./. . ./EC lays down that the maximum total appropriation for the Fourth Framework Programme shall be reviewed before 30 June 1996 at the latest, with a view to its being increased, and as a result of this review the amount deemed necessary for implementing this programme may increase;

Whereas the aims of this programme are to ensure the widest possible dissemination of the results of research, to achieve optimum exploitation by encouraging, with

the assistance of the various operators concerned, the conversion of the results obtained into innovations, to promote technology transfer, in particular to small and medium-sized enterprises, and to support the initiatives launched at national and regional level so as to give them a Community dimension;

Whereas the innovation process is complex and interactive and involves various types of operators, and the activities for disseminating and exploiting results must therefore be combined with those aimed at improving technology transfer;

Whereas the creation of an environment favourable to the exploitation of results and the dissemination of technologies in all sectors of industry and in all regions of the Community contributes directly to adapting the industrial fabric and increasing the competitiveness of undertakings;

Whereas the contents of the Fourth Framework Programme for Community RTD activities were drawn up in accordance with the principle of subsidiarity, and this specific programme sets out the contents of activities to be undertaken in the field of dissemination and exploitation in conformity with this principle;

Whereas, in accordance with Article 130 j, the rules for the participation of undertakings, research centres (including the JRC) and universities, and for the dissemination of research results, are applicable to this Specific Programme;

Whereas, in implementing the present programme, in addition to those countries covered by the Agreement on the European Economic Area (EEA) international cooperation may also, in accordance with Article 130 m, prove appropriate with other third countries and international organizations;

Whereas the dissemination of results to SMEs is a priority of the Fourth Framework Programme, and this dissemination concerns SMEs participating in the specific programmes and also any undertakings likely to employ scientific knowledge or new technologies to strengthen their competitiveness;

Whereas this programme benefits, in particular, small and medium-sized enterprises in the regions least involved in the Community's RTD activities, contributes to improved economic and social cohesion in the Community and operates in conjunction with the Community Structural Fund measures taken to this end;

Whereas the economic and social impact and the possible technological risks of activities undertaken under this programme must be assessed;

Whereas there must be continual and systematic monitoring of progress in implementing this programme, with a view to adapting it, if necessary, to developments in this field; whereas, also, an independent assessment of progress in implementation of the programme must be conducted in due course with the aim of providing all the background information necessary for drawing up the aims of the Fifth RTD Framework Programme; whereas, finally, at the end of the programme, a final assessment of the results obtained must be carried out as regards the objectives set out in this Decision;

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

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

HAS DECIDED AS FOLLOWS,

Article 1

A Specific Programme for the dissemination and exploitation of the results of activities in the field of research, technological development and demonstration, the objectives and contents of which are set out in Annex I, is adopted for the period ... to 31 December 1998.

Article 2

1. The amount deemed necessary for the implementation of the programme is ECU 293 million, including 8,4 % for staff and administrative expenditure.

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

3. The amount deemed necessary for the implementation of the programme, as above, may increase as a result of, and in accordance with, the Decision referred to in Article 1 (3) of the Decision .../.../EC.

4. The budgetary authority shall determine the appropriations available for each financial year in accordance with the quota laid down by the Framework Programme.

Article 3

The procedures for implementing this programme, other than those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continually and systematically monitor, with assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall examine in particular whether the objectives, priorities and financial resources are still appropriate to the

changing situation. If necessary, it shall make proposals to amend or supplement this programme according to the results of the monitoring.

2. To help in obtaining an overall assessment of the Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall in due course have an assessment carried by independent experts of the activities undertaken in the fields directly covered by this programme, and of their management during the five years preceding such assessment.

3. On completion of this programme, the Commission shall have a final assessment of the results conducted by independent experts as regards the objectives set out in Annex III to the Fourth Framework Programme and in Annex I to this Decision. The report on the final assessment shall be communicated to the Council, the European Parliament 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 shall when necessary be updated. It shall set out the detailed objectives to be achieved and lay down stages in the programme's implementation and the funding envisaged for each implementation procedure.

The work programme may also provide for participation in certain Eureka activities.

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 fo the implementation of the programme.

2. In the cases referred to 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.

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

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

If the measures envisaged are not in accordance with the opinion of the committee, or in the absence of an opinion, the Commission shall submit to the Council without delay a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

If, after one month from the date of referral to the Council, the latter has not acted, the proposed measures shall be adopted by the Commission.

Article 7

1. The procedure set out in Article 6 (2) shall apply in respect of:

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

— the assessment of the projects proposed for a Community contribution and the estimated amount of that contribution, when this is greater than ECU 300 000,

— the measures to be taken to assess the Specific Programme,

— all modifications to the indicative breakdown of the amount given in Annex II, which has not been the subject of a budgetary decision.

2. At each meeting, the Commission shall inform the committee of progress in implementing the programme as a whole.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1), international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL AIMS AND CONTENT

The present Specific Programme is fully in keeping with the guidelines of the Fourth Framework Programme and sets out details of its aims in the field of dissemination and exploitation.

The chapter in Annex III relating to the third activity under that programme is an integral part of this programme.

I. AIMS AND GENERAL PRINCIPLES OF IMPLEMENTATION

The action in the field of dissemination and exploitation of results supplements the actions undertaken by the Member States by giving them a dimension and an added value at a Community level. It has three objectives:

— to ensure the widest possible dissemination of the results of RTD activities under Community and national programmes;

— to optimize their exploitation, i.e. to ensure with the assistance of the various operators concerned that the results obtained under Community and national programmes are transformed into innovations, and to promote transfers of technology, particularly to the SMEs;

— to support the various initiatives launched at national level so as to give them a trans-European dimension.

By virtue of its aims and content, this programme helps the regions of the Community least favoured by the RTD programmes and contributes to economic and social cohesion. It is therefore closely linked to various initiatives in these domains and takes account of the communication from the Commission on cohesion and RTD policy (COM(93) 203 final).

The programme also contributes to cooperation activities with non-member States and international organizations in the fields for which it is responsible.

Responsibility for the exploitation of RTD results must be largely borne by enterprises, but Community assistance is also needed.

At Community level, the dissemination and exploitation activities are implemented through the Specific Programmes of the first activity and this programme. In particular, a sum representing on average 1 % of the total budget for the Fourth Framework Programme has been set aside to this end, under the first activity, for the dissemination and exploitation of the results. This will cover in particular sectoral dissemination and exploitation activities.

The Specific Programmes implement dissemination and exploitation activities relating to their fields of research, in close coordination with those under the present programme, with a view to avoiding duplication and wastage of resources, maintaining a good geographical balance in the actions envisaged and allowing proper utilization of the skills and infrastructures existing under the third activity — in particular the network of relay centres as a common basis for activities.

The Specific Programmes ensure *inter alia* that account is taken of the dissemination and exploitation aspects amongst the criteria for evaluating and selecting RTD projects, and that the provisions of the contracts which relate to protection, exploitation and dissemination are complied with, and that networks and partnerships established in connection with research projects are also enabled to contribute to the process of dissemination and exploitation of the results obtained.

II. CONTENTS OF THE SPECIFIC PROGRAMME

A new approach is necessary to achieve these aims, given the diversity of the operators involved, the cumulative, interactive and complex nature of the innovation process and the specific needs of SMEs.

This approach involves integrating the follow-up to VALUE and Sprint into a single programme and exploiting to the full the synergies between the activities provided for by the various areas of this programme.

The emphasis on SMEs is reflected in the three parts proposed. Part A, concerning the 'dissemination and optimization of the results of Community research', is particularly addressed to the SMEs participating in the specific programmes or those which are capable of exploiting the results of Community or national research programmes. Part B, concerning the 'dissemination of technologies to enterprises', is aimed at the large number of SMEs which have to integrate in their activities the know-how and new technologies on which the preservation or enhancement of their competitiveness depends and which they have to procure from external sources because they do not possess the necessary internal RTD capacity. Part C, concerning the 'financial environment for the dissemination of technology', provides for measures and instruments to assist both these categories of SMEs.

A. Dissemination and exploitation of the results of research

The aim of this domain is to promote the dissemination and trans-sectoral and transnational exploitation of the results of research, regardless of their source, and in particular to publicize Community RTD activities and their results in order to increase utilization and to facilitate scientific and technical cooperation in Europe.

It comprises a cohesive set of activities comprising services of a general nature, such as the Community network of relay centres, the public information and dissemination service, services specializing in assistance with regard to the protection and exploitation of research results, together with action to improve not only the economic but also the social impact of the exploitation and transfer of the results of research.

1. *The Community network of relay centres*

The action taken under the Third Framework Programme to establish a network of 'VALUE' relay centres in the Member States in order to promote Community RTD activities and their results will be continued and intensified with the aim of attracting closer attention from enterprises and research laboratories in the individual countries, improving the transnational exploitation of research results and fostering scientific and technical collaboration.

This action will be developed and strengthened through the following:

— providing support for enterprises and research laboratories to facilitate their access to information on Community RTD and demonstration activities;

— providing assistance, where necessary, for the transnational dissemination of results of national research or of programmes such as Eureka and COST;

— systematic examination of the technical and economic potential of RTD results, in collaboration with the specific programmes and contractors concerned, with a view to their dissemination to the relay centres;

— evaluation of the potential scientific and technological needs of industry so that the supply of results from Community or national research programmes can be better matched to them;

— organization of targeted actions designed to promote results, with the emphasis on themes selected for their relevance to the needs of local industry;

— developing the synergies with the relevant national and regional networks and operators with the aim of boosting the transnational dissemination and exploitation of research results from any source;

— supplying telematic services to the relay centres, to facilitate the organization of joint activities.

2. *The information and dissemination service*

The three pillars of this structure are the data collection and production service, the services and products which specialize in the dissemination of information via networks serving the general public or the various target groups and those which concentrate on publizing and heightening public awareness of research.

The following activities are planned:

— extension of the Cordis information service to incorporate new sources of information (Eureka, COST, other international research frameworks, national contact points, etc.) and multimedia documents;

— organization of dissemination projects aimed at specific target 'multiplier' groups (scientific journalists, documentalists, relay centres and other intermediary networks, etc.);

— design and production of new information products adapted to the wide ranges of potential requirements for disseminaton on a variety of media including CD-ROM, public networks, extracts from databases, bulletins, etc.;

— sustained publication activity aimed at the scientific community, information 'multipliers' and the public at large;

— use of various means of communication with the public and methods of increasing awareness other than publications, such as audiovisual and multimedia techniques;

— improvement of coordination with similar activities at national level.

3. *Protection of know-how*

The aim of this line of action is to inform researchers and sensitize them to questions relating to the protection of industrial and intellectual property rights and to help organizations which do not themselves possess the necessary resources to protect the results of Community RTD which they have acquired.

Conferences and training activities will be organized with the aim of enhancing researchers' awareness of the various aspects of intellectual and industrial property rights. Steps will also be taken to develop collaboration with the European Patent Office and its national counterparts with a view to the organization of joint activities.

Provision will be made for continuing protection of the property rights (patents, trademarks, etc.) of the Community. On request also, subject to certain conditions, assistance and financial support may be made available to universities, research centres and SMEs with the aim of protecting the results of Community research.

4. *Help with the exploitation of research results*

The aim of this line of action is to offer, particularly to SMEs, specialized services and assistance in addition to the activities of the relay centres, to facilitate transfer from research to industry and the trans-sectoral and transnational exploitation of results.

— the services offered under this heading after assessment of the technical and economic potential for exploitation of the results can include, in particular, the identification of future markets (including a study on technological change), technical and economic feasibility studies, promotion activities, training schemes, advice on exploitation strategies and examination of subsequent industrial exploitation potential within the framework of inter-governmental projects (Eureka) or other Community initiatives;

— assistance will take the form of partial financial support for activities in the fields of transfer, adaptation and exploitation of research results.

  It may include projects which are specifically designed to meet the needs of SMEs, support for know-how transfer schemes (training, technology clubs, researcher mobility) and the shared-cost financing of transnational and transsectoral exploitation projects.

This work will be done with the help of selected experts, or consultants or competent organizations in the Member States. Steps will be taken to develop coordination with national and regional exploitation and technology dissemination activities. Efforts will be made to establish synergies with the MINT project ('Managing the Integration of New Technologies') and the networks established under the Sprint programme (such as Eurotech).

5. *The exploitation of research and the needs of society*

The aim of this line of action is to carry out measures and studies which will help to improve the effectiveness of the exploitation and transfer of research results and to set out future strategy in the light of both economic and social needs and to organize joint action projects involving the scientific and educational community, public and private decision-makers, the social operators and the media in order to streamline communications between the general public and the world of science.

The competent structures in the Member States will be associated with the implementation of this line of action with the aim of stimulating synergies and ensuring mutual enrichment via the adoption of a coordinated approach and exchanges of information.

The action will include the following themes and activities from the standpoint of the transfer and exploitation of know-how:

— evaluation of the economic and social impact of RTD activities;

— the economy and the management of research;

— organization of communication projects designed to enhance awareness of the implications and impact of science and technology.

These activities will be implemented in close cooperation with those undertaken for the evaluation of the scientific and technical policy options in the programme of 'focused socio-economic research'.

B. Dissemination of technology to enterprises

Priority attention will be given to SMEs in the industrial and service sector which depend on access to new technology for the preservation of their competitiveness but do not have sufficient resources to participate in Community research activities or the direct exploitation of Community research results. Many of these enterprises are in the lower or middle ranges of technological intensity and measures must be taken to improve their absorption capacity for new technology.

Hence the need to heighten their awareness of the new technologies which are available, whatever their origin, and of the opportunities they provide from the standpoint of their individual needs and strategies. They are so numerous that direct action is not a feasible proposition.

To stimulate these enterprises, the Community must play the role of a catalyst and motor, and this will involve the radical decentralization of the organization of its activities and reliance on the competent organizations in the Member States, the TT intermediaries, the multipliers of information, etc., in order to optimize the impact of its action.

The action taken under this heading is intended to raise the level of European awareness of these organizations and improve their quality and professionalism by fostering the establishment of cooperation networks, exchange of good practice, the provision of training and support for joint activities.

Community action must also contribute to the establishment of an environment favouring the absorption of technologies, via the organization of awareness-enhancement projects in the business sector, the demonstration of effective methods and the promotion of modern innovation management techniques. Finally, it must raise the general level of knowledge of the relevant mechanisms, instruments and policies and facilitate the dissemination of good practice to the local and regional operators, particularly by organizing the exchange and evaluation of experience.

Hence the simultaneous involvement of five major categories of operators:

— technological resource centres (TRCs), capable of providing SMEs with the technological expertise they need for an innovation project (universities and public research centres, sectoral joint research centres, companies specializing in research under contract, etc.);

— suppliers of interface services, capable of rapid diagnosis of the needs of client SMEs and able to put them in touch with the competent TRC ('conseillers technologiques' in France, 'one-stop shops' in the United Kingdom, innovation centres in the Netherlands, etc.);

— suppliers of specialized advisory services (quality, design, management, search for partners, creation of networks, etc.);

— suppliers of financial services, able to mobilize the capital resources required for innovation projects;

— the national, regional or local public organizations which lay down policies, determine the conditions under which enterprises have to operate and manage support procedures.

Three lines of action are to be followed in this domain:

1. *Transnational networks providing support for the transfer and dissemination of technology*

In the follow-up to the Sprint programme, the emphasis will be firmly fixed on European orientation and the quality and effectiveness of the services providing support for innovation and technology transfer. A coordinated bottom-up approach, geared to the needs of enterprises from the outset and

encompassing every aspect of the transfer and utilization of technologies, will be promoted in this context.

Provision will be made for the following activities:

— consolidation of the transnational cooperation networks of national or regional operators in the fields of technology transfer or dissemination, so as to strengthen their European orientation: RTD organizations, sectoral technology centres, science and technology parks, local and regional technology disseminaton organizations and networks, etc.;

— promotion of cooperation between universities, research centres, industry and sources of financing in order to facilitate the expansion and transnational development of high-tech firms;

— organization and support for access to international expertise for designing and evaluating technology dissemination networks in the less-favoured regions. Promising projects not yet up to the required level would be given proposals for improvements through partnerships with a view to enabling, as far as possible, their subsequent acceptance;

— support for national or regional schemes to make technology transfer services more effective, in the form of training sessions (e.g. in the form of a 'summer university'), exchanges of experience and good practice, publication of manuals, etc., in order to give a trans-European dimension to these initiatives;

— measures to facilitate the trans-European dissemination of technological opportunities, whatever their origin, and to promote contact between suppliers, potential clients and intermediaries (TT conferences, technology exchanges, etc.) through maximum use of the network of relay centres.

2. *An environment favouring the absorption of technologies by industry*

The aim is to foster the absorption of new technologies not only by industry in general, and especially by SMEs, but also by public sector organizations, particularly at a local level. A special effort will be made to help the users to express their requirements and hence to choose the technologies which match their individual strategies and absorption capacities (demand-led approach).

The following activities are proposed:

— support for pilot projects for transregional or inter-sectoral transfer of technologies which can serve to demonstrate the methods and conditions of adoption of technologies by new users. These projects will be supported by intermediary organizations selected for their capability of playing a positive role as multipliers in the dissemination of technology in the SME sector;

— promotion, among businesses and especially among SMEs, of good practice in the various domains of innovation management and absorption of new technology by new users, including strategic planning, technology watch, value analysis, design, quality management and the marketing of innovations. These activities may include the organization of competitiveness (for prizes such as the EC Design Price) and support for decentralized projects for the promotion of an integrated approach to the application of these management techniques (MINT initiative). Special efforts will be made to encourage undertakings to adapt organizational methods which allow them to adapt to radical innovations;

— implementation of schemes to encourage the less-favoured regions to join with the more advanced regions in an exchange of experience on the design and application of measures aimed at increasing the capacity of their SMEs to absorb technologies;

— promotion of inter-business cooperation in the field of technology in all its phases (search for partners, establishment of contacts, mobilization of financial resources, negotiation of contracts) with the help of appropriate instruments and networks;

— promotion of decentralized awareness-enhancement projects in the fields of technology transfer and innovation (e.g. 'Innovation Road Show').

3. *Exchanges of information and experience with regard to policies for the dissemination of technologies*

Action under this heading is intended to improve the interlinkage of national, regional and Community TT policies and the instruments used for their implementation.

This means not only raising the levels of awareness of innovation systems (and their performance) and of regional, national and Community rules and regulations, but also the organization of regular exchanges of experience and good practice between the various operators concerned.

The following actions are proposed:

— further study and observation of the various European systems, policies and instruments (European Innovation Monitoring System) with particular emphasis on comparative analysis of the rules and regulations with regard to licensing, tax incentives or legal instruments;

— action to help the regional operators to analyse their TT infrastructures and fine-tune their policies and instruments with the assistance of external experts;

— creation of a forum for the exchange of experience and good practice in the formulation, implementation and evaluation of national and regional TT policies (Innovation Policy Forum).

These activities will be implemented in close cooperation with those undertaken under other Community programmes, in particular the programme of 'focused socio-economic research'.

C. The financial environment for the dissemination of technology

The aim in this area of activity is to improve the European environment for financing the exploitation, adaptation and dissemination of technology by means of an appropriate Community scheme to be implemented in accordance with the principle of subsidiarity.

This domain encompasses:

1. *Indirect support measures*

These include:

— the organization of schemes for improving transnational communications between financial circles and promoters of technology projects (such as investment fora);

— continuation of the pilot project for Technology Performance Financing started under the Sprint programme, with the aim of encouraging the traditional industries to absorb new technologies;

— support for the analysis and possibly the experimental application of systems for mobilizing private funds (including investment exit mechanisms) for the benefit of RTD projects (e.g. comparison of local networks of private investors or 'business angels').

2. *A pilot scheme to promote the transfer and exploitation of technologies by SMEs,*

e.g. via a system of premiums for SME participation in activities designed to promote the dissemination and exploitation of Community RTD results. The management of this activity will be largely decentralized and entrusted to organizations with a well-developed national or regional network or experience in the provision of suport for SMEs (public innovation agencies, relay centres, etc.).

3. *The granting of technical and management assistance,*

particularly in the less-favoured regions of the Community, to public and private financial intermediaries, selected — or to be established — in Member States, offering small and medium-sized enterprises the opportunity for participate co-funding, with particular reference to facilitating the evaluation of technological projects to be submitted by SMEs and allowing optimum exploitation of the research results.

These actions will be closely coordinated with the various Community actions in this field (Eurotech Capital, European Investment Fund, business policy, etc.).

D. Scientific services for Community policies

This involves activities to provide scientific and technical support for Community policies, at the request of the Directorates in charge of these policies, wherever the need and demand for it is expressed. To ensure a competitive approach, they will be open to participation by all research institutes in the Community and the JRC.

Implemented completely independently, these actions will be aimed at meeting specific needs arising in the implementation of the various Community policies; in particular, they will satisfy the need to mobilize the most appropriate scientific and technological skills in support of the dissemination of knowledge and the exploitation of the results of research, as well as their use by the different operators in the economic fabric.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT

Dissemination and exploitation of RTD and demonstration results	48—55 %
Dissemination of technologies to industry	40—45 %
Financial environment for technology dissemination	5— 7 %
Total	293 (1) (2)

(1) Of which 4,4 % for staff expenditure and 4 % for administrative expenditure.
(2) A sum of ECU 37 million, representing the difference between the amount deemed necessary for the present programme and the sum allocated within the Fourth RTD Framework Programme to Action 3 (dissemination and exploitation of results), is entered in the 'specific RTD programme to be carried out by means of direct action and S/T support activities in the framework of a competitive approach'.

The breakdown between different areas does not preclude projects covering a number of fields.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

1. The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

   The detailed rules for the participation of undertakings, research centres and universities, and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

   However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

   (a) to all legal entities established and regularly carrying out RTD activities:

   — in the Community, or

   — in a third country associated, wholly or in part, with the implementation of the relevant programme through an agreement concluded between the Community and the said third country

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

1.4. Partners specialized in the fields of dissemination, exploitation and transfer of technologies and decentralized actions under national operators may be envisaged. Adapted management arrangements and suitable funding measures are necessary for those actions.

2. This programme will be carried out in the form of:

2.1. Financial participation of the Community in dissemination and exploitation activities conducted by third countries or by JRC institutes in association with third parties.

(a) Shared-cost activities covering the following procedures:

— dissemination and exploitation projects carried out by undertakings, research centres, universities or any other organizations specialized in the fields of dissemination and exploitation, including consortia for integrated projects with a common objective;

— technology stimulation to facilitate the use of research results and the transfer of new technologies among SMEs may result in financial aid and, in particular, exploitation subsidies being granted, with a view to facilitating the exploitation of RTD results by SMEs. The above subsidy will be granted after the selection of draft proposals, which may be submitted at any time;

— support for financing the infrastructure in the fields of dissemination and exploitation or the installations necessary for coordinated action (closer coordination).

(b) Concerted activities, which consists of coordinating, particularly, with the aid of concertation networks, projects already funded by public authorities or private bodies. Concerted activities can also include the necessary coordination of the operations of dissemination and exploitation networks which, through RTD projects involving shared-cost activities (cf. 2.1 (a), first indent) or preparatory, accompanying or support measures, bring together those persons or bodies — manufacturers, users, universities, research centres or other operators involved in technology transfer — with the same technological or industrial objective.

(c) Specific measures such as measures to promote standardization and measures for setting up general-purpose instruments for use by research centres, universities, undertakings and other operators involved in technology transfer in the fields of dissemination and exploitation. The Community's contribution covers up to 100 % of the costs of the measures.

2.2. Preparatory, accompanying and support measures covering, in particular, the following:

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

— conferences, seminars, workshops or other scientific or technical meetings, including intersectoral or multidisciplinary coordination meetings;

— use of external expertise, including access to or development of information systems;

— scientific publications, including the dissemination, promotion and utilization of the results;

— studies to assess the socio-economic consequences and any technological risks associated with all the projects covered by this programme;

— measures to support the operation of decentralized awareness and assistance networks for SMEs, in coordination with the Euromanagement-RTD audits scheme;

— training activities related to the activities under the programme;

— assistance for the mobility of staff with a view to disseminating know-how and technologies;

— independent evaluation (including studies) of programme administration and of the implementation of the activities.

Proposal for a Council Decision adopting a specific research and technological development programme in the field of stimulation of the training and mobility of researchers (1994—1998)

(94/C 228/16)

(Text with EEA relevance)

COM(94) 68 final — 94/0094(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme for Community activities in the field of research, technological development and demonstration (RTD) for the period 1994—1998 specifying *inter alia* the activities to be carried out in the field of the training and mobility of researchers; whereas this Decision takes account of the grounds set out in the preamble to that Decision;

Whereas Article 130 i (3) of the Treaty specifies 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 implementing it, fix its duration and provide for the resources deemed necessary;

Whereas this programme will be carried out mainly through shared-cost actions, concerted actions and through preparatory, accompanying and support measures;

Whereas, in accordance with Article 130 i (3), an estimate shall be made of the financial amount necessary to carry out this Specific Programme; whereas the definitive amount shall be decided by the Budgetary Authority in conformity with the share fixed by the Framework Programme;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) provides that the maximum overall amount of the Fourth Framework Programme will be re-examined by 30 June 1996 at the latest with a view to being increased; whereas the amount deemed necessary for implementation of this programme may be increased as a result of that examination;

Whereas the development and better utilization of human resources in the Community through the training and mobility of researchers is one of the priorities of the Fourth Framework Programme;

Whereas intensification of Community collaboration by the networking (including twinning) of laboratories in different countries is an important means of strengthening the European research base; whereas it is also important to facilitate the access of Community researchers to large-scale facilities essential to high quality research;

Whereas training activities, networking and facilitating the access to large-scale facilities call for appropriate accompanying measures, such as conferences and courses, prizes for young scientists, dissemination and utilization of research results and the consultation of distinguished European scientists and representatives of industry;

Whereas the promotion of human resources must also contribute to the Community's scientific cohesion by offering scientific institutions and researchers in the less-favoured regions training and research opportunities enabling them to achieve excellence;

Whereas the content of the Fourth Framework Programme 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 training and mobility of researchers;

Whereas Decision . . ./. . ./EC (Fourth Framework Programme) provides that Community action is justified if *inter alia* the research contributes to strengthening the economic and social cohesion of the Community and to promoting its overall harmonious development while maintaining scientific and technical quality; whereas it is considered that this programme contributes to attaining these objectives;

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

Whereas the training activities for researchers in the specific programmes of the first, second, and third activities of the Fourth Framework Programme must be coordinated;

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

Whereas, in accordance with Article 130 m of the Treaty, it may be appropriate to engage in international cooperation activities with international organizations and third countries other than the countries covered by the EEA Agreement for the purpose of implementing this programme;

Whereas this programme also comprises activities for the dissemination and utilization of RTD results, in particular vis-à-vis SMEs and notably those in the Member States or regions that participate least in the programme;

Whereas an assessment should be made of the economic and social impact and any technological risks associated with the activities carried out under this 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 of 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 the 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 research and technological development programme in the field of training and mobility of researchers, as set out in Annex I, is hereby adopted for the period from (date of adoption of this programme) to 31 December 1998.

Article 2

1. The amount deemed necessary for carrying out the programme is ECU 744 million, including 5,6 % for staff and administrative expenditure.

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

3. The amount deemed necessary for carrying out the programme, as indicated above, could increase as a result of, and in accordance with, the Decision referred to in Article 1 (3) of Decision . . ./. . ./EC (Fourth Framework Programme).

4. The Budgetary Authority shall determine the appropriations available for each financial year in accordance with the share fixed by the Framework Programme.

Article 3

Detailed rules for implementing this programme, in addition to those referred to in Article 5, are set out in Annex III.

Article 4

1. The Commission shall continuously and systematically monitor, with appropriate assistance from independent, external experts, the progress within this programme in relation to the objectives set out in Annex I. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. It shall submit proposals to adapt or supplement this programme depending on the results of this monitoring process.

2. In order to contribute to the overall assessment of Community activities provided for in Article 4 (2) of the Decision adopting the Fourth Framework Programme, the Commission shall, in due course, have an assessment made by independent experts of the activities carried out under this programme, and of their management during the five years preceding the assessment.

3. At the end of this programme, the Commission shall instruct independent experts to conduct a final evaluation 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 Council, the European Parliament 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 shall be updated where appropriate. It shall set out in detail the scientific and technological objectives and specify the stages in the implementation of the programme and the proposed financial arrangements.

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) below, the Commission shall be assisted by a committee consisting of representatives of the Member States and chaired by the representative of the Commission.

The Commission representative shall submit to the Committee a draft of the measures to be taken. The Committee shall give its opinion on this draft within a period which the chairman may determine on the basis of the urgency of the issue.

The opinion shall be given by the majority provided for in Article 148 (2) of the Treaty for the adoption of Decisions by the Council on a proposal from the Commission. For the purposes of voting within the Committee, the votes of the representatives of the Member States shall be weighted in accordance with the abovementioned article. The chairman shall not vote.

The Commission shall adopt the measures envisaged where they are in accordance with the opinion of the Committee.

If the measures envisaged are not in accordance with the Committee's opinion, 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 qualified majority.

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

Article 7

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

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

— the evaluation of the RTD projects proposed for Community financing as well as of the amount estimated for this financing, where for a particular project that amount exceeds ECU 0,2 million;

— the measures to be taken to evaluate the programme;

— any departure from the indicative breakdown of the amount set out in Annex II, which has not been the subject of a budgetary decision.

2. The Commission shall inform the Committee, at each of its meetings, of the evaluation of the programme's implementation in its entirety.

Article 8

The Commission is authorized to negotiate, in accordance with Article 228 (1) of the Treaty, international agreements with European third countries with a view to involving them in all or part of the programme.

Article 9

This Decision is addressed to the Member States.

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.

The section of Annex III to the Fourth Framework Programme concerning the fourth activity is an integral part of this programme.

1. THE CONTEXT

1.1. Stakes

The optimal utilization of human resources is a basic parameter of all socio-economic activity. The Commission's White Paper on 'Growth, Competitiveness, Employment' signalled in particular the importance in regard to researchers of 'their qualifications, their ability to meet the needs of developing industries and the extent to which the capital they represent is utilized' in order to contribute 'to renewing growth, strengthening competitiveness and boosting employment in the Community'.

Although Europe possesses, in the field of research, a human capital that ranks high in the world, its utilization is often ponderous and slowed down by differences that still exist between Member States and between different disciplines. The development of human resources by means of training through research and their better utilization through transnational mobility and cooperation are essential means to meet the general objectives of the Framework Programme. In this context, it is essential to ensure equal opportunities for male and female researchers.

In order to encourage creativity and innovation, there is a need to stimulate transnational training and cooperation activities proposed spontaneously by researchers themselves (bottom-up approach) without the outside imposition of pre-established targets or objectives. It will not always be easy to make a distinction between the 'targeted' approach of the first activity of the Fourth Framework Programme and this so-called 'free' research. It will be necessary to avoid overlap (in the case of projects, proposed to the fourth activity, that satisfy the specific objectives of the first activity), while at the same time ensuring the complementarity links that are necessary if the training and mobility activities of Community programmes are to create a bridge between fundamental research and applied research. For this reason, the training actions of the specific programmes of the first activity and of the JRC will be co-ordinated with those of this programme.

While respecting the fundamental principle of scientific excellence that governs Community RTD programmes, this programme will make an important contribution to Community cohesion by reducing the isolation of researchers, by improving communication and by establishing a climate of collaboration in the world of European research.

The fourth activity, which is aimed at providing advanced training in laboratories throughout the whole Community, will be open in character and will also stress the cooperation between universities and industry.

In order to stimulate fully the mobility of researchers, a major effort will have to be made to adapt the conditions and implementation procedures of Community training grants to national systems and, in the longer term, to coordinate the social, tax and salary conditions of these grants in all Member States.

1.2. Continuity and evolution in the programme

This programme is a continuation, with necessary modifications, of the 'Human Capital and Mobility' programme (1992—1994) and the earlier programmes 'Stimulation' (1983—1988), 'Science' (1988—1992), 'Access to Large Installations' (1989—1992) and 'SPES' (1989—1992).

Continuity elements, essential to any long-term activity, concern objectives (to increase, through training, mobility and cooperation, the efficiency of research and of research infrastructure), cohesion factors (to take into consideration the needs for qualified scientific staff in the less-favoured regions) and subsidiarity factors (to exploit the catalytic effects originating from the pooling of abilities and resources dispersed throughout the Community).

2. RTD ACTIVITIES

2.1. General objectives

The aim of the programme is to promote, through the stimulation of training and mobility of researchers, a quantitative and qualitative increase of human resources within the Community and the associated States [1]. Its general objectives are the following:

— to stimulate training through research and, by means of cooperation, to foster better utilization of high-level researchers in the Community;

— to improve the mobility of European researchers throughout the Community, encouraging mobility both between universities, research institutes and industry and between disciplines, thus better exploiting the research potential in the different disciplines;

— to promote, for instance through networks, transnational cooperation on research activities proposed essentially by the scientists themselves and not eligible for support under the first activity;

— to facilitate the access of all European researchers to existing large-scale facilities that are essential for high-quality research;

— to improve the scientific and technological cohesion of the Community and contribute to the attainment of a general level of scientific excellence by offering research opportunities to scientific institutions and researchers from all regions of the Community. As was the case under the 'Human Capital and Mobility' programme (1992—1994), the return to their region of origin of researchers originating in the less-favoured regions will be encouraged and financed.

This activity will cover the exact, natural, economic and management sciences, as well as those social and human sciences that contribute to the Community's objectives in research, technological development and demonstration.

2.2. Specific activities

The programme is divided into three interdependent areas (research networks, access to large-scale facilities, training through research), to which is attached an activity concerning accompanying measures aimed at improving communication between researchers themselves and with industry, at encouraging young researchers and at publicizing the results and achievements of the programme.

2.2.1. *Research networks*

Networks will allow researchers from as many countries as possible to join their efforts in 'European Laboratories Without Walls' and to constitute, in this manner, groups capable of performing research of higher quality. Small associations of laboratories from different countries (including twinnings) will also be eligible for support when they are considered to form the core of a future larger network.

Grants will be awarded to help researchers to meet, to perform experiments in common, to exchange results, to reinforce research staffs through temporary contracts for visiting scientists (preferably from a country other than that of the team concerned) and, in exceptional cases, to cover additional costs linked to scientific equipment where it is necessary for the joint research of the network. The average grant to a research team participating in a network shall correspond typically to the cost of taking on a post-doctoral researcher.

It will be the task of each network to distribute the research responsibilities between laboratories and to coordinate the research operations so that cooperation and communication is as open and efficient as possible. Advantage should be taken of the capabilities and potential of modern telematics, whenever appropriate.

Each network shall ensure the regular diffusion of its principal research results by publication of brochures and overview articles. After the work of a network has started, arrangements shall be made, where relevant, for establishing regular dialogue with industrial laboratories, particularly from SMEs, that could exploit the research findings or finance an extension of the research towards new

[1] An 'associated State' is a country participating financially in this programme, notably countries having ratified the Agreement on the European Economic Area, which are associated with the implementation of the Framework Programme.

objectives. As far as possible, SMEs of the less-favoured regions will be associated in this dialogue and encouraged to integrate with the transnational research teams.

The lifetime of a network shall not be less than three years.

2.2.2. *Access to large-scale facilities*

This activity is devoted to large research installations whose uniqueness or rarity in the Community, high investment or upkeep costs, and importance for research justifies substantial effort at Community level. It will be of particular importance to researchers working in regions of the Community where such installations do not exist.

Community actions, complementing national and international efforts, will include:

— support for researchers in order to facilitate their access to large installations and large instruments that are necessary for research and rare in the Community;

— support for improvement, where necessary, to large-scale facilities in order to provide wider access to Community researchers, thus encouraging more efficient use of these facilities.

2.2.3. *Training through research*

— Implementation of an activity of training through research and stimulation of researcher mobility in all the fields covered by the programme. Training periods may have a duration of between three months and three years and will allow European researchers to undergo training or specialization outside their country of origin. With regard to cohesion, measures will be taken to encourage the return to their region of origin of researchers from the less-favoured regions, and to enable leading scientists from the industrialized regions to work for extended periods in research centres in the less-favoured regions.

  Particular attention will be given to training activities devoted to the management of change, within enterprises, associated with new technology. Special attention will be attributed to the training of researchers belonging to SMEs.

— Coordination of the training activities defined in the specific programmes in the first, second and third activities of the Fourth Framework Programme. The purpose is to offer a coherent framework (correspondence of training grants and of categories of fellows, single entry points for receiving proposals and for expenditure commitments, harmonizaton of evaluation and selection procedures, ...) for the various actions at the Community level of training through research without going so far as to impose a centralized system unsuited to the special requirements of each programme.

— Study of the host conditions of Community research fellows. Large differences exist between Member States as regards the legal and financial status (salaries, social benefits and taxes) of Community disbursements to research fellows. The analysis of these differences will be pursued and efforts made to offset them or to adapt the system of Community training grants to the specific national situations.

2.2.4. *Accompanying measures*

Accompanying measures will be taken to contribute to the objectives of the programme in relation to the stimulation of researcher mobility and training; at the same time, they will be an appropriate vehicle for the dissemination of information on the conditions and procedures for participating in the various activities of the programme and for the dissemination of its results.

They will include in particular:

— the development of a system of Euroconferences to enable young researchers to make contacts with leading scientists in their respective disciplines;

— the organization of practical courses in laboratories or in industry to acquaint researchers with methods and techniques that are novel or little used. These courses will be organized, whenever practicable, in the less-favoured regions of the Community;

— the award of prizes to young undergraduate students and a competition for talented young scientists in secondary education;

— the encouragement of the participation of the less-favoured regions in the programme through the organization of information seminars;

— the publication and dissemination by all appropriate means of the objectives, details of participation, implementation and results of the programme;

— the consultation of distinguished European scientists and representatives of industry on the progress of the programme and on the possible need to modify its implementation or objectives;

— the organization of seminars as a forum for debate with the programme's fellows on the impact of the programme on their scientific activities and their careers;

— the evaluation of the economic and social impact and of possible technological risks arising out of the activities conducted in the frame of this programme;

— regular evaluation, in direct consultation with Member States, of progress made under the programme with regard to cohesion;

— study of the possibility of organizing training through distance-learning for the less-favoured regions of the Community.

ANNEX II

INDICATIVE BREAKDOWN OF THE AMOUNT DEEMED NECESSARY

Research networks	40—50 %
Large-scale facilities	13—17 %
Training	30—40 %
Accompanying measures	4— 6 %
Total	100 % (1) (ECU 744 million)

(1) Including 2,7 % for staff expenditure and 2,9 % for administrative expenditure.

The breakdown between different areas does not exclude the possibility that a project may be financed from more than one area.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE PROGRAMME

The detailed rules for the Community's financial contribution are laid down in Annex IV to the Decision on the Fourth Framework Programme.

The detailed rules for the participation of undertakings, research centres and universities and for the dissemination of results will be laid down in the measures provided for by Article 130 j of the Treaty.

However, for the purpose of implementing this programme, the following exceptions shall apply:

1.1. Participation in this programme is open, with financial support from the Community:

(a) to all legal entities, established and regularly carrying out RTD activities:

— in the Community, or

— in a third country associated, wholly or in part, with the implementation of the programme through an agreement concluded between the Community and the said third country,

(b) to the Joint Research Centre.

1.2. Participation in this programme is open, without financial support from the Community, and on condition that their participation is in the interests of Community policies:

(a) to legal entities established in a country which has concluded a scientific and technical cooperation agreement with the Community relating to activities covered by the programme, provided the participation accords with the terms of the agreement,

(b) to legal entities established in a European country,

(c) to international research organizations.

1.3. The participation of European international organizations may be financed on the same basis as that for Community organizations in duly specified cases.

1. RESEARCH NETWORKS

Participants in this shared-cost action will be research teams, in universities, research institutes and industry, grouped in transnational networks for the purpose of jointly conducting a research project.

As a general rule, a network shall consist of at least five research teams from at least three countries. The lifetime of a network shall be at least three years. However, networks of less than five teams in different countries, including twinnings, may be supported when they are considered to form the core of a future larger network. Such networks will be supported, in a starting phase, for a maximum of only two years; the continuation of support will depend on the number of participants having increased to five or more from at least three countries.

Networks to be financed by the Community shall be selected on the basis of their scientific quality, taking into account the added value that working together as a network could represent for European science and the participation of industry where relevant to the project proposed. While respecting the overriding criterion of scientific quality in the selection process, proposals linking established laboratories of high quality, on the one hand, and promising laboratories situated in the less-favoured regions, on the other, will be encouraged.

The Community contribution will be granted to cover 100 % of the additional costs of creating and maintaining the network (mobility, additional personnel, research costs). As a general rule, it shall not be used to procure durable equipment or to contribute to infrastructural costs. A part of the Community contribution awarded to a network may however be used to cover the costs of 'infrastructure-equipment' when it is needed to help establish a new research team to be set up in a less-favoured region [1] of the Community by a researcher trained abroad on a post-doctoral fellowship in the frame of this or the previous Human Capital and Mobility Programme.

2. LARGE-SCALE FACILITIES

The term 'large-scale facilities' refers to an installation, which is rare in the Community, whose investment and operating costs are high, and whose importance for research justifies a substantial effort at the Community level in order to encourage the access of researchers and the more efficient use of the facility. A group of smaller complementary installations, located on the same site, could also be considered to be a large-scale facility, if this group as a whole has equivalent characteristics to those described above.

Facilities to be financed by the Community shall be selected on the basis of the following criteria:

— the qualities of the facility, in particular the originality and range of possible experiments, as well as the capacity of its scientific, technical and logistical infrastructure;

— the scale of interest shown by potential new users;

[1] Objective 1 regions of Council Regulation 93/2081/EEC (OJ No L 193/19, p. 5, 31. 7. 1993).

— the cost effectiveness of Community support;

— the benefit to the Community in terms of improving the scientific and technical potential of the less-favoured regions.

Shared-cost actions

Community support will be granted to cover 100 % of the additional costs relating to the use of existing facilities by researchers other than those belonging to the host organization. Priority will be given to new users and to researchers who come from countries other than that in which the facility is located. Grants are intended to cover the travel and subsistence costs of the researchers, fees for the researchers to use the facility, and the publication and dissemination of scientific results. Such grants will not provide support to procure durable equipment or to contribute to infrastructural costs.

In the case of the improvement of installations (for example, peripheral equipment, instrumentation, technological development, feasibility studies) in order to encourage wider access to researchers and to encourage more efficient use of the facilities, Community support will be granted to cover 100 % of the additional costs, or, where it is more appropriate, 50 % of the full costs of the project.

Concerted actions

Concerted actions (studies, seminars, workshops, etc.) will also be supported in order to encourage the exchange of information between large-scale facilities and European researchers on subjects of common interest, complementing national and international efforts.

3. TRAINING THROUGH RESEARCH

Participants in this activity are, on the one hand, researchers wishing to receive training or to specialize outside their country of origin and, on the other, the research institutions hosting them.

Researchers must be citizens of Community Member States or of an associated State.

The research institutions must be legal entities, established in the Community or an associated State and have the capacity to provide training through research.

The activity will be financed through Community grants for training and mobility designed to cover the subsistence and mobility expenses of the researchers and to make a contribution to the research and administrative costs of the host institution. The training period could vary from three months to three years.

The training programme covers basic and applied research in all the exact and natural sciences, economic and management sciences, as well as in the human and social sciences that contribute to the Community's RTD objectives.

Eligibility

Persons whose studies or career have reached the following levels are eligible for support:

— *postgraduate:* holder of a degree, obtained after at least four years' full-time studies, delivered by a university or equivalent institution of higher education, which qualifies the holder directly, without an intermediate examination, to embark on a doctorate;

— *post-doctoral:* researcher holding a doctorate or, alternatively, a researcher without a doctorate, but having at least four years' full-time research experience after successfully graduating from a course of study of at least four years' duration;

— *experienced researcher:* researcher with at least eight years' full-time research experience after successfully graduating from a course of study of at least four years' duration.

Return grants

Return grants are reserved for researchers from less-favoured regions who have been in receipt of a two-year grant for training through research. Their purpose is to enable the researcher to return to his region of origin during a period of one year. An applicant for a return grant must provide proof of links (birth or extended period of residence during the last few years) with his region of origin.

Selection criteria

Curriculum vitae of the candidate for a grant,

research experience,

scientific interest of the proposal,

value and realistic nature of the work,

and the qualities and abilities of the host laboratory.

The applications must be presented by researchers with the agreement of the host institution where they wish to undergo their training.

Call for proposals

The call for proposals will remain open throughout the whole duration of the programme.

4. ACCOMPANYING MEASURES

The accompanying measures set out in Annex I are intended to contribute to the effectiveness of the various training and mobility activities and to the proper dissemination and utilization of the results of the programme and of scientific research in the Community. The activities relating to dissemination and utilization of results carried out under this programme will complement those conducted under the third activity of the Framework Programme and will be implemented in close coordination with the latter. Partners in RTD projects are excellent vehicles for the dissemination and utilization of results. Back-up will be provided via publications, conferences, promotion of results, studies of technical and economic potential, etc. To ensure optimum utilization, factors liable to encourage the subsequent utilization of results should be taken into account from the outset and throughout the RTD projects. Additional measures may be planned in the course of the programme on proposal of the Commission Services, following consultation and agreement of the component bodies.

The selection procedure for the accompanying measures will involve a single call for proposals which will be published at the beginning of the programme, and which will remain open throughout its entire duration.

Selection criteria

— the scientific or technical quality of the proposal;

— its contribution to the general objectives and guidelines of the programme and of Community RTD policy.

Financing

The accompanying measures selected will be the subject of a contract between the Commission and the proposer(s). The contract may provide for financial participation by the Community of up to 100 % of the approved costs.

In the case of Euroconferences, at least 75 % of the Community's financial participation shall be allocated to financing the participation of young researchers; a maximum of 25 % may be provided for the preparation and organization proper of the conference, including in particular the reimbursement of expenses relating to the participation of experienced researchers.

Proposal for a Council Decision adopting a specific research and development programme to be carried out for the European Community, — 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 scientific and technical support to Community policies (1995—1998)

(94/C 228/17)

(Text with EEA relevance)

COM(94) 68 final — 94/0095(CNS)

(Submitted by the Commission on 30 March 1994)

THE COUNCIL OF THE EUROPEAN UNION,

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

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas, by Decision . . ./. . ./EC, the Council and the European Parliament adopted a Fourth Framework Programme of Community activities in the field of research, technological development and demonstration (hereinafter referred to as 'RTD') for the 1994—1998 period, defining the activities to be carried out by means of direct action, on the one hand, and, on the other hand, by means of activities within the framework of a competitive approach and intended for scientific and technical support to Community policies; whereas this Decision is taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 130 I, paragraph (3) of the Treaty provides that the Framework Programme is to be implemented through Specific Programmes developed within each of the activities of which it is composed; whereas each Specific Programme lays down the detailed rules for its implementation, specifies its duration and provides for the funds deemed necessary;

Whereas the RTD activities carried out by means of direct action are conducted by the JRC; whereas these activities consist of institutional research and scientific and technical support activities;

Whereas the Commission may undertake activities for the scientific and technical support of Community policies which come within the framework of a competitive approach;

Whereas it is necessary, in accordance with Article 130 I, paragraph 3 of the Treaty to estimate the funds required for the implementation of the direct action to be conducted through this Specific Programme; whereas the final amounts are adopted by the budgetary authority;

Whereas Decision . . ./. . ./EC provides that the maximum overall amount for the Framework Programme is to be reviewed no later than 30 June 1996 with a view to its being increased; whereas, as a result of that review, the amount deemed necessary for implementation of this programme might increase;

Whereas it is desirable, in the context of this programme, to have an evaluation carried out of the social and economic impact and of any technological risks;

Whereas there should be continual and systematic monitoring of progress on the implementation of this programme with a view to adapting it, if necessary, to scientific and technological developments;

Whereas the content of the Fourth Framework Programme for Community RTD activities has been defined in accordance with the principle of subsidiarity; whereas this Specific Programme defines the content of the activities to be carried out in accordance with that principle by way of direct actions and activities within the framework of a competitive approach and intended for scientific and technical support to Community policies;

Whereas Decision . . ./. . ./EC provides that Community action is justified if *inter alia* the research contributes to strengthening the economic and social cohesion of the Community and to promoting its harmonious overall development, while complying with the objective of scientific and technical quality; whereas this programme is deemed to contribute to the attainment of those objectives;

Whereas the JRC is called upon to contribute to the implementation of the Framework Programme through RTD activities for which it has special, if not unique, capabilities and installations and by providing the scientific and technical support needed for the formulation and implementation of Community policies and the tasks assigned to the Commission under the Treaty requiring the impartiality of the Centre; whereas that contribution should be an integral part of a long-term strategy which will lead to the JRC playing a significant role in the field of European scientific cooperation;

Whereas, as part of the direct action, the research activities must be carried out in such a way as to ensure their complementarity with the corresponding indirect action;

Whereas, as part of the direct action, the scientific and technical activities to support Community policies should remain consistent with the requirements of these policies for the duration of the implementation of this programme;

Whereas the JRC may also take part in the indirect action carried out under the other specific programmes in the same way as third parties situated in a Member State or an associated State;

Whereas the JRC may also take part, on a competitive basis, in any other activity implemented by the Community and carry out research on behalf of third parties;

Whereas exploratory research should be encouraged;

Whereas the JRC may contribute to the alignment of national, Community and European research activities, including Eureka; whereas, closely involved in the formulation and implementation of Community policies, it may, in the scientific and technical sectors in which it has expertise, play a leading role, be a focal point for networks involving public and private laboratories in the Member States and serve as a centre of gravity for European research consortia in specific fields;

Whereas the JRC may contribute to the implementation of such activities, in particular in the fields of information and communications technologies, industrial technologies, the environment, the life sciences and technologies, energy, targeted socio-economic research, the dissemination and utilization of the results of the research activities, and technology transfer;

Whereas it is necessary to continue widening the scientific and technological bases of European industry in order to encourage its international competitiveness; whereas it is therefore necessary to promote the prenormative research activities consideed to be necessary under other Community policies;

Whereas the JRC may contribute, through its activities in respect of consumer protection and the environment, to meeting social needs and requirements concerning the quality of life;

Whereas Article 130 F of the Treaty provides that it is necessary to promote the research activities needed for the preparation and implementation of other Community policies; whereas the JRC is called upon to contribute to this through its institutional support activities for which its impartiality is necessary;

Whereas it is necessary to strengthen the economic and social cohesion of the Community and to promote its harmonious overall development, while complying with the objective of scientific and technical excellence; whereas it is also necessary to strengthen the synergy between research activities and the action of the Community itself through Structural Funds; whereas the activities carried out by the JRC should help to achieve these objectives;

Whereas the JRC should be better integrated into networks or consortia with partners in all the Member States, in both its institutional and its competitive activities; whereas the JRC should, in particular, play a leading role in improving links between research laboratories and institutions in all regions of the Community;

Whereas account should be taken of the fact that the EFTA Member States which are parties to the EEA Agreement may participate fully in this specific programme;

Whereas, in the implementation of this programme, international cooperation activities may, in accordance with Article 130 M of the Treaty, also prove to be useful with other third countries and international organizations;

Whereas, with this in mind, the JRC should establish preferential links with public and private bodies and undertakings established in third countries, in particular European third countries; Whereas the implementation of this programme also includes activities concerning the dissemination and utilization of RTD results, in particular for the use of small and medium-sized enterprises, and activities to encourage the mobility and training of scientists;

Whereas there should be an independent evaluation, in good time, of progress with the institutional research activities in order to provide the background information required for determination of the objectives of the Fifth RTD Framework Programme; whereas, lastly, it is necessary, under that programme, to carry out a final evaluation of the results obtained in the light of the objective set out in this Decision;

Whereas the Board of Governors of the JRC plays an important role in the operation of the Centre and in the implementation of its activities.

Whereas, within the framework of the support activities needed for the implementation of other Community policies, use will be made, on a competitive basis, of bodies situated in the Member States or the JRC;

Whereas the objective of these activities is to meet requirements which arise during the implementation of

Community policies; whereas, therefore, the Commission must be able to take the action needed to adjust or supplement them;

Whereas, to this end, detailed rules concerning responsibility and the grant of funds provided for these activities must be laid down in the light of the Community policy concerned.

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

HAS ADOPTED THIS DECISION:

Article 1

A Specific Programme of research and technological development activities to be carried out

— on the one hand, by means of direct action and

— on the other, by means of activities suited to a competitive approach and intended for scientific and technical support to Community policies

is hereby adopted for the period 1 January 1995 to 31 December 1998.

Section I — Direct action

Article 2

The Commission, assisted by the Board of Governors of the JRC (hereinafter referred to as the 'Board of Governors'), shall be responsible for the implementation of the direct action and, to this end, shall call upon the services of the JRC.

Article 3

1. The direct action consists of institutional research activities and institutional scientific and technical support activities;

2. The institutional research activities, as defined in Annex IA, are those for which the JRC has special, if not unique, capabilities, and which contribute to the RTD policy of the Union. They shall be carried out in such a way as to ensure their complementarity with the corresponding indirect action contained in the other Specific Programmes of the Fourth Framework Programme.

3. The institutional scientific and technical support activities, as defined in Annex IB, are the activities needed for the formulation and implementation of other Community policies and the tasks assigned to the Commission under the Treaty and requiring the impartiality of the JRC.

Article 4

1. The JRC shall participate in the implementation of Community action on research, technological development and demonstration in the fields of information and communications technology, industrial technologies, the environment, the life sciences and technologies, energy and targeted socio-economic research and through its exploratory research activities.

2. It shall also participate in the implementation of Community action on the dissemination and utilization of the results of Community research, technological development and demonstration activities.

3. It shall also contribute to the implementation of Community research, technological development and demonstration activities through its participation in the indirect action implemented under the other specific programmes in cooperation with one or more partners situated in a Member State.

4. The JRC shall participate in the implementation of Community research and technological development and demonstration activities through its involvement in networks or consortia with partners in all of the Member States. It shall endeavour, in particular, to improve links between the research laboratories and institutions in all regions of the Community.

Article 5

1. The amount deemed necessary for the implementation of the JRC activities under this programme is 600 million ECU.

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

3. The amount deemed necessary, as indicated above, for implementing the programme may increase pursuant to and in conformity with the Decision referred to in Article 1, paragraph 3 of Decision . . ./. . ./EC.

4. The budgetary authority shall determine the appropriation available for each financial year in compliance with the scientific and technological priorities laid down by the Fourth Framework Programme.

Article 6

The detailed rules for implementing the direct action are defined in Annex III.

Article 7

1. The Commission, assisted by the Board of Governors, shall continually and systematically monitor progress on the implementation of the direct action in relation to the objectives set out in Annex I. It shall assess in particular whether the objectives, priorities and financial resources are still appropriate to the changing situation. It shall, if appropriate, submit proposals to adapt or supplement these programmes depending on the

results of the monitoring process and, with regard to the activities for the scientific and technical support of Community policies, take the necessary action to ensure that these are consistent with the requirements of these policies.

2. The Commission shall each year before 15 April submit to the European Parliament, the Council and the Econonic and Social Committee a report on the implementation of this Decision. This report shall be accompanied by the observations of the Board of Governors. The latter may also submit, through the Commission, to the European Parliament, the Council and the Economic and Social Committee a separate report on any aspect of the implementation of this Decision.

3. In order to contribute to the overall evaluation of the Community activities provided for in Article 4.2 of the Decision adopting the Framework Programme, the Commission, after consulting the Board of Governors, shall, in good time, instruct independent experts to conduct an evaluation of the research activities and their management conducted by the JRC under this programme.

4. At the end of this programme, the Commission, after consulting the Board of Governors, shall instruct independent experts to conduct a final evaluation of the results achieved compared with the objectives set out in Annex III to the Framework Programme and Annex I to this Decision. The final evaluation report shall be forwarded to the Council, the European Parliament and the Economic and Social Committee.

Article 8

The Commission shall ensure, in cooperation with the Board of Governors, that there is systematic consultation with the programme committees concerned to ensure close coordination between the indirect action, the corresponding national activities and the institutional research activities of the JRC in the same fields and to guarantee a coherent approach.

Article 9

1. The Commission is authorized, in accordance with Article 228, paragraph 1 of the Treaty, to negotiate international agreements with third countries, in particular European third countries, not covered by the EEA Agreement, and with international organizations situated in Europe, with a view to associating them with the JRC activities.

2. The Commission, assisted by the Board of Governors may, on the basis of the criterion of mutual benefit, request the JRC to execute projects with bodies and undertakings established in third countries, in particular European third countries, in the context of the Specific Programmes carried out by the JRC.

Section II. Activities within the framework of a competitive approach and intended for scientific and technical support to Community policies

Article 10

The Commission may carry out scientific and technical support for Community policies with the aid of activities within the framework of a competitive approach.

Article 11

The scientific and technical support activities defined in Annex IV are intended for the implementation of other Community policies. These activities come within the framework of a competitive approach.

Article 12

1. The amount deemed necessary for the implementation of the activities covered by this section is 128 million ECU.

2. An indicative breakdown of the amount between the first and third activities under the Framework Programme is given in Annex V.

3. The amount deemed necessary, as indicated above, for implementing the programme may increase pursuant to and in conformity with the Decision referred to in Article 1, paragraph 3 of Decision . . ./. . ./EC.

4. The budgetary authority shall determine the appropriations available for each financial year in compliance with the scientific and technological priorities laid down by the Fourth Framework Programme and described in detail in this programme.

Article 13

The detailed rules for implementing the competitive support activities covered by the present Section are defined in Annex VI.

Article 14

The Commission shall continuously and systematically monitor progress with this section of the programme in relation to the requirements of Community policies. It shall in particular assess whether the objectives, priorities and financial resources are still appropriate. It shall, where appropriate, take action to adapt or supplement these activities depending on the results of this monitoring process.

Article 15

This Decision is addressed to the Member States.

ANNEX I

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENT

This Specific Programme fully reflects the broad lines of the Framework Programme, applies the selection criteria and spells out the objectives.

Paragraphs 1C, 2B, 3A, 3B, 4C, 5 and 7A of Annex III (first activity) of the Framework Programme are the basis of the objectives of this programme.

The Joint Research Centre (JRC) will conduct strategic and applied research. It will therefore be an integral part of European science and technology. The JRC will also contribute to the establishment of the scientific and technical bases needed for the formulation and implementation of various Community policies.

In line with the priorities defined in the White Paper 'Growth, Competitivity, Employment' in the research field, the scientific and technical activities carried out by the JRC should meet the needs of the Community as a whole, its institutions and Member States with the objectives of:

— helping to strengthen the scientific and technological basis of European industry and to encourage the development of its international competitiveness;

— providing the independent scientific expertise necessary for the implementation of Community policies and the tasks which the Treaty assigns to the Commission;

— providing scientific and technical services to Community institutions and making JRC capabilities and scientific and technical installations available to public and private bodies;

— contributing to the improvement of public safety aspects of new technologies;

— contributing to the improvement of environmental impact assessment and protection;

— contributing to the reduction of scientific and technological disparities between Member States.

The European dimension of its research must remain one of the fundamental strengths of the JRC. Its activity should be characterized by a multidisciplinary approach based on the broad span of its capabilities. This multidisciplinarity is reflected in the choice of subjects covered by its institutes, thus ensuring its ability to meet new challenges as they arise.

Thanks to its capabilities and its involvement in the formulation and implementation of Community policies, the JRC will contribute to the integration of national, Community and European activities. Thus it will participate in networks of public and private laboratories in the Member States or European research consortia, and may be the focal point of such networks in its areas of expertise. It will furthermore participate in relevant Eureka projects.

This large exposure should not, however, lead to an excessive dispersion of the activities undertaken. Without ignoring the expectations of its customers, the Centre and its management must have clear views on the proper scientific and technical policy for the JRC and be able to maintain a balance in order to ensure that the activities and contracts which are accepted can be executed at all times with the requisite level of competence, both qualitatively and quantitatively.

Against this background, it should also be pointed out that some activities are horizontal: those concerning environmental protection may appear in fields other than that headed 'Environment'. The same applies, for example, to activities concerning the working environment.

The work to be carried out by the JRC falls into two categories:

— institutional research activities;

— institutional, scientific and technical activities in support of Community policies.

A. INSTITUTIONAL RESEARCH ACTIVITIES

These research, technological development and demonstration activities for which the JRC has special, if not unique, expertise and installations in the Community will contribute to the Community research policy.

Industrial technologies

The contribution of the JRC to this sector is aimed at improving the competitiveness of European industry, conducted in close coordination with the corresponding shared-cost action programmes. It will focus on prenormative research which, save exceptions, will be undertaken within the framework of networks of European bodies with interests and capabilities in this type of research and in association with standards organizations, in particular the European Committee for Standardization (CEN). This will guarantee that the overall requirements of industry are taken into account from the start.

Line 4: Industrial technologies and materials technologies

Research into materials will be directed mainly at the following sectors, which have a prenormative dimension and good potential as enabling technologies, with an emphasis on clean technologies:

— ceramics, metals and composite materials: process development, study of interfaces and joints, improvement of technological properties, characterization and demonstration;

— surface modification and characterization technology: ion implantation and laser beam, protective coating, non-destructive evaluation methods;

— prenormative research leading to standards on material recyclability, including the development of a database on recyclable materials (ecological characteristics and estimation of useful life).

This research is aimed at acquiring, in close cooperation with the national laboratories concerned, the scientific knowledge necessary for these materials to be used industrially, and to provide the standards bodies with knowledge which is essential for standardization in this field.

Line 5: Measurements and testing

These activities are directly related to standardization and include:

(a) Prenormative research on reference materials and prenormative and normative research on reference measurement, in particular in the following sectors:

— preparation, characterization and certification of high-quality reference materials. International intercomparison exercises will be used to ensure adequate quality assurance and to facilitate harmonization;

— establishment of a common scientific basis for the chemical reference measurements;

— measurements and evaluation of basic data, improvement of their quality and accuracy using the experimental installations available and by making use of European and international collaboration, in particular through networks.

The distribution of reference materials produced within a Community framework is assured by the Institute for Reference Materials and Measurements (IRMM). The results achieved by IRMM in establishing extremely accurate measurements have won it recognition as a reference centre. Intercalibration campaigns conducted by the IRMM among the network of all interested laboratories in the Community will provide each laboratory with an impartial and reliable evaluation of the quality of its own measurements. This activity will be extended on request to any third country laboratory, on payment of a fair fee.

(b) Prenormative research in the field of structural safety and reliability to improve the design specifications of civil engineering works for the development of standards (Eurocodes), in particular, by taking into account earthquakes, and the construction technologies of European industry. This research will continue to be conducted with the organizations in the Member States which have been grouped together since 1989 in the European Association of Structural Mechanics Laboratories. In order to carry out destructive dynamic tests on civil engineering works and industrial structures made of steel, concrete, brickwork and composite materials, the JRC has constructed the ELSA ('European Laboratory for Structural Assessment') test wall and the LDTF ('Large Dynamic Test Facility'), which are unique in Europe.

Furthermore, the development of non-destructive evaluation techniques to study the reliability and useful life of mechanical constructions will continue with a view to the development of component inspection techniques and the harmonization of qualification procedures. This research will continue to be conducted in the framework of the laboratory networks which have existed for a number of years, which will be gradually enlarged in line with needs.

Environment

Line 6: Environment and climate

The JRC will contribute to the promotion of environmental protection in close cooperation with the corresponding shared-cost action programme and through the following three sectors:

— Natural environment, environmental quality and global change

— Technologies for the environment

— Applied space techniques for environmental monitoring and research.

The European Community should make a major contribution to international research into global change, in particular by participating in major initiatives undertaken by the scientific community, such as the International Geosphere Biosphere Programme (IGBP) — the activities of the European IGAC (International Global Atmosphere Chemistry) Project Office (EIPO) will be continued at Ispra for IGBP — the World Climate Research Programme (WCRP) and the Human Dimension Programme (HDP).

In this context, the Joint Research Centre will concentrate its research on:

— the surveillance and study — particularly using remote sensing technology — of biosphere-atmosphere interactions and interactions between the processes taking place on land and in the ocean and the related parameters affecting climate change;

— physical and chemical analyses of atmospheric processes (in particular the study of sulphur in the atmosphere), including the behaviour of biogenic and anthropogenic emissions. This should include both measurements and modelling;

— the surveillance of global change by remote sensing through the development of advanced Earth observation techniques. This should include research into the development of techniques for using space data obtained from satellite observation for the surveillance of the marine environment and of changes in the terrestrial ecosystem. A number of advanced techniques (including those of a statistical nature) for using the new Earth observation system should also be developed.

In addition the JRC will make a significant contribution to the implementation of the Centre for Earth Observation (CEO).

The scientific community and decision-makers need accurate and consistent Earth observation data spanning a long period. To meet this urgent need, the European Community should set up the Centre for Earth Observation in close cooperation with the Member States and in association with the European Space Agency. This project is designed to guarantee users continuous and long-term availability of consistent data relating to Earth observation. It will set up a decentralized network of interested European bodies and thus bring users, the bodies responsible for thematic analysis and data-processing centres together in a single forum. The role of focal point of such a network should be performed by the JRC, while the programmes of shared-cost action will provide support for the national components of the network.

The JRC will also contribute to the Enrich network by making its scientific research on global change available.

The JRC will continue to contribute to improving environmental quality, mainly through research on air and water quality and the evaluation of the risks arising from chemical products and waste. Research into air quality inside buildings will also be continued, as will the study of pollution caused by metals in trace quantities.

Research into innovative technologies for environmental protection will aim to:

— improve industrial safety and environmental management by providing industry, research bodies and the public authorities with innovative methodologies (in particular design tools) for evaluation of the safety of chemical installations;

— developing mechanisms for the control of chemical reactions which might become uncontrollable, tools for predicting the dispersion of toxic or flammable products and the consequences of combustion and explosion.

Line 11: Non-nuclear energy

The JRC will contribute to the development 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 membrances for advanced ceramic filters, ceramic alloys and composite materials for high-temperature applications (turbines and heat exchangers).

Line 13: Targeted socio-economic research

The European Science and Technology Observatory (ESTO) of the JRC's Institute for Prospective Technologies will provide an information service on progress in science and technology and ensure surveillance of scientific developments and technological innovation.

In order to improve communications and to avoid duplication of effort, the Observatory will work in close cooperation with Eurostat and establish close links with European organizations and the OECD, but also with ESA, CERN, Eureka, etc. Its activities will be conducted in close cooperation with those foreseen under the heading for the corresponding shared-cost action programme.

It will act within the ETAN network, whose creation is foreseen in the shared-cost actions programme as the focal point within, on the one hand, a network consisting of various similar observatories in the Member States, and on the other, university and industrial experts responsible for evaluating the relevance, development and impact of scientific technological breakthroughs.

In a Community perspective, it will contribute by gathering information for the regular evaluation of the state of RTD in Europe and comparing it with the situation in other developed countries.

The aim of the technological watch system will be to detect new scientific breakthroughs and technological innovation at an early stage and to alert those responsible in the Community to the implications and consequences, notably for technological research and for the industrial world.

B. INSTITUTIONAL SCIENTIFIC AND TECHNICAL SUPPORT ACTIVITIES

These activities are necessary for the formulation and implementation of Community policies and the tasks assigned to the Commission under the Treaty.

The following description, which is based on current Community policy requirements, is given for guidance only and may be modified in accordance with the relevant provisions of Article 7, paragraph 1.

Information and communications technologies

Line 3: Information technologies

The JRC will make its contribution to this field, notably in contributing to the improvement of safety and systems reliability. This will include safety-critical computer systems, computer systems, robots and safety-relevant computer systems. The main prenormative areas will cover, in particular, the drawing-up of design guidelines to ensure that safety and reliability are taken into account. Tools for the analysis and validation of the safety and reliability of systems will be developed.

Furthermore, the JRC will make a contribution in the area of high-performance computing and its applications, in association with a network of national centres, in defining methods for comparing such systems. The Centre could also be called on to become a conformity testing site for specialized software and make other contributions in the information technology area, such as the development of testing methodologies, and contribute to the organization of workshops and training activities.

Environment

Line 6: Environment and climate

Research in this area, in which the independence and impartiality of the JRC play a very important part, will focus on certain well-structured programmes planned to run for average-to-long periods. These concern, in particular:

— Research on air quality to be carried out by the Central Laboratory for Air Pollution (ERLAP), which is intended to provide the scientific basis and scientific and technical support for the preparation and implementation of Community Directives on air quality. Particular attention will be paid to the urban environment and industrial emissions. The implementation of the Community Directives on radioactivity in the environment, in particular those concerning exchanges of information between the Member States

under normal conditions and in the event of an accident, requires scientific and technical support which is closely associated with this research;

— The evaluation and control of chemical products which, in view of the importance of the chemical industry and the potential impact of chemical products on the environment, call in particular for an impartial, independent body. The scientific and technical tasks needed for the implementation of the Community legislation in this area will be carried out by the European Chemicals Bureau (ECB), as described in the communication from the Commission to the Council and to Parliament [1];

— The continuation, also within this framework, of the work undertaken by the European Centre for the Validation of Alternative Methods (ECVAM) and described in the communication from the Commission to the Council and to Parliament (SEC(91)1794) in October 1991. The aim of ECVAM is to coordinate the validation and acceptance of 'alternative' methods which may reduce or abolish laboratory experiments on animals. To this end, discussions between government, companies, scientists, consumers and animal protection associations are being conducted successfully thanks to the impartiality of the JRC;

— Community Regulations require the development of methods of analysis to be applied to consumer goods and chemical products and the harmonization of the existing national methods in the context of the internal market in these products. The need to safeguard the transparency of the market in medicinal products and the exchange of data with the national authorities and the European Agency for the Evaluation of Medicinal Products (Council Regulation (EEC) of 23 September 1993) have led the Commission to call on the JRC to provide integrated information and communication services utilizing the impartial, independent role it plays in the European network on Community pharmaceutical products (ECPHIN).

— Council Regulation (EEC) No 1210/90 of 7 March 1990 provides for the support of the JRC for the European Environment Agency (EEA) as a priority for the following areas:

  — the harmonization of environmental measurement methods;

  — the intercalibration of instruments;

  — the standardization of data formats;

  — the development of new environmental measurement methods and instruments.

  In addition, other tasks may be assigned to the JRC, in view of its experience, regarding air and water quality, waste management and land-based pollution as well as broad support for information technologies.

— Major hazards, biotechnological risks, the safety and quality control of consumer products, environmental impact studies as well as safety at work, for which the JRC provides a support activity for the implementation of the relevant Community Directives.

Life sciences and technologies

Line 10: Agriculture and fisheries (including agro-industry, food technologies, forestry, fish farming and rural development):

— Research and development on new technologies using remote sensing to improve the methods of monitoring the common agricultural policy (CAP) will include:

  (a) the second phase (1995—1998) of the pilot project for the application of remote sensing to agricultural statistics (MARS-STAT):

  The first phase (1989—1993) of MARS-STAT, which was the subject of the Council Decision of 23 September 1988, is now completed. As planned, certain specific activities now no longer come under the RTD phase but may be operationally used by the Member States or the Commission. Nevertheless, other actions are still in development and require continued work before becoming operational.

  The second phase aims, in particular, to continue the work with regard to vegetation evolution and forecast models with the aim of obtaining an integrated agricultural information system at Community level. Studies on the applications of methods or new sensors should also be followed up. Finally, it could prove useful to extend these applications to the needs of other countries, notably the central and eastern European countries.

[1] OJ No C 1, 5. 1. 1993, p. 3.

(b) Techniques for surveillance and control of the implementation of the CAP (MARS-CAP):

For some time, remote sensing techniques have been applied for the production of citrus fruits, vineyard and olive tree registers and the inspecton of the use of CAP subsidies at regional and local level. The new CAP rules, which have been extended to all the main crops, need scientific and technical support using remote sensing for the development of an integrated system for the management and control of declared agricultural land and the registers of the various crops.

— The European Office for Wine, Alcohol and Spirit Drinks, as described in the communication from the Commission to the Council and to Parliament (COM(93)60 final of 16 September 1993), provides the Commission with scientific and technical support to enable it to verify the proper application of Community provisions. Focusing mainly on control of the adulteration and the origin of wines, and intended for use in the choice of arbitration procedures between two Member States, this activity makes use of nuclear magnetic resonance and mass spectrometry and also calls for the development of new analytical techniques.

— The elaboraton of methodologies for reference measurements and the preparation of reference materials necessary for the quality control of food products are another impartial contribution of the JRC to the European agricultural policy.

Line 13: Targeted socio-economic research

The aim of this activity is to gather, for the formulation and implementation of Community policies by the Commission, basic information and analyses on scientific and technological developments and innovations, and their prospects and consequences, in particular their impact on industrial competitiveness. Through its impartiality, the JRC is in a position to provide independent opinions, in particular by taking account of the results of studies carried out by European and non-European public or private bodies in the fields in which it has acquired competences, such as energy, transport and environment.

ANNEX II

INDICATIVE BREAKDOWN OF AMOUNT

First activity	ECU million	
Information and communications technologies		11
— Information technologies	11	
Industrial technologies		195
— Industrial and materials technologies	84	
— Measurements and testing	111	
Environment		294
— Environment and climate	294	
Life sciences and technologies		47
— Agriculture and fisheries	47	
Energy		20
— Non-nuclear energy	20	
Targeted socio-economic research		33
Total		600 (1) (2)

(1) This total includes an amount equivalent to 6 % which may be allocated to exploratory research.
(2) This total also includes the JRC's budget contribution necessary for its participation in shared-cost actions.

ANNEX III

DETAILED RULES FOR IMPLEMENTING THE DIRECT ACTION AND THE DISSEMINATION AND EXPLOITATION OF THE RESULTS

1. The Commission, assisted by the Board of Governors of the JRC, shall implement the direct action on the basis of the scientific objectives and contents described in Annex I. The activities relating to this action shall be performed in the relevant institutes of the Joint Research Centre (JRC).

2. The rules for implementing the direct action referred to in Article 6 comprise research and technological development projects, the scientific and technical support necessary for the formulation and implementation of Community policies and the tasks assigned to the Commission under the Treaties and requiring the impartiality of the JRC, and accompanying measures.

3. These rules may apply to cooperation with the EFTA States which are party to the EEA Agreement.

4. The JRC institutes shall endeavour, wherever possible, to carry out the research in cooperation, preferably on the basis of networks, with the national research bodies in the Member States. Particular attention shall be paid to cooperation with industry, especially with small and medium-sized enterprises. Research bodies established in third countries may also cooperate on projects in accordance with the relevant provisions.

   Research projects as part of international cooperation under the conditions set out in the previous paragraph include cooperation with research laboratories and the exchange of scientists. Supplementary measures should allow for cooperation with research laboratories and institutes in the countries of central and eastern Europe.

5. The accompanying measures shall include:

   — the organization of visits to JRC institutes of grant holders, visiting scientists and seconded experts;

   — organization of the secondment of JRC staff to national laboratories, industrial laboratories and universities;

   — the organization of scientific seminars, workshops and colloquiums;

   — specialized training with the emphasis on multidisciplinarity;

   — an information exchange system;

   — promotion of the exploitation of the research results;

   — the independent scientific and strategic evaluation of the performance of the projects and programmes.

6. The knowledge gained through implementation of the projects will be disseminated under the programmes themselves and under the centralized action described in the third activity of the Framework Programme.

ANNEX IV

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND CONTENTS OF THE COMPETITIVE SUPPORT ACTIVITIES

This section of the specific programme fully reflects the broad lines of the Fourth Framework Programme, applies the selection criteria and spells out the scientific and technical objectives set out in that programme.

The scientific and technical support activities which come within the framework of a competitive approach are described below on the basis of Annex III (first activity and paragraph D of the Third Activity).

The following description is given for guidance only on the basis of the current requirements of Community policies. It refers in particular to paragraphs 1C, 2D, 3A, 3B, 4C and 5 of the first activity.

In order to ensure that the activities are fully in line with the actual requirements of Community policies throughout the Fourth Framework Programme, these objectives may be modified in accordance with the provisions of Article 14 of this programme.

The scientific and technological objectives may cover the following:

FIRST ACTIVITY

Information and communications technologies

Line 3: Information technology

This support is intended to enable the Commission to pursue the Community information technology policy, notably in fields such as software technology, components and systems, or multimedia technology, as well as in other priority fields such as, for example, high-performance computing systems, microprocessing systems and the integration of such technologies into a professional environment.

Industrial technologies

Line 5: Measurements and testing

The activities in this sector may be aimed at the development of non-destructive test methods for mechanical structures and the software needed for the development of Community standards in the field of structural mechanics, in particular for structures used in construction or, more broadly, civil engineering.

Environment

Line 6: Environment and climate

The aim of these activities is to support the Commission's regulatory activities in the general framework of environmental policy, including the development of analytical methods and the implementation, through a network of analytical laboratories, of test series on atmospheric pollution, water quality, waste and land-based pollution.

One particular activity will be the use of aerospace remote sensing methods for the surveillance of tropical forests, desertification and marine productivity.

Some subjects concerning the regulation of industrial hazards and some measures relating to industrial safety, including biotechnology, may be the subject of a support activity.

Life sciences and technologies

Line 8: Agriculture and fisheries

(including agro-industry, food technologies, forestry, fish farming and rural development).

Support activities in this field may include contributions to:

— the application of remote sensing techniques to agriculture by the gathering of images, the handling and treatment of data;

— reference measurements for the control of food products (notably their contamination) and their quality, in particular to a series of tests and intercomparison exercises for quality control in these products;

— control of dairy products;

— the evaluation of phytopharmaceutical products, notably with regard to those aspects linked to their launch on the market.

Energy

Line 11: Non-nuclear energy

Support activities in this field will include:

— the handling and processing of information from projects carried out under Community programmes, in particular demonstration projects;

— certification procedures for energy conservation in buildings, industry and transport as well as the application of energy modelling methodologies (relationships between energy production, consumption and environmental impact) to particular energy scenarios.

THIRD ACTIVITY

These generally short activities may concern any field, their aim being to meet specific requirements which appear during the implementation of various Community policies.

By their nature, such requirements will only appear during the implementation of this programme and the activities concerned will aim to provide an immediate response.

ANNEX V

INDICATIVE BREAKDOWN OF THE AMOUNT

	ECU million	
FIRST ACTIVITY		91
Information and communications technologies		
Information technologies	10	
Industrial technologies		
Measurement and testing	10	
Environment		
Environment and climate	26	
Life sciences and technologies		
Agriculture and fisheries	30	
Energy		
Non-nuclear energy	15	
THIRD ACTIVITY		37
Total		128

ANNEX VI

DETAILED RULES FOR IMPLEMENTING THE COMPETITIVE SUPPORT ACTIVITIES

The competitive support activities are carried out by means of work suited to a competitive approach and intended for scientific and technical support to Community policies. The implementation of this research will be assigned to research bodies and centres, including the JRC, universities or undertakings.

While ensuring maximum flexibility, the Commission will determine the responsibilities, in particular as regards the grant of the financial resources provided for these activities, according to the field of activity concerned. The resources will be granted on a competitive basis.

These rules may apply to cooperation with the EFTA States which are party to the EEA Agreement.