COMMISSION OF THE EUROPEAN COMMUNITIES

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Proposal for a

COUNCIL DECISION

concerning the fourth framework programme of the European Economic Community activities in the field of research, technological development and demonstration (1994 to 1998)

Proposal for a

COUNCIL DECISION

concerning a framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994 to 1998)

(presented by the Commission)

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SUMMARY
OF
THE PROPOSALS CONCERNING
THE FOURTH FRAMEWORK PROGRAMME
OF RTD AND DEMONSTRATION AND THE FRAMEWORK PROGRAMME OF
RESEARCH AND
TRAINING IN THE NUCLEAR FIELD
(EAEC) (1994-98)

Objective

Building on the working documents of October 1992, COM(92)406, and of April 1993, COM(93)158, the present proposal takes account of:

- *the Edinburgh conclusions;*
- *developments in the world context;*
- *comments and opinions concerning the first working document;*
- *comments and opinions concerning the second working document.*

In order to accelerate interinstitutional deliberations on the Fourth framework programme (political agreement) and ensure the continuation of the Community's RTD effort, the Commission's proposal is based legally on the Single European Act with footnotes indicating the texts which will take effect on the entry into force of the Maastricht Treaty. The proposal on the EURATOM Framework Programme is presented in parallel in order to ensure the coherence of all Community RTD activities and this proposal is based on the EAEC Treaty.

Policy changes

- *Greater selectiveness with regard to Community RTD activities in order to increase their economic impact (focusing on generic technologies)*
- *Greater integration of national, Community and European activities (Article 130h of the EC Treaty)*
- *Develop research/training synergy*
- *Increase the flexibility of Community activities in order to respond rapidly to new scientific and technological challenges*
- *Bring the financial data into line with requirements and the proposed financial perspective for 1993 to 1999.*

Greater selectivity

- *The Framework Programmes cover all research, technological development and demonstration activities. The Fourth Framework Programme comprises four activities. The first (RTD and demonstration programmes) contains seven themes compared with 15 in the Third Framework Programme. Two new themes are introduced: research for a European transport policy and targeted socio-economic research. Each theme covers one or more area of RTD and demonstration.*

As regards the EURATOM Framework Programme,it is subdivided into two distinct areas.

- *The selection criteria set out in the preceding working documents have been adjusted to take account of the need to focus and integrate activities, thus reducing the number of areas originally proposed from 54 to 28 for the total of both Framework Programmes.*

- *Greater priority is accorded to the first activity in order to take account of the Edinburgh guidelines concerning the need to focus on generic technologies of multisectoral application.*

- *Selectivity applies within the individual areas as well in order to focus activities on mobilizing projects and to integrate national, Community and European activities to a greater extent.*

The activities

The Community support for RTD activities covered by the ***first activity*** *will continue to focus on generic, precompetitive research of multisectoral application.*

Scientific and technological cooperation activities on subjects of mutual interest with third countries and international organisations, which are one factor in determining the economic efficiency of the Community's RTD activities, are organized partly on a centralised basis in the ***second activity*** *and partly under the individual themes of the first activity, in so far they help to attain the relevant objectives.*

Dissemination activities must be consistent and coordinated, through centralized management on the one hand in the ***third activity*** *and the specific programmes on the other.*

The ***fourth activity*** *addresses advanced training in centres of excellence throughout the Community and will therefore be open-ended and will also focus on partnerships between universities and industry.*

Integration of national, Community and European activities

This objective will be pursued at three levels:

- *assessment of the RTD and demonstration policy options (a new area is proposed in order to promote work in support of decision making)*

- *political level (regular Ministerial consultations)*

- *operational level: between those responsible for RTD activities.*

Appropriate procedures need to be developed within the programmes on the basis of the experience built up and the desire to encourage researchers at national, Community and European level to work together.

Research/training synergy

In order to promote growth and reinvigorate economic and social development a combination of labour and capital is not enough; a third factor is needed – a combination of knowledge, know–how and dissemination of know–how.

Research training activities will be carried out both within the themes of the first activity of the Fourth framework programme and across the board (fourth activity) to promote the cross–frontier mobility of researchers working on emerging themes. The same applies to the fields covered by the EURATOM Framework Programme. They will be supplemented by research activities making it possible to introduce innovation into education and training systems and by education and training schemes deriving from the COMETT and ERASMUS programmes, etc.

Flexibility

The decision making system is very complex. The Community needs to be able to respond rapidly to scientific and technological changes intervening between the adoption of a framework programme and its review after three years.

Measures are proposed at three levels:

- *framework programme: preparatory activities*
- *specific programmes: limited amount for technology promotion earmarked for unsolicited proposals from SMEs; links with EUREKA*
- *work programmes: adaptability.*

Financial resources

- *11625 million ECU (current prices) for the 4th Framework Programme and 1475 million ECU for the EURATOM Framework Programme (1994-98) thus bringing the total for all Community activities up to 13100 million ECU;*
- *with regard to the distribution between the four activities within the Fourth Framework Programme, the First Activity stands out as the major component of the Fourth Framework Programme, although increased priority will be given to the Second Activity (International cooperation) and to the Third Activity (dissemination) relative to funding levels during the period 1990-1994;*
- *within the first activity (RTD and demonstration programmes), it is suggested, as an indicative breakdown, to give increased priority to work addressing industry's needs and affecting industrial output within all the topics, as well as to research on a European Transport Policy and life sciences and related technologies.*

EXPLANATORY MEMORANDUM

Introduction

The Community is an area without frontiers, organised both economically and socially and a partner of consequence in Europe and the world. Cooperation between socio-economic actors and citizens is spreading and competition is benefiting from transparent and stable conditions.

The political upheavals in the world, the accompanying slowdown in economic activity and the recent initiatives taken by its partners have prompted the Community to adopt a large programme to relaunch economic growth and employment.

The policy of research, technological development and demonstration (RTD) established in the Treaty on European Union contributes to this effort through the knowledge and know-how which it helps develop in the medium and long term. It promotes the adaptation on industrial structures and strategies to the new conditions with regard to world competition and to the requirements of sustainable growth and of a better quality of life in Europe.

1. The proposal for a Fourth framework programme for research and technological development (1994 to 1998), which is the subject of this document, is a direct and logical continuation of a number of developments in the Community's science and technology policy since the mid–1980s.

   In 1984 the Community decided to improve the coordination of its research and technological development activities by bringing them within multiannual framework programmes. To this end it adopted the first framework programme for research and technological development (1984-1987). The second framework programme (1987-1991) and the third, the current programme, (1990-1994) have followed.

   In 1987 the Single European Act brought research and technological development within the formal competence of the Community, consolidated the rules and principles governing Community action in this area, and established the basic machinery through which it was to act: adoption of multiannual framework programmes and their implementation through specific programmes. The second and third framework programmes were proposed and then adopted on the basis of the Single Act. The Treaty on European Union, signed in Maastricht in February 1992, clarified certain aspects of the Single Act relating to RTD, and also introduced a number of amendments, some of them major, to the rules governing this area.

   In April 1992 the Commission published a communication entitled "Research after Maastricht: an assessment, a strategy" (SEC(92)682). On the basis of an analysis of the state of research and industry in Europe at the beginning of the 1990s and a critical assessment of Community action to date, this document set out the Commission's guidelines for Community RTD policy for the next five years.

At the same time, the Commission published an evaluation report of the second framework programme (1987 to 1991). An analysis of this was made by CREST at the request of the Council. At the end of April 1992, having considered these two Commission documents, the Council asked the Commission to let it have working proposals as soon as possible.

In July 1992, the Commission, in a bid to avoid any gap in RTD financing over the next two years, presented a proposal for a financial supplement to the third framework programme (1990 to 1994). This was adopted by the Council in March 1993.

In October 1992 the Commission published a working document concerning the fourth framework programme (COM(92)406) with a view to pressing ahead with the discussion on the general guidelines for this framework programme pending ratification of the Treaty on European Union. The first working document provided an opportunity for a wide-ranging debate with the constructive participation of the Member States, the European Parliament, the Economic and Social Committee and other Community organizations, together with research scientists and representatives of industry. One very significant point which emerged from the discussions was the emphasis placed on the important role of research in improving the quality of life and strengthening the competitiveness of industry in the Community.

2. In Edinburgh in December 1992 the European Council stressed the need for Community RTD activities to continue to focus on generic, precompetitive research with a multisectoral impact; at the same time it set the financial perspective for 1993-99, laid down the general framework for the Community funding allocated to research and called on the Commission to make some changes:

"Community support for R&D should continue to focus on generic, precompetitive research and be of multisectoral application. EUREKA should remain the principal vehicle for supporting R&D activities which are nearer to the market and the Commission should bring forward proposals to improve the synergy between the Community's research activities and EUREKA. Improving the dissemination of results amongst enterprises, particularly small and medium-sized businesses, cost-effectiveness and coordination between national programmes should be priorities for Community action. These conclusions should be reflected in the consideration and adoption of the fourth framework programme."

The European Council also called upon the Commission:

"to bring forward proposals for improving the management and efficiency of research funded by the Community to achieve better economic effectiveness. To this end the selectivity of actions should be increased, and it should be ensured that Community activities contribute the most value added possible to efforts already under way in the Member States."

In April 1993 the Commission published a second working document (COM(93)158) taking account of the comments received on the first, developments in the world context and in Europe and the guidelines issued at the Edinburgh European Council. It complemented and clarified the broad lines set out in the October 1992 working document indicating how to mobilize more effectively the capacities of the Community as a whole. This communication is based on that second working document.

I. BROAD LINES OF THE COMMUNITY'S RESEARCH TECHNOLOGICAL DEVELOPMENT AND DEMONSTRATION POLICY

3. The need is to respond to the challenge which American and Japanese RTD policies pose and to make up for the European shortfall as regards the intensity of research (2 % of GDP in the Community as compared with about 3 % in the United States and Japan) and human resources (4.3 researchers in Europe for every 1000 employees as compared with 7.5 in the United States and Japan). The basic objective is to *move on from a patchwork of separate RTD and demonstration activities to a fully fledged Community policy* in this field.

   The fourth framework programme must, therefore:

   - make *Community activities more selective* so as to increase the *economic spin-offs*, in particular by concentrating on generic technologies which will enable European industry and its subcontractors to go back on the offensive in international competition;
   - prepare the way for cooperation leading to closer integration of *national and Community RTD activities and increased synergy between the Structural Funds and the research activities contributing to strengthen cohesion within the Community*;
   - create the conditions for increased *synergy between research and training;*
   - empower the Community, using appropriate means, to *respond rapidly* to scientific and technological change;
   - be allocated sufficient financial resources to *maintain a sustained effort at Community level* to pursue realistically the objectives set by the Treaty on European Union and thus contribute the most value added possible to efforts already under way in the Member States.

Greater selectiveness to secure improved economic benefits

The scope

4. The scope of the fourth framework programme has been determined on the basis of one of the most important new RTD provisions introduced in the Maastricht Treaty. Under this provision the framework programme is to include all the RTD activities covered by the Treaty. Thus all Community research and technological development activities, whatever their form and under whichever common policy they fall, are

included within the framework programme. These activities include basic research, basic industrial research, applied research and technological development. Under the terms of the new Article 130f(3) they also include demonstration projects in the sense of the demonstration of the technical feasibility of projects on the demonstration of their economic viability. All these activities are explicitly confined to the precompetitive stage.

In keeping with the Maastricht Treaty the fourth framework programme will also include all research, technological development and demonstration activities carried out within the framework of the major common policies, such as agriculture, fisheries, energy or transport. A framework programme of research and training in the nuclear field for the EAEC is being proposed at one and the same time as the Fourth framework programme in order to ensure the coherence of all Community RTD activities. The Fourth framework programme will incorporate demonstration and dissemination activities related to the promotion of energy technologies which are currently included in the THERMIE programme. Likewise in accordance with the Commission's approach to the future of the ECSC Treaty, the coal and steel industries of the Community will increasingly ("phasing in") find a response to their research needs, including those on social aspects, in the Community's RTD activities. The aim here is not merely a mechanical grouping of activities. The significance of this new provision is primarily political, namely consistency and mutual reinforcement between research policy and the other major common policies. Organized programming of all research activity is needed to ensure such consistency and to allow for the greatest possible synergy in the definition and implementation of the various policies.

5. The activities previously executed outside the framework programme and referred to as APAS (Preparatory, Accompanying and Support Activities) will henceforth be included in the Fourth framework programme.

   The most obvious case is international scientific cooperation. The measures which were until now executed on an annual basis without an overall, long-term planning frame will now be subject to multiannual planning. They will form a coherent whole in the shape of the second activity.

   The same will apply to other measures with a multiannual horizon, such as SPRINT, which are today executed on various legal bases. These measures will be brought together under the wide-ranging third activity of the framework programme.

   Another group of measures which are currently outside the framework programme are the general measures needed to define, implement and support RTD policy. They concern in particular: studies, exploratory and evaluation activities, promotion, support and coordination activities. These measures will also be included in the fourth framework programme, but must be implemented with the procedural flexibility required so that the Commission maintains its power of initiative and execution for non-significant measures in accordance with Article 22 of the Financial Regulation.

The evaluation of programmes and policies of Community RTD will be given greater credibility through the institution, by and for the Commission of a Committee for the Evaluation of Research, the independence and permanence of which will be ensured.

The activities

6. The Maastricht Treaty specifies the activities which go to make up the framework programme. There are four activities, clearly described in Article 130g:

   (a) implementation of research, technological development and demonstration programmes, by promoting cooperation with and between undertakings, research centres and universities;

   (b) promotion of cooperation in the field of Community research, technological development and demonstration with third countries and international organizations;

   (c) dissemination and optimization of the results of activities in Community research, technological development and demonstration;

   (d) stimulation of the training and mobility of researchers in the Community.

   The fourth framework programme is, therefore, built around these four activities.

   The areas of RTD covered by the EAEC Treaty are grouped together in the framework programme for research and training in the nuclear field.

Focusing

7. This entails being more selective in the activities carried out and laying the scientific and technical foundations needed for sustainable, environment-friendly development in industry, agriculture and services, exploiting the advantages of the single market in order to improve Europe's competitiveness and quality of life. Within each research theme, it is intended to concentrate financial resources on a limited number of topics, chosen for their specific added value (shared cost actions), and, in addition, to work towards the coordination of national, community and European actions through suitable methods.

   In keeping with the Community's industrial policy strategy endorsed by the Council and given the needs of the other common policies, *research activities should focus on precompetitive research into technologies with a multisectoral impact* which can help increase industrial competitiveness, especially in key areas, and on *themes of interest to society in general*; it is necessary to ensure that the results are transferred rapidly to industry, especially to small and medium-sized businesses and to the branches of the economy which will use them. Certain major objectives guide the choice of research activities: to develop efficient and safe infrastructures, in particular an information and communications infrastructure; to produce efficiently, cleanly and safely on the basis of modern organization of production; to make environmental protection an aspect of industrial competitiveness; to promote an improvement in

health care, food quality and food hygiene; to ensure technological and industrial integration within the internal market (in particular by strengthening coordination between RTD policy and standardization policy); to anticipate technological and industrial changes so as to ensure that greater account is taken of the needs of the market; to increase the synergy between international cooperation activities in this area and the Community's external policies.

The focusing of Community RTD activities is reflected at three levels:

- the structure of the Fourth framework programme: on the grounds of rationalization it is proposed that the first activity (research, technological development and demonstration programmes) should be organized around seven main themes including two new themes concerning research for a European transport policy (strategic aspects and systemic and general aspects useful for the definition and realisation of the Community transport policy in coordination with the generic activities coming under other themes) and targeted socio-economic research. Annex I proposes a structure for the fourth framework programme which ensures a large degree of continuity with the third framework programme and takes into account the new elements needed;

- selectiveness criteria: in order to define the Community RTD activities, Annex II of this proposal for the Fourth framework programme (Selection Criteria for Community Activities) lays down criteria with regard especially to the greater focusing of activities and the coordination of national and Community activities; they will also be applied when preparing specific programmes and selecting projects;

- applying these criteria to focus Community activities on a limited number of research, technological development and demonstration areas: Annex III gives a detailed description of the subject matter of the activities proposed for the Fourth framework programme.

The structure, criteria and content of the activities of research and training in the nuclear field are set out in annexes to the proposal regarding the framework programme for the EAEC.

Closer coordination of RTD activities in Europe

8. The principle of subsidiarity dictates that the Community should take action on research only if the objectives can be better achieved by the Community than by the Member States acting on their own (see the annex concerning the subsidiarity of this proposal). Article 130h of the Treaty on European Union also requires the Community and the Member States to coordinate their activities so as to ensure that national policies and Community policy are mutually consistent. It must be acknowledged that not enough has been achieved on this point so far. A new approach is needed, with the detailed procedures tailored to each research area.

9. The call for greater consistency between national policies and Community policy is based on thefact that less than 4% of all government expenditure on civil research and technological development by the Member States corresponds to the Community funds allocated to joint actions.

It is proposed that the following types of action should be launched:

- evaluation of science and technology policy options to supply a common knowledge base for discussions on RTD activities in Europe;

- political concertation at the highest level, in the form of regular meetings of the European Ministers of Research in conjunction with the Ministers with special responsibility for industry and economic development specifically on this issue;

- concertation at the operational level between the heads of the national and European research bodies and those responsible in industry (producers and users).

As far as the practical implementation of RTD activities is concerned, the coordination of national and Community activities could be achieved in three ways:

- greater synergy and mutual enhancement of the action taken at national level could be achieved by giving priority in the specific programmes to activities aiming at such closer cooperation;

- in fields where worldwide collaboration is already established, only a coordinated, united Europe will be able to hold its own in talks with the other major partners, particularly the USA and Japan; it is proposed that national and Community activities should be coordinated to a large extent in certain areas which lend themselves to this approach;

- integration to create the "European research area" while maintaining the diversity and plurality of approaches which will require closer coordination of the research conducted at European level under the auspices of international bodies such as CERN, ESA, ESO, EMBO, EMBL, the ESF and, above all, EUREKA. The need to strengthen links between Community activities and EUREKA should be stressed in this context. Recalling the respective roles of EUREKA and Community research, the Edinburgh European Council emphasized the need to strengthen the synergy between them.

10. Alongside the traditional networks established in the context of Community activities hitherto, this cooperation can be achieved through such means as thematic networks of excellence, concertation networks and consortia for integrated projects (see Annex III to this proposal).

The Joint Research Centre will make its contribution to this new approach.

11. Such consistency is pointless unless the Community aims at achieving harmonious development of its scientific and technological resources. Synergy between RTD policy and the structural policies should be strengthened. The amendments proposed by the Commission to the Regulations governing the Structural Funds provide one opportunity in this connection during the new programming period (1994–99). The emphasis now being placed on technology in the less–favoured regions and on skills in science and technology offers new prospects for synergy, in particular with the third and fourth activities of the fourth framework programme. While applying the principle of excellence, Community RTD activities provide a second opportunity. The research priorities reflected in the first activity of the fourth framework programme take account of the interests and capacities of the Member States, including the less advanced ones. The RTD programmes can make an effective contribution at little cost to making good use, for the benefit of the Community, of the scientific and technological potential of the less–favoured regions by networking them with centres of excellence in the most advanced regions. The third and fourth activities will have a growing impact on the less developed regions and countries through specific measures (national/regional relay centres, transfer networks geared to the traditional industries, measures to avoid the "brain drain", "European chairs"). This synergy between the Structural Funds and research activities will contribute towards a true policy of cohesion by developing the potential of the regions and relating them to the European research area. However, it should not be forgotten that it is primarily the responsibility of the Member States to establish an overall strategy aimed at making the best use of the capacities created by the various sources of Community funding available. A Commission paper on synergy between RTD policy and the structural policies was sent to the Council, the European Parliament and the Economic and Social committee in May 1993.

Furthermore, in the light of the decisive role played by SMEs in the economic development of the Community as a whole, there should be greater coherence between RTD policy and actions focusing on SMEs. On this last point, the Council adopted on 14 June 1993 a new multiannual programme of Community actions which is intended to reinforce these main guidelines and to ensure the continuity and the consolidation of policy on enterprises, particularly SMEs. This programme includes an important aspect relating to the improvement of SMEs' access to Community programmes.

Synergy between research and training

12. In order to promote growth and reinvigorate economic and social development a combination of labour and capital is not enough; a third factor is needed - a combination of knowledge, know–how and dissemination of know–how using the latest technologies, particularly information and communications technologies. Knowledge must be acquired with the aid of research; know–how must be built up with the aid of research and training; and scientific knowledge must be disseminated with the aid of information systems and the media. One of the greatest spin–offs of Community activities in recent years has been the establishment and expansion of Europe–wide research networks.

Activities aimed at promoting the mobility of researchers and stimulating the creation of networks must constitute an important aspect of each of the topics within the first activity of the Fourth framework programme, as well as in the extension of the current "Human Capital and Mobility" programme, where they are the object of a cross disciplinary activity (the fourth activity) for the development of the human resources necessary to exploit new fields or research subjects.

The role of training activities, which seek to raise the general level of scientific and technical competence, is likewise of strategic importance. This calls for action to build on the foundations laid by the ERASMUS and COMETT programmes by promoting training at European level and mobility as well as promoting scientific information and culture in Europe alongside the implementation of the Fourth framework programme, in particular in the activities related to the development of generic technologies.

The ability to respond rapidly to developments in science, technology and industry

13. Related to the objective of improving the economic spin-offs from Community research there is the problem of the speed of response to developments in science and technology. The Community's institutional and decision-making framework for RTD is unwieldy.

The Community therefore has to be able to respond swiftly to developments in the situation, while maintaining the interinstitutional balance. This means first of all respecting the nature and degree of detail of the two levels of Community legislation (framework programme, specific programmes) and the implementation level (work programme). Flexibility could be built into Community RTD activities at three levels:

- framework programme: provision must be made for a limited range of activities so that preparatory activities, definition phases for new programmes and possibly pilot projects can be launched between the time when the framework programme is adopted and its revision. Continuous and systematic examination of the progress of the framework programme and independent evaluation of its management and the achievements of the actions undertaken will also help to reorientate Community actions in due course;

- specific programmes: to ensure flexibility, a limited amount of funds should be set aside, in each specific programme, for unsolicited proposals from operators (mainly from SMEs, technical centres and research organizations) which have to be processed very quickly (technology stimulation);

- work programmes: the ability to adapt the work programmes under the specific programmes will enable the Member States and the European Parliament to have a real say in how to respond to developments in science and technology: in the case of the Member States, by being represented on the programme committees

and, in the case of Parliament, through the annual budget procedure. Particuliar attention will be paid in the implementaiton of Communtiy activities to the simplification and improvement of management in the general interests of transparency and efficiency, to decentralisation in appropriate ways as well as to rigorous evaluation.

14. As regards links between Community activities and EUREKA, considerable progress has been made and the basis for greater cooperation has been established jointly by the Commission and the EUREKA authorities in accordance with the twin principles of greater transparency in the procedures followed by the countries concerned with regard to EUREKA projects and the framework programme, and a clearer definition of their respective roles. The essential elements are better circulation of information concerning projects and support measures (legislation, standardization, training), the taking into consideration in EUREKA projects of the results of Community projects, clearer definition of the respective roles of each forum vis-à-vis industrialists, and especially SMEs, more systematic taking into account of the precompetitive phases of EUREKA projects within the framework programme and joint examination of large-scale strategic projects proposed by industrialists. As regards the Community, this entails the establishment, after an extensive pilot phase, of new mechanisms for taking into account projects from the EUREKA framework outside the timetable for Community calls for proposals in accordance with the normal selection rules, along the lines of earlier decisions taken on a case-by-case basis concerning certain large, strategic EUREKA projects (JESSI, HDTV, COSINE). The financial resources to be allocated to this activity could be included on an indicative basis in the work programmes for the Community programmes. The same would apply to projects which are part of a research activity within other European scientific and technological cooperation forums. The projects would be taken into account by the respective authorities (in the case of the Community, by the Commission assisted by the committees, on which the Member States are represented) and compared with the merits of projects proposed in response to the publication of Community calls for proposals. Any involvement by the Community will have to be consistent with the objectives of the specific programmes and confine itself to the precompetitive and generic aspects of projects submitted to the committees for appraisal. EUREKA's national and international authorities should ask the industrialists concerned to look more systematically into the relationship with Community RTD activities at each stage right from the definition of EUREKA projects through to their execution. EUREKA should remain the main vehicle for support for RTD activities which are closer to the market, including demonstration and production development projects, and give rise to increased coordination between the RTD activities of the EUREKA member countries, while drawing benefit from the flexibility and "bottom-up" nature of the initiative.

(3)

II. THE OVERALL LEGISLATIVE FRAMEWORK

The decisions needed

15. The fourth framework programme has been conceived in the spirit of the Maastricht Treaty. However, in view of the delays encountered in the ratification of the Treaty on European Union, and in order to ensure the indispensable continuity of the Community research effort, the Commission is now presenting its proposal for the fourth framework programme on the basis of the Single Act, indicating in footnotes the texts which will take effect upon the entry into force of the Treaty on European Union.

The proposal for the Fourth framework programme (1994-1998) is but one stage in the larger decision-making process. The Treaty on European Union maintains the principle of the dual legislative procedure introduced by the Single Act, i.e. adoption of the framework programme as a whole followed by the adoption of the individual specific programmes. However, the Treaty introduces an important innovation compared with the Single Act. The provisions on the adoption of rules on the participation of undertakings, research centres and universities in Community programmes have been changed. In the past they were adopted at the same time as each of the specific programmes; in the future they must be the subject of a separate Council Decision. The same applies to the provisions, currently governed by the Council Decision 92/272/EEC of 29 April 1992 concerning the dissemination and exploitation of knowledge resulting from the specific programmes of research and technological development of the Community.

16. The legislative framework within which the fourth framework programme is to be implemented will thus comprise four different types of legal act:

(a) a Decision on the framework programme itself. In accordance with the provisions of the EC Treaty, it must be adopted by the Council, acting unanimously, under the co-decision procedure with the European Parliament (Article 189b). To include all Community RTD activities in the Programme, a parallel Council Decision based on the Euratom Treaty is also required. Consequently, the procedure for adoption of the framework programme is more complex than the system under the Single Act;

(b) in contrast, the Maastricht Treaty has simplified the procedure for adopting the specific programmes. They will be adopted by a qualified majority in the Council after consulting the European Parliament and the Economic and Social Committee;

(c) a Council Decision laying down rules for the participation of undertakings, research centres and universities in the framework programme, as well as a Council decision on the rules governing the dissemination of research results. These decisions, referred to in the new Article 130j of the Treaty, will be to be adopted in cooperation with the European Parliament (the procedure laid down in Article 189c of the new Treaty);

(d) all the acts adopting Decisions concerning the creation of other, optional, instruments for the implementation of the framework programme: supplementary programmes, participation in research programmes undertaken by several Member States, cooperation with international organizations, and joint undertakings. These acts are covered by Articles 130k, 130l, 130m and 130n of the EC Treaty respectively and are adopted under the procedures foreseen in Article 130o.

Decision-making timetable

17. The timing of the decisions must satisfy the following two constraints :

- the Fourth framework programme, which will govern Community RTD almost until the end of the century, must be firmly based on the Treaty on European Union and therefore must be adopted after it has entered into force;
- the Fourth framework programme must be adopted early enough to ensure proper continuity of Community RTD in industry, universities and other research organisations. In this context, it should be remembered that the Third framework programme and its specific programmes end on 31 December 1994 and that the implementation of the Fourth framework programme requires not only decisions on the specific programmes but also a whole preparatory phase before actual research projects can start.

These two points imply a very tight timetable starting in November/December 1993 (1st reading by the European Parliament and common position of the Council) and finishing in February/March 1994 (2nd reading by the European Parliament and final decision) and militates in favour of a process of consensus between the two legislative branches thereby avoiding a 3rd reading (conciliation procedure).

III. FINANCIAL ASPECTS

The legal and budgetary framework

18. The legal and budgetary provisions of the fourth framework programme (1994 to 1998) will differ significantly from those for the first three framework programmes. In this area too the Maastricht Treaty introduced an important innovation compared with the Single Act. Articles 130i and 130k of the EEC Treaty as modified by the Single Act use the concept of the "amount deemed necessary". The Maastricht Treaty, however, has introduced the concept of the "maximum overall amount" to determine the funding for the framework programme as a whole and for the various activities implementing it. The framework programme and its four activities will therefore be funded within the bounds of the "maximum overall amount" set by the legislative authority.

The financial implications of the RTD priorities

19. In the context of the conclusions adopted by the European Council in Edinburgh concerning Community finances for the period 1993-1999, the new guidelines and the resulting priorities for RTD have the following financial implications:

- the maximum overall amount allocated to the Fourth framework programme for the period 1994–98: the conclusions adopted in Edinburgh envisage funding for Community RTD activities ranging between one–half and two–thirds of that for internal policies over this period. Also the growth in RTD expenditure must be consistent with the overall growth in spending on the internal policies (category 3 of the proposed financial perspective). On the basis of RTD expenditure for 1993, the Commission has adjusted its October 1992 assessment, taking into account these various considerations and an appraisal of the financing requirements, and is now proposing 13100 million ECU at current prices for the Fourth framework programme and the framework programme of research and training in the nuclear field (1994-1998). This funding, however, must cover needs expressed throughout the Community and thereby contribute to supporting the competitiveness of its industry and to improving the quality of life. Given the increased emphasis on priority areas, this amount will considerably strengthen certain activities whilst at the same time allowing certain new areas to be included within the first activity of the Fourth framework programme. Among other things it will allow energy demonstration activities to be carried out which were previously the responsibility of the THERMIE programme but which now come under the Fourth framework programme. It will also allow the Community coal and steel industries to find a progressively strengthened ("phased in") response in the Fourth framework programme to their research needs. It will ensure the integration of all scientific and technological cooperation with third countries and an adequate reply by the Community to external challenges, such as the massive investments by countries like the USA and Japan, and internal challenges such as the tendency not to increase national research budgets.

- the breakdown of this overall amount between the four activities of the Fourth framework programme and the relative priorities assigned to the major themes making up the first activity: Annex I to the fourth framework programme shows the relative shares for each of the four activities proposed. The financial balance between the four activities has been altered, compared with Annex I to the first working document, to take account of the decisions and guidelines adopted by the Edinburgh European Council (financial framework, priority given to the first activity concerning generic technologies, greater importance attached to dissemination and optimization of results within each theme and as a centralized activity). Given the comparative importance of the first activity, Annex I to the four framework programme also gives additional indications of the respective priorities assigned to each of the major themes in it. These include the new research for a European Transport Policy since the common transport policy

requires specific research work which must be adequately financed. To contribute to a better quality of life in Europe, inter alia life sciences and related technologies must be granted additional resources in order to cope with the increasing needs for research in general biotechnology, biomedicine and health, as must the research needed to accompany the reform of the Community policies on agriculture, forestry, rural development,fisheries and fish farming.

ANNEX TO THE EXPLANATORY MEMORANDUM

SUBSIDIARITY OF THE PROPOSAL FOR THE FOURTH FRAMEWORK PROGRAMME

The principle of subsidiarity as defined in article 3b of the Treaty on European Union imposes limitations on the fields where the Community can act, it acting only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community. In this context the following questions are pertinent.

(a) *What are the objectives of the proposed action in relation to the Community's obligations?*

This proposal is directed towards achievement of the objectives which have been assigned to RTD policy by the Single Act and subsequently confirmed by the Treaty on European Union and, in particular, the strengthening of the competitiveness of Community industry, the improvement of the quality of life and the support of other Community policies. These objectives are set in the context of a harmonious and sustainable development of the Community.

(b) *Does competence for the planned activity lie solely with the Community or is it shared with the Member States?*

The Single European Act brought research and technological development within the explicit competence of the Community, although competence is shared with Member States, consolidated the rules and principles governing Community action in this area, which complements the activities undertaken by the Member States, and established the basic machinery through which it was to act.

(c) *What is the Community dimension of the problem (for example how many Member States are involved and what solution has been used up until now)?*

The implementation of the framework programme for RTD aims at strengthening the scientific and technological basis of the whole of the Community (all the Member States), and it is in line with the previous framework programmes implemented since 1984. However, it only includes less than 4 % of Member States' total public expenditure on research.

(d) *What is the most effective solution taking into account the means available to the Community and those of the Member States?*

In order to ensure the effectiveness of Community RTD actions and in order to avoid duplication of activities being undertaken at the level of the Member States, the framework programme will concentrate its activities particularly on generic technologies with multi-sectoral impact and on large scientific projects.

An additional guarantee of effectiveness will be the higher degree of coordination between national and Community actions in line with article 130h of the Treaty.

(e) *What real added value will the activity proposed by the Community provide and what would be the cost of inaction?*

In comparison with individual national efforts, their integration with Community actions together with the development of synergies with the activities undertaken in the wider framework of European research, in particular the strengthening of the synergy between Community actions and EUREKA, will permit improvements in the way that existing research potential in the Community is used and will represent real added value for the whole of the Community not only in terms of advantages for industrial competitiveness and of the response to social needs but also in terms of support of other Community policies. Inactivity would lead to a loss of this synergy, to fragmentation and to duplication of efforts made by the Member States individually.

(f) *What forms of action are available to the Community (recommendations, financial support, regulation, mutual recognition, ...)?*

The forms of action available to the Community are described in Annex IV of the proposal for a Council decision.

(g) *Is it necessary to have uniform regulation or is a directive setting out the general objectives sufficient, leaving implementation at the level of the Member States?*

The framework programme does not impose uniform regulation in the strict sense. Through appropriate financial mechanisms it establishes a coherent framework for action, bringing together projects implemented in cooperation by public and private operators (companies, research centres, universities).

Proposal for a

COUNCIL DECISION[1]

concerning the fourth framework programme of the European Economic[2] **Community activities in the field of research, technological development and demonstration**

(1994 to 1998)

THE COUNCIL[3] OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic[4] Community, and in particular Article 130q(1) thereof,[5]

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,[6]

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

Whereas Article 130f of the Treaty provides that the Community's aim is to strengthen the scientific and technological basis of European industry and to encourage it to become more competitive at international level;

Whereas it is important for the Community and the Member States to coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent;

Whereas Article 130i of the Treaty provides for the adoption of a multiannual framework programme, including all the activities of the Community in the field of research, technological development and demonstration (hereinafter referred to as "RTD");

NB: The numbered footnotes indicate the amendments (deletions or additions) which will have to be introduced after the entry into force of the Treaty on European Union and the alphabetical footnotes contain references to previous publications in the Official Journal of the European Communities

(1) Replace by : "EUROPEAN PARLIAMENT AND COUNCIL DECISION"

(2) Omit this word

(3) Replace by: "THE EUROPEAN PARLIAMENT AND THE COUNCIL"

(4) Omit this word

(5) Replace by: "Article 130i (1)"

(6) Omit this citation

Whereas by Decision 90/221/Euratom, EEC[a] the Council adopted a third framework programme for the period 1990 to 1994, which is in the process of being implemented; whereas Council Decision 93/167/Euratom, EEC[b] provided for supplementary financing for the last two years of implementation of the third framework programme;

Whereas on 9 April 1992 the Commission presented an assessment of progress in implementing the third framework programme; whereas on 22 April 1992 it also presented an evaluation of all the specific programmes carried out under the second framework programme; whereas on 25 September 1992 the Scientific and Technical Research Committee (CREST) presented an analysis of this evaluation at the request of the Council;

Whereas on 18 November 1992 the Commission presented a document on the future of the ECSC Treaty and its financial activities until the year 2002, the date on which it expires;

Whereas the European Council, at its meeting in Edinburgh on 11 and 12 December 1992, reached conclusions reaffirming the general, precompetitive and multisectoral nature of Community RTD, calling for more synergy between Community RTD activities and those undertaken in the context of EUREKA and for better dissemination of the results of those activities to small and medium-sized undertakings, and emphasizing the central role of Community RTD policy in coordinating activities undertaken by the Member States;

Whereas, in view of the rapid pace of technological development, the new economic challenges which the Community must meet and the increased level of global competition, it has been judged appropriate to adopt a new framework programme for the period 1994 to 1998 in order to ensure the continuity of multiannual Community RTD activities;

Whereas the purpose of strengthening the scientific and technological basis of the Community should be to improve both quality of life and the Community's industrial competitiveness[7];

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[a] OJ No L 117, 8.5.1990, p. 28.

[b] OJ No L 69, 20.3.1993, p. 43.

[7] Add: "and whereas there is a need to promote research activities deemed necessary as part of other Community policies;"

(4)

Whereas, in accordance with the Treaty, it is necessary to undertake demonstration activities in the sense of demonstration of the technical feasibility of projects or of their economic viability;

Whereas the Community is committed to ensuring sustainable development which respects the environment and whereas Community RTD activities will contribute to such development;

Whereas small and medium-sized undertakings are able to make a significant contribution to the innovation process and should play a substantial role in the implementation of Community RTD activities; whereas, therefore, particular attention should be paid to the specific needs of such undertakings in order to facilitate their access to information, encourage them to take part in Community programmes and enhance their ability to exploit their results;

Whereas the formulation and implementation of the Community's policies and actions must take into account the objectives related to economic and social cohesion; whereas, in accordance with this principle, the framework programme must contribute to the harmonious development of the Community while maintaining scientific excellence as an essential criterion; whereas it is therefore necessary to strengthen the synergy between RTD activities and the action undertaken by the Community via the structural funds;

Whereas, in conformity with the principle of subsidiarity, the Community should act only if and to the extent that the objectives of a proposed action cannot be adequately achieved by the Member States and is therefore, by reason of its scale or effects, better carried out at Community level; whereas this is the case with Community RTD activities which meet the criteria provided for in this Decision; whereas compliance with these criteria implies that decisions on the areas for Community intervention must be very selective;

Whereas Articles 130g and 130i of the Treaty define four types of Community activity; whereas the first of these activities involves the implementation of specific RTD programmes by promoting cooperation with and between undertakings, research centres and universities; whereas such programmes should cover a limited number of RTD areas of priority to the Community; whereas, because of the importance of the topics covered by this first activity, it constitutes the main component of the fourth framework programme;

Whereas research actions in the field of nuclear safeguards and safety and controlled thermonuclear fusion are the subject of a separate decision relating to the framework programme of Community activities in the field of nuclear research and training; whereas the scientific and technical objectives of the actions to be carried out are listed in the abovementioned framework programme:

Whereas the second of these activities involves the promotion of cooperation in the field of Community RTD with third countries and international organizations; whereas in this field of activity it is important for the Community to assume its responsibilities at the international level; whereas scientific and technical cooperation must be developed with the industrialized nations, taking due account of the new opportunities for cooperation offered by the Agreement on the European Economic Area, the developing countries, the countries of Central and Eastern Europe and the States which have emerged from the former Soviet Union; whereas it is important systematically to reinforce the complementary relationship and to improve links between Community activity and research activities undertaken in the framework of specialized European organizations; whereas it would be expedient to step up COST activities relating to multilateral RTD projects;

Whereas the third of these activities involves the dissemination and optimization of the results of Community RTD; whereas a strengthening and renewal of this activity is desirable in order to facilitate the efficient use of results and to improve the environment for dissemination and absorption of technologies; whereas, in this respect, ways and means should be provided of facilitating optimal use of results and technological transfer between the persons concerned and in particular smaller and medium-sized enterprises by improving their financial environment;

Whereas the fourth of these activities involves the stimulation of the training and mobility of researchers, particularly young researchers, in the Community; whereas work should be pursued on the initiative launched under the third framework programme to increase human RTD capital and to improve the mobility of researchers, inter alia on the basis of networks of laboratories and research teams, both public and private, in Member States, throughout the Community;

Whereas the fact of centralized activities involving international cooperation, dissemination and optimization of RTD results and stimulation of the training and mobility of researchers does not mean there cannot be similar activities in a manner appropriate to each of the specific programmes covered by the first of these activities to the extent required for proper implementation of these programmes;

Whereas the Joint Research Centre is called upon to contribute to the implementation of the framework programme, particularly in those fields in which it can offer an impartial and independent expert opinion and in which it can take a lead in encouraging the implementation of Community policies;

Whereas the framework programme must be implemented through specific programmes, and may also be implemented through supplementary programmes involving the participation of certain Member States only or Community participation in RTD programmes undertaken by several Member States, or involve the setting up of joint undertakings or other structures necessary for the efficient execution of Community RTD programmes;

Whereas there should be continual and systematic monitoring of progress with the fourth framework programme as regards the criteria and objectives laid down in this Decision; whereas there should also be an independent assessment of management of the programme and of progress with the activities undertaken, in due time and before the presentation by the Commission of its proposal for the fifth framework programme;

Whereas, in accordance with Article 130i(1) of the Treaty, it is necessary to fix the amount deemed necessary[8] for the realization of the framework programme and to fix the detailed rules for Community financial participation in the programme and the respective shares in each of the activities provided for;

Whereas it is expedient to maintain coherence between all Community RTD activities and whereas this framework programme and the Euratom framework programme should therefore be adopted jointly for the same period;

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

HAS DECIDED AS FOLLOWS:[9]

Article 1

1. A framework programme for Community activities in the field of research, technological development and demonstration, hereinafter referred to as "the fourth framework programme", is hereby adopted for the period 1994 to 1998.

2. The fourth framework programme shall include all Community activities as set out in Article 130g of the Treaty.

3. The amount deemed necessary[10] for Community financial participation in the fourth framework programme as a whole shall be ECU 11 625 million. Annex I sets out the breakdown between each of the activities.

4. The selection criteria to be applied in the implementation of the fourth framework programme are laid down in Annex II.

5. Annex III sets out the scientific and technological objectives and main lines of the proposed activities in accordance with the criteria referred to in paragraph 4.

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[8] Replace "amount deemed necessary" with " maximum overall amount"

[9] Replace by "HAVE DECIDED AS FOLLOWS"

[10] Replace the words "the amount deemed necessary" by "the maximum overall amount"

Article 2

1. The fourth framework programme shall be implemented through specific programmes, each of which shall specify its precise objectives in accordance with the guidelines set out in Annex III.

2. The implementation of the fourth framework programme may also give rise, as necessary, to supplementary programmes involving the participation of certain Member States only, to Community participation in RTD programmes undertaken by several Member States, or to the setting up of joint undertakings or other structures necessary for the efficient execution of Community RTD programmes.

Article 3

The detailed rules for financial participation by the Community in the fourth framework programme as a whole shall be those provided for by the specific provisions regarding RTD funding of the Financial Regulation applicable to the General Budget of the European Communities as specified in Annex IV to this Decision.

Article 4

1. The Commission shall continually and systematically monitor the progress of the fourth framework programme as regards the criteria and objectives set out in Annexes II and III. 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 the framework programme according to the results of such monitoring.

2. Before presenting its proposal for the fifth framework programme, the Commission shall have an assessment conducted by independent experts into the management of and progress with Community activities carried out during the five years preceding such assessment. It shall communicate the assessment, accompanied by its comments, to the European Parliament, the Council and the Economic and Social Committee at the same time as its proposal for a fifth framework programme.

Done at Brussels,

For the Council
The President

ANNEX I

FOURTH FRAMEWORK PROGRAMME (1994 to 1998): AMOUNTS AND BREAKDOWN

	MECU (current prices)
First Activity (Research, Technological Development and Demonstration Programmes)	9 450**
Second Activity (Cooperation with Third Countries and International Organizations)	790
Third Activity (Dissemination and optimisation of Results)	600
Fourth Activity (Stimulation of the Training and Mobility of Researchers)	785
AMOUNT DEEMED NECESSARY[1]	11 625**

Indicative breakdown between themes in the first activity	MECU (current prices)
-Information and Communication Technologies*	3 900
-Industrial Technologies*	1 800
-Environment*	970
-Life Sciences and Technologies*	1 325
-Non nuclear Energy*	1 150**
-Research for a European transport Policy*	280
-Targeted Socio-economic Research*	125
	9 450

* of which JRC 724 MECU. N.B.: in addition to participating in the first activity the JRC will also participate in the third activity to the tune of 70 MECU.

** A framework programme for research and training for the European Atomic Energy Community (1994-1998) is decided along with this programme, for a total of 1475 million Ecu, taking the total deemed necessary[11] for RTD actions in the field of energy to 2525 million Ecu and the total for Community RTD activity to 13100 million Ecu.

*** see this number of the OJ page...

(1) Replace the words "AMOUNT DEEMED NECESSARY" by "MAXIMUM OVERALL AMOUNT".

ANNEX II

SELECTION CRITERIA FOR COMMUNITY ACTIVITIES

The following criteria which guide the selection of scientific and technical objectives of the framework programme should also be applied in the definition of specific programmes:

1. Community research, technological development and demonstration (RTD) activities must focus on clearly defined objectives which will contribute towards:

   - strengthening the technological base of Community industry and providing it with the knowledge and know-how (skills) required to make it more competitive at international level;

   - defining and implementing Community policies;

   - meeting the needs of society and promoting a sustainable development.

   This approach will also yield short-term, medium-term or long-term economic benefits and should contribute to the strengthening of economic and social cohesion in the Community, while being consistent with the pursuit of scientific and technical quality.

2. The Community's RTD activities must observe the principle of subsidiarity, whereby the Community takes action if, and only if, the objectives cannot be fully achieved by the Member States and can be better achieved by the Community.

3. On this basis, the following types of action could warrant Community activities:

   - action on a very large scale for which Member States could not provide the necessary facilities, finance and personnel, or could only do so with difficulty ("critical mass");

   - activities tackling ambitious themes, addressing large-scale problems or of long-term scientific benefit. Activities of this type require specific research at Community level and can thus often enhance the Community's overall contribution to the solution of international problems;

   - activities producing obvious financial benefits which justify joint action even allowing for the extra costs inherent in all international cooperation;

   - activities which are complementary to those being carried out nationally and which aim at strengthening the scientific and technological base of the Community as a whole and where there is a better chance of applying the results at Community level;

- activities contributing to the achievement of a common policy, such as the completion of the Single Market or of a common objective such as the unification of the European scientific and technical area, and, where the need is felt, to the establishment of common rules and standards.

4. The Community's RTD activities must be implemented through projects which are to be assessed on the basis of their scientific and technical excellence.

   In this process of selecting the projects to be carried out in the specific programmes, priority will be given to projects:

   - allowing closer coordination of the research being conducted in the Member States, at Community level and within other European and international cooperation forums;

   - making it possible to respond as effectively as possible to the Community's objectives regarding economic and overall industrial competitiveness.

ANNEX III

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES

The new guidelines for a genuine Community research and technological development and demonstration (RTD) policy imply greater focusing of the Community's activities in order to increase the value added, notably by applying the principle of subsidiarity and the criteria set out in Annex II.

The RTD activities in the third framework programme (1990 to 1994) which meet these criteria have been retained.

The measures selected cover all the Community's RTD activities. They are designed to support the common policies and aim at providing the scientific and technical basis needed for sustainable, development, respecting the environnment, which improves the competitiveness of European industry and the quality of life.

In particular, in keeping with the Community's industrial policy and in order to meet society's growing needs, a series of objectives in the public interest have been identified for the purposes of selecting the Community's RTD activities:

- to develop efficient and safe infrastructures, in particular an information and communications infrastructure;

- to produce efficiently, cleanly and safely on the basis of modern organization of production taking into account human factors;

- to make environmental protection an aspect of industrial competitiveness;

- to promote an improvement in health care, food quality and food hygiene;

- to ensure technological and industrial integration within the internal market (in particular by strengthening coordination between RTD policy and standardization policy);

- to anticipate technological and industrial changes so as to ensure that greater account is taken of market and society's needs;

- to increase the synergies between the international cooperation activities proposed and the Community's external policies;

- to ensure efficient dissemination, throughout the whole economic and social system, in particular to small and medium sized enterprises, of the scientific and technological advances made;

(5)

- to train economically active people to master the new technologies.

The scientific and technological objectives are built around *four activities*:

- the first activity covers the research, technological development and demonstration programmes;

- the second activity aims at promoting cooperation in the field of Community RTD with third countries and international organizations;

- the third activity deals with the dissemination and valorization of results of Community's RTD activities;

- the fourth activity covers stimulation of the training and mobility of researchers in the Community.

The Community must aim at ensuring harmonious development of its scientific and technological resources. In support of strengthening the synergies between RTD policy and structural policies, and while maintaining the principle of excellence, the research priorities set for the first activity must take account of the interests and capacities of all Member States, including the less advanced ones. The third and fourth activities will have a growing impact on the less developed regions and countries through specific measures. However, it is primarily the responsibility of the Member States to establish a coherent overall strategy aimed at making the best use of these possibilities.

The Community support for RTD activities covered by the *first activity* will continue to focus on generic, precompetitive research of multisectoral application. This activity also includes the JRC's support for other Commission services which have a long-term character. Further, Community actions will be orientated towards certain major topics in order that European research is able to contribute, in the most effective way, to the solution of problems with which industry and society are faced.

In this respect, the need is to develop an operational approach in order to establish an effective interface between cross discipline research programmes and the needs of specific industrial sectors such as the automobile and aeronautics industries which need to strengthen their competitiveness. For this reason, the Commission will coordinate the activities in the different cross discipline research programmes and will for this purpose consult representatives of industry, public bodies and users who will give advice on the definition of the most promising research topics so that they can be included, as a priority, in the implementation of the first activity at the level of work programmes and calls for proposals. This could apply in particular to the automobile, aeronautics and maritime industries.

EUREKA will remain the principal vehicle for supporting RTD activities which are nearer to the market. The synergy between the Community's activities and EUREKA will be improved. Financial resources to be allocated to this action could be included in

an indicative fashion in the work programmes for Community programmes. Improving the dissemination of results amongst enterprises, particularly small and medium-sized businesses, cost-effectiveness and coordination between national programmes will be priorities for Community action.

Particular attention will be paid to the research, development and innovation capacities of small and medium sized businesses, of institutes of higher education and of research centres. Partnerships between them will be encouraged. Particular attention will be given to encouraging access to Community programmes by small and medium sized businesses by extending the approach whereby a rapid response can be given to their spontaneous proposals (technology stimulation).

Within the different activities emphasis will also be placed on basic research wherever necessary.

Within each research area, particular attention has been paid to the opportunities for cooperation or even coordination between national, Community and European activities. Other than shared cost action centred on selected research, increased use of concerted actions will allow promotion of this cooperation in a wider range of areas, while always respecting the criteria listed in Annex II. Similar attention has been given to ensure complementarity between JRC activities and shared cost ones.

Closer consultations will be held with bodies representing scientific, technical and industrial circles in the Community, particularly to define the science and technology policy options at European level.

In addition to the specific programme on targeted socio–economic research under the first activity, research in the human and social sciences under every theme in the first activity, and also under the second, third and fourth activities, will be coordinated with research in the exact sciences, natural sciences and engineering with a view, in particular, to anticipating and assessing the socio–economic impact of the activities planned and any possible technological risks.

The objectives of the research activities which up to now have been carried out within the ECSC Treaty will be gradually incorporated ("phasing in") into the relevant themes under the first activity, thus allowing the bodies concerned to submit their projects in response to calls for proposals by specific programmes of the framework programme.

Scientific and technological cooperation with third countries and international organizations on subjects of mutual interest will be organized partly on a centralized basis (as the *second activity*) and partly under the individual themes in the first activity, in so far as they help to attain the relevant objectives of these themes. International scientific and technological cooperation is one factor determining the economic efficiency of the Community's RTD activities. Consistency must be ensured in this area between national and Community policies. In this way, cooperation with third countries and international organizations will provide added impetus for the Community's investments in R&D.

The Council will lay down the rules governing dissemination of the know–how acquired under the specific programmes and the other arrangements for implementing the framework programme. Within this legal framework, the dissemination activities must be consistent and coordinated. This implies not only centralized management (as the *third activity*) but also a degree of autonomy for the specific programmes in order to organize special dissemination arrangements. In both cases, these activities can be carried out primarily by means of publications or using computerized methods applying common standards and protocols.

The dissemination activities also include measures to provide small and medium-sized firms and private or public research laboratories with greater access to information on Community programmes and activities. To the same end, the third activity will encourage the establishment or expansion of national or regional relay centres to disseminate and optimize the results.

Although application of the results is clearly primarily up to businesses and laboratories, in certain cases it will require concerted action by the Community and the players involved and by the relevant public- or private–sector organizations, particularly at national or regional level (including, in particular, the above-mentioned relay centres) in order to protect certain results and to facilitate the absorption of technologies and to ensure the best possible degree of transfer of innovations. The third activity also includes scientific services carried out by the JRC in support of Community policy which are not covered by the first activity.

Activities on the training and mobility of researchers will be carried out within each theme in the first activity in order to provide users in priority areas for the Community not only with the RTD results they need but also with the human resources capable of using them. Such activities will allow an increase in the economic impact of work undertaken within these priority areas.

However, the European dimension must also be used for more general measures to develop the human resources which make it possible to react in real time to scientific and technological developments in emerging areas. The *fourth activity*, addressing advanced training in centres of excellence throughout the Community, will therefore be open-ended and will also focus on partnerships between universities and industry.

Two main avenues will be used for the *implementation* of research supported by the Community: first, focusing financial resources on a limited number of subjects selected for their specific added value (shared–cost activities), without precluding the possibility of reduced rates of support depending on the nature of the project, and secondly encouraging the integration of national, Community and European activities by appropriate means.

In particular, alongside the traditional networks established in the context of Community activities hitherto, this cooperation can be achieved by means such as:

- *Thematic networks of excellence* bringing together for a given technological or industrial objective manufacturers, users, universities and research centres to facilitate the integration and transfer of knowledge and technologies and to ensure that fuller account is taken of the needs of the market. They would be organized, with catalytic support from the Community, along the lines already tested during the implementation of the Third Framework programme in areas such as microsystems, linguistics and flexible manufacturing. They will be "bottom-up" in both conception and management.
- *Concertation networks* in which Member States will play an important role in identifying the national laboratories or institutes to take part in the activity decided upon. The Commission will organize the concertation. This method could be used to carry out epidemiological research and clinical studies in the area of biomedical research, for example.
- *Consortia for integrated projects* along the lines, in previous framework programmes, of the Fusion Programme. The Member States identify the laboratories or institutes to take part in an integrated project supported by pooling financial resources from the Community. Major European research bodies such as CERN, ESA and EMBL will be invited to take part.

In this connection, the Commission considers that the JRC can make a contribution towards the implementation of this new approach. As it is itself actively engaged in research and is closely involved in the formulation and implementation of Community policies, it could play the role, in the scientific and technical areas which it covers, of organizer or focal point for networks bringing together public and private laboratories in the Member States, and could act as a centre of gravity for European research consortia in specific areas.

The following paragraphs set out the scientific and technological content of the activities to be conducted and the reasons for including them in the framework programme for 1994 to 1998, in a manner which accords strictly with the Treaty's designation of the framework programme as a planning instrument.

FIRST ACTIVITY

Implementation of research, technological development and demonstration programmes, by promoting cooperation with and between undertakings, research centres and universities.

This activity covers a major part of Community activities in the field of research and technological development. The basic approach is the participation of transnational groupings of organisations, research centres, universities and enterprises with the Joint Research Centre (JRC) also participating where it has specific competencies. It will develop in the fourth framework programme along the following lines.

GENERAL OBJECTIVES: Three fundamental objectives form the basis of the fourth framework programme: support for the competitiveness of European industry; the contribution of science and technology to the satisfaction of society's needs; support for the various common policies. In addressing these three objectives, an appropriate combination of continuity and novelty will be sought. Moreover, research activities currently scattered either in common policies or in the category of activities currently carried out outside the framework programme, will be unified in the single scheme of the framework programme.

1. INFORMATION AND COMMUNICATIONS TECHNOLOGIES

The horizontal role of information and communications technologies in all industrial and societal activities has become a factor of crucial importance for RTD policy. The boundaries between ICT and other industrial sectors, between suppliers and users, and between the professional and consumer markets are constantly being eroded, as ICT increasingly underpins all service and production industries. A new "digital industry" is emerging. In the societal dimension, administration, health, education, transport, environment and entertainment, the workplace and the home, all become increasingly dependent on ICT. As regards the ICT industries themselves, the pace of technological advance demands ever greater efforts from suppliers if they are to remain competitive, but the costs of RTD spiral out of reach of even the largest companies. At the root of these changes is the emergence of a new **information and communications infrastructure**, bringing together information content, information storage, computation capacity, communications, services, and applications.

The broad twofold objective of Community RTD in ICT in the 1990s is the improvement of the competitiveness of all industry within the favourable environment created by the internal market, and the satisfaction of societal needs for a better quality of life. To achieve this objective, and leading on from the technology driven policy of the 1980s directed at a growing ICT industry, there will be firmer emphasis on a user and market led policy geared to the development of the new infrastructure. At the same time work will draw on the results of the second and third framework programmes, where the programmes, including ESPRIT (information technology), RACE

(communications) and DRIVE, AIM and DELTA and other telematic applications, have furnished a solid scientific and conceptual basis for the integration of information and communications technologies into society and for the building of the new infrastructure. Activities will continue to be precompetitive in nature, and will emphasise demonstration, validation, and integration of technologies, specifications and standards. They will be reinforced by an effort in longer term advanced research, especially interdisciplinary research addressing issues of relevance in several industrial areas.

The new focus of RTD on the generic technologies and applications essential to the fundamentally pan-European information infrastructure, together with careful coordination with national initiatives, ensures respect for the principle of subsidiarity. Furthermore, the growth and spread of the infrastructure strengthens economic and social cohesion by bringing information, services and advanced communications to enterprises and citizens in outlying regions. It enables SMEs to realise their full competitive potential. The requirements of the infrastructure gives us a yardstick for assessing R&D priorities, and so ensuring effective use of resources.

The infrastructure can be seen as consisting of four main domains: applications, integrated systems, communications, and underpinning information technologies. The generic information technology and communications technology domains encompass those technologies which lie at the heart of the infrastructure, including components, computers, software, data banks, data highways, and video displays, and which are also essential for the technologies for digital high- definition TV. They provide the building blocks for the complex integrated systems bringing together technologies such as language engineering, high performance computing and multimedia interfaces. These in turn are the basis for the implementation of applications in areas such as health, transport, open learning, statistics, libraries and business organisation.

There are inevitably close links between RTD activities in the different domains, reflecting the increasingly integrated nature of ICT. Furthermore the widespread application of ICT means that there are links with many other themes within the framework programme.

All four domains draw on a range of modalities with a view to encouraging flexibility and responsiveness. As well as traditional shared-cost and concerted activities, RTD in certain areas will use focused clusters of projects, accompanied and reinforced by networks of excellence, association of suppliers and users, coordination with national initiatives, international cooperation, dissemination of results, and training activities complementary to and coordinated with similar more centralised activities. In addition the participation of SMEs will be facilitated through supplier-user pairs and streamlined procedures for small projects.

In order to strengthen the industrial and social impact of RTD results, RTD actions will be embedded in a set of coherent industrial policy actions. Consequently, accompanying measures will be systematically identified, in particular through a continuous analysis of market, industrial and technological evolution. These analyses will provide guidelines for future actions and pave the way for the implementation of appropriate industrial policy measures.

A. Telematics applications of common interest

This domain covers RTD activities on applications of information and communication technologies that will contribute, on the one hand, to fulfilling requirements resulting from existing Community policies as well as fundamental needs of modern societies in sectors such as health care, transport or training, and, on the other hand, to the positioning of European industry for the new markets that will emerge as a result of research activities. The general objective is to improve the effectiveness of telematics applications engineering and to ensure the interoperability of systems and telematics networks, by means of prenormative research and development activities and trials for technical validation. The work will draw upon the experience gained in the Third Framework Programme, but the emphasis will shift from data telematics to image telematics. Activities will be focused around six topics and will be closely coordinated with other relevant Community activities.

Development and upgrading of trans-European telematics applications. Today, to be more efficient, European research needs advanced trans-European networks and services. In addition, the internal market has set important requirements in the field of services and information exchange between administrations. The needs for enhanced telematics services will be supported by RTD activities aiming at developing and validating cost-effective solutions based on the constantly evolving pool of new technologies and on the upgrading of European telecommunications networks. In particular, work will concentrate on applications integrating distributed services for information exchange and videoconferencing. The results of the RTD work in this first area, which deals exclusively with trans-European applications, will be made available to the remaining telematics application areas.

Applications for health care will aim at the stimulation of telematics technologies for delivery of seamless health care irrespective of location with a focus on information access, interchange and management of data, telemedicine, and security and privacy issues, whereas **applications for disabled and elderly people** will develop and validate systems and services compensating for the impact of disability, ageing and social exclusion.

Work in the area of **flexible and distance education and training and information exchange between libraries** will promote the provision of efficient education and training services, widely available and able to meet the needs of individuals, industry and researchers. The activities will encompass technology and systems development for the design and delivery of learning products and services, and their integration into experimental networks. Work will also cover technology development creating a generic scientific and technological base for European library resources and for a networked library infrastructure.

RTD for **telematics transport applications** will develop and validate common functional specifications, practices and guidelines for telematics systems and services developed for all transport modes, including multimodal transport. Particular attention will be given to telematics systems as a contribution to the traffic management of railways, shipping and road traffic including inter- and intra-city traffic and multi-modal transport as well as for the creation of a unified system for European air traffic management. **Applications for urban and rural areas** will validate solutions, such as teleworking and teleservices, that

will bring work and services to citizens and will reduce unnecessary movement of people. It will also combat the migration of companies and citizens from rural areas and improve the conditions of daily life. Particular attention will be paid to the ease of use of these telematics services by citizens and small and medium-sized enterprises.

Finally, exploratory actions will assess the potential of telematic solutions in new areas such as **environment** (pollution monitoring, surveillance and control, advance warning for major natural catastrophe, management of environmental hazards and tracing of dangerous material) as well as other needs for telematics services which may usefully be developed in the course of the Fourth Framework Programme.

B. Technologies for integrated information and communications systems

The increasing convergence of information technologies and communications in the information infrastructure leads to greater complexity of systems, which in turn relies upon the availability of technologies for the integration of systems. This domain concentrates on the development of the integrated technologies most vital for the growth of the European information infrastructure. Activities are divided into six topics.

The aims of activities within the topic **language and information engineering** are to develop technologies for processing spoken and written language within information and communication systems, and to demonstrate their integration into a variety of application areas. Work also covers electronic language resources, including dictionaries and corpora, and general linguistic research. Information engineering will cover advanced electronic publishing systems, new database structures to ease information access, improvements in the usability of information and in information management, cooperative RTD networks, and standards work. The topic **high performance computing and networking** has as its objective the exploitation of high performance computing and networking technologies for the benefit of a broad range of users in fields such as manufacturing, engineering, and commerce, on applications ranging from non-destructive simulation of car collisions, drug design, and advanced imaging for earth observation, to medical diagnosis and surgery, and very high performance databases. Activities include the transfer of applications and the implementation of user environments for the use of parallel, distributed and embedded systems, and the development of selected new applications and technologies. Work on **integrated personal systems** is directed at the development of technologies and systems supporting personal access from any location to services in the information and communications infrastructure, and the local manipulation of information. Work will include miniaturisation, new multimodal user interface paradigms, high levels of systems integration, integration of smart card technology, personal applications, and secure, fast access to remote digital information services. Applicability will be demonstrated in systems such as the electronic wallet, advanced European Minitel and systems for personal and group working.

The topic **multimedia systems** aims to stimulate advanced technologies and standard exchange formats for the processing, retrieval and dissemination of multimedia electronic information (text, voice, images, audio and video), and to demonstrate their integration into a variety of interactive multimedia applications. Work will cover hardware and software productivity tools for authoring and development platforms, multimedia information servers, hypermedia presentations, the management of documents, advanced compression algorithms, copyright protection software, virtual reality techniques, and

(6)

pilot applications, particularly in the area of business processes. ICT support for function **integration in manufacturing** aims at the development of new ICT solutions in support of manufacturing and engineering operations, in order to achieve increased competitiveness as well as greater efficiency and environmentally clean and safe operations supporting a lean manufacturing approach. A specific ICT infrastructure and advanced ICT technologies for distributed multi-site operations will be developed to support innovation. Activities will be targeted at exploiting new organisational approaches integrating basic technologies of software engineering, open systems, data modelling and database design, computer aided design, microelectronics, microsystems and, selectively, mechatronics. Work on **security of information systems** covers the development and demonstration of technologies for the integrity, confidentiality and availability of information in integrated systems. The work will include research on new technological opportunities to assure security, the development of software, protocols, and components and their integration into secure systems and services followed by validation and testing within integrated systems. Particular attention will be given to the requirements of electronic payment, health-care and remote-working systems.

C. Technologies for advanced communications services

Telecommunications networks are an indispensable part of the information infrastructure. The overall objective of this domain is to develop advanced communications systems and services for the consolidation of the internal market, economic development and social cohesion in Europe, taking account of the rapid development of technology, the changing regulatory situation, and opportunities for development of advanced trans-European networks and services. An effective framework will be provided for usage innovation and the wide dissemination of European technologies and expertise. Activities will concentrate on four topics.

Work on **digital multimedia services** will include technology development for terrestrial radio, satellite and fibre transmission of interactive digital video services. It will also cover switching, processing and recording developments, for service providers, network operators and users, including new technology development for image compression, variable bit-rate coding, wireless networks, network interfaces, and recording. The objective of work on **photonic technologies** is to stimulate and accelerate European development of integrated photonic systems, and involves the development of integrated optical subsystems, free packaging and mass-manufacturing techniques, and optical cross-connects, as well as key technologies for 21st century: 3D holographic displays, life-images recognition and new signal compression techniques. **Mobile communications** activities are directed towards ensuring mobility on fixed networks and using advanced radio and satellite systems across Europe. The work will involve technology developments in signal coding; access systems; channel, network and service management; the development of new signalling protocols; and system development to ensure compatibility and interoperability of networks through protocols for transparent network interoperation. The objectives of work on **intelligence in networks and service engineering** are to develop technology for flexible and real-time management of communication assets, to enable the fast and flexible introduction of new services in advanced networks and effective network management and service deployment in a

diverse and competitive communication environment. The work will focus on the development of tools for service integration and will support the development of protocols and standards. It will involve the development, enhancement and prototyping of service creation environments and the development of advanced "operating systems" for communications services.

D. Information technologies

Work in this domain focuses on the technologies underpinning the information infrastructure, selecting activities which are most essential and add most value at the European level. There is a strong feedback relationship with the other three domains of ICT: activities in information technologies provide important inputs to the other domains, and conversely are conditioned by the other domains' requirements. Work is divided into six topics.

The objective of the topic **semiconductor technologies, including ASICs** is to provide essential microelectronic components which underpin the competitiveness of all high technology industries. Work will concentrate on those technologies, particularly CMOS, likely to be in major use towards the end of the decade. All aspects of the process, including design and production, will be supported. Some work may be undertaken in conjunction with the Eureka initiative. Systems integration of advanced components into Application Specific Integrated Circuits (ASICs) is a key area of emphasis. The **open microprocessor systems initiative** aims to provide Europe with a recognised capability in microprocessor systems, and to promote their broad acceptance in applications systems world-wide. The work includes the provision of an open library of hardware building blocks which can be integrated into on-chip systems for a wide range of applications, open systems software, and both hardware and software integration tools. The objectives of the topic **integrated microsystems** is to provide technologies for the emerging domain of microsystems, in which microelectronics will be integrated with other microtechnologies such as micromechanics and microoptics. The work will focus on multidisciplinary design, manufacturing of miniature multitechnology systems, and integration and packaging methods. Applicability will be demonstrated in microsystems for applications such as the clean, safe car of the 21st century and portable intelligent medical diagnostic systems.

Activities within **advanced peripheral technologies** concentrate on the technologies needed for the low-cost high-resolution thin-screen display components and memory subsystems required by computers, televisions, and intelligent systems in areas such as avionics, cars, telecommunications, manufacturing, and retailing. Work on displays focuses on visual quality, screen size and flatness, with an emphasis on LCD technology. Memory subsystem development will include increased capacity, compactness and read/write performance. The objective of the topic **software best practice** is to improve productivity, quality and reliability in European software production by fostering the best use of advanced software tools and techniques, including aids for re-use and portability in a distributed environment. In addition to further development of current techniques, work will include industrial experiments, dissemination aimed at raising awareness of

best practice, training for the introduction of new practice, and the European Software Institute. **Distributed information processing** activities concentrate on tackling challenges generated by the convergence of information processing and communications technologies, and will focus on distributed database management, distributed statistical systems, open distributed processing, and advanced human-computer interactions.

2.INDUSTRIAL TECHNOLOGIES

The globalisation of markets, newly emerging competitors, the internationalisation of processes for new technologies and the essential improvement in environmental protection are forcing European industries to adapt their structures, their cooperation and their competition strategies. In the developed countries the share of manufacturing is declining and accounts for about 30% of GDP (including the building and construction industry). It must be stimulated it in order to improve its competitiveness through a better collaboration with "knowledge-related" activities (eg services, engineering, training). Despite past efforts, Europe is still in a difficult situation; industrial R&D expenditure and the number of researchers are still significantly below those of Japan and USA (1.3% of GNP against respectively 2.2% and 1.9%) and there is a risk that this difference will increase. In this context, the strategy of the Community has to play an important catalytic role to support industrial initiatives, to stimulate the development of technological innovation, and to help the establishment of European standards.

The growing requirement to master a large spectrum of technologies for industrial competitivity justifies the reinforcement of Community actions in this field. The studies realised for the BRITE-EURAM II programme have shown that the European effort on industrial research is generating important results; the indirect economic impact has been estimated to be more than four times Community funds in R&D (technological effects, organisational effects, networking, training) with a relatively larger impact on peripheral and less favoured regions. The proposed research actions are a continuation of previous activities but will be concentrated on the development and application of generic sciences and technologies (such as mathematics and physics applied to industrial systems, new design and organisation methodologies, high performance material engineering, rapid prototyping or molecular engineering) operating within multidisciplinary and multisectoral projects. In addition, the development of harmonised methods for measurement and testing and prenormative research will reinforce industrial competitivity while offering support to European legislation.

Following the lines of the new European industrial policy, the research actions on industrial technologies will be aimed at industrial technologies the application of which could have a rapid impact on a wide range of industrial activities. Research on new technologies for "clean manufacturing" or "flexible manufacturing" is a clear example and their global economic impact is important; a reduction of 1 month on the time to place a new vehicle on the market will represent a gain of 30 MECU or so for the automotive industry. Numerous industries, including SMEs, could benefit from these research activities, concentrated as they are around strategic objectives and consortia of

suppliers, manufacturers, end users, universities and research centres. Proposed actions, especially those dealing with coordination, will stimulate technological networking improving the consistency between projects and the diffusion and exploitation of RTD results, in particular through standards and industrial specifications. Research activities for and by SMEs, and training activities within an industrial context will also be reinforced.

The proposed actions cover 4 areas: the first three areas address the integration needs of technologies related to the materials and product life cycle (including applications of available information and communication technology), whilst the fourth area is more specifically related to prenormative research.

A *Design, Engineering, Production Systems and Human Management*

This theme is of major importance and covers the whole of the manufacturing industry. The objective is to develop and apply, within a perspective favourable to the environment and to the improvement of the quality of life, new methods, techniques, new processes and tools in each phase of industrial production essential for competitiveness (design and engineering, production and maintenance, quality of products); such diffusing technologies will be integrated and applied in production systems so as to fit the needs of networks of companies and human management in production. In particular, emphasis will be placed upon use of the available computer integrated technologies "CIT", rapid prototyping, micro-system technologies, man-machine interfaces and the technologies required for clean manufacturing (such as bioprocessing) and for the rapid emergence of new products, particularly in the field of industrial machines, transport and human habitat.

B *Materials and material-related technologies (including processing and recycling)*

The objective is twofold: first, to improve the existing processes commonly used by the material transformation industries (metallurgy, chemical processing, construction) and, secondly, to make sure that the most advanced materials are ready for supply to both manufacturing industry (electro-mechanical, machine-tools, transportation, etc...) and high-tech industries (eg aeronautics and electronics). Priority will be given to research topics related to high performance materials (structural materials but also on bio-materials, magnetic, optical and super-conducting materials), and to research into the improvement of the quality, reliability and the performance of materials and products and into longer term research whose exploratory character may quickly yield practical applications thereby strengthening European industry's technological lead. The programme will obviously cover the recycling and treatment of waste and the recovery of materials at the end of product life, including the necessary quality assurance. Special attention will be given to the technologies required for the rational management of primary resources and the reuse of secondary materials and products in order to contribute to the development of clean processes and technologies.

C *Advanced propulsion technologies*

European integration and the trends in the economy are creating a growing demand for flexible and efficient transport systems. The advanced propulsion systems are the key elements which allow for comfort, quality, safety, cost-efficiency, volume, speed and environmental-friendliness in the context of the European transport policy. The priority research tasks for automotive, aeronautics, railway and shipbuilding industries will therefore encompass the design, engineering and production of new transmission and power systems. Research topics will consider the application and integration of generic technologies and the development of specific technologies to set up advanced systems, even if, in relation with the different transportation means, various technologies may be developed and applied; the emphasis will concentrate mainly on design and manufacturing techniques, modelling and simulation, advanced material applications and the reduction of the environmental impact. Particular attention will be given to command and control systems.

D *Research linked with standards, measurement and testing*

The main objective is the research necessary to develop new measurement and testing methods and to accelerate the establishment of European directives and standards for the reinforcement of the single market and the realisation of the other Community policies, especially those dealing with health and security. Within the industrial field the emphasis will be placed on the improvement of the interface between standardisation and regulatory issues and the design, assembly and the quality of products. In parallel with the development of test procedures and more effective measuring systems and a better system for mutual recognition of conformity certificates, the accent will be put on recognition of accreditation and audit systems set up in the framework of partnership with industry or sub-contracting. The infrastructure will be strengthened at the European level. Coordinated and cost-shared actions will be undertaken with networks of national laboratories. Workshops and training courses will permit the diffusion of codes of good practice within Member States.

All these actions will be principally undertaken through collaborative research projects. On the basis of the experience of the third framework programme (CRAFT, Feasibility Awards) specific activities to stimulate research for and by SMEs will be improved and reinforced, especially through simplified procedures and the support of a decentralised assistance network. Greater use of concerted actions, when this mode of action is sufficient to attain the Community added value, will permit greater selectivity in cost-shared actions (concentrated on strategic fields, needing a minimum critical mass). Modalities will be established such that the necessary flexibility is achieved in order to guarantee maximum efficiency and a quick reaction to emerging needs.

Accompanying measures aiming at strengthening the impact of Community actions will be optimised: studies, evaluation of impacts, training, support to diffusion and exploitation of RTD results, joint activities with assistance networks for SME's, measures for decentralised management, and coordination of industrial research on common objectives, such as the factory of the future, the clean vehicle, etc, to facilitate integration of technologies and transfer of knowledge between projects, sectors and other European initiatives such as EUREKA.

JRC actions will complement these efforts through research on advanced materials, ceramics and composites (especially for high temperature applications) and non-destructive testing techniques. Prenormative research will cover work on structural mechanics and research on measurement and reference materials. These actions will also cover all scientific and technical support activities of JRC to the Community industrial policy and the Single Market.

3. ENVIRONMENT

Environmental research makes major contributions to commercial competitiveness and to the improvement of quality of life in the Community. These are essential elements in the definition and the execution of Community environment policy and to the expectation of an economic boost based on sustainable development in the sense of the objectives of the Community's Fifth Action Programme on the Environment. This programme provides a new strategy to determine, in a spirit of sharing of responsibilities, the actions which affect natural resources or which affect the environment. This strategy aims at reducing the tendencies and practices which have a negative effect on the environment with a view to improving both the quality of life and socio-economic development for the current and future generations by enlarging the range of instruments available aimed at changing the behaviour of actors in the field. It will also take into account what the Community has accepted to do as a result of the UNCED in Rio de Janeiro.

Environmental research and its economic and social implications have acquired a world-wide dimension. As it becomes ever more multi-disciplinary and requires more money and resources, environmental research needs a strongly integrated and coordinated international effort that exceeds the capability of any one Member State. The participation of the European Community in this effort is clearly justified by the political and geostrategic stakes in areas such as global change and the management of natural resources.

In this context the Community's intiative with regard to RTD on the environment has the following priority objectives:

(a) continuing the development of a scientific base permitting the definition and execution of a Community environment policy that will achieve an increased level of environmental protection;

(b) contributing to improving industrial competitiveness by (i) the stimulation of the development of generic technologies integrating environmental constraints within the scope of sustainable development and (ii) improving ability to anticipate environmental problems;

(c) contributing to the observation of the behaviour and the understanding of the processes taking place within the Earth's systems, and examining the effects of human activities on these characteristics and processes.

In comparison to the Third framework programme, the nature and scale of these issues requires a thematic focus of Community effort on two priority areas of research: on the one hand the natural environment and global change, and on the other the new technologies for the protection of the environment.

Concerted actions (concerted networks) and shared cost actions (integrated projects) will be the main operational mechanisms ,as in the third framework programme (continuity). However, in the area of *research on the quality of the environment and global change*, in order to focus Community efforts concerted and shared cost actions will be incorporated into the large thematic networks, integrating strongly the potential of the national research programmes. These networks will be developed in cooperation with the JRC and in close cooperation with international organisations and research programmes (ESF, IGBP, WCRP and HDP) and the space agencies.

At the same time the socio-economic aspects inherent in the two priority themes and linked with the general topic of sustainable development will be tackled. These aspects will be important with regard to changing the behaviour of actors in the field.

A. Natural environment, environmental quality and global change

In this area Community efforts will be concentrated on prenormative and pre-legislative aspects to facilitate the implementation of the Fifth Community Programme of Policy and Action in relation to the Environment and Sustainable Development.

Community effort, including the activities of the JRC concerning the risks associated with chemical products (European Chemicals Bureau) and the validation of alternative testing methods (European Centre for the Validation of Alternative Methods), will concentrate on the following objectives:

- providing a scientific basis for evaluating the state of the environment and improving the timely awareness of environmental problems, which will require the identification of indicators and environmental parameters, of advanced systems for surveillance and evaluation, including natural phenonema, constiting a risk for man and society;
- a better understanding of the fundamental mechanisms which are active in the environment and the effects of human activity. Here there is a need for a long term research strategy focusing on global change and its possible effects.

Within this framework Community activities will be concentrated on: a) observation of the behaviour and understanding of the basic processes of natural, terrestrial, oceanic, climatic and atmospheric systems, putting the emphasis on the European context and dimension, but within a planetary perspective; b) identification and evaluation of the impact of human activities on this behaviour and processes, and; c) evaluation of the impact of the possible climatic, biospheric and atmospheric changes on man, the environment, society and economic activities. These tasks will be achieved through thematic networks consisting of concerted actions and integrated projects and the activities of the JRC. The thematic networks will be coordinated to ensure coherence of the whole, particularly in the diffusion of results and model development. The JRC will be closely associated with these actions. They will be developed within the framework of the ENRICH (European Network for Research on Global Change) network and in collaboration with CEO (Centre for Earth Observation).

Socio-economic aspects will be considered partly within the research projects (multidisciplinary approach) and partly through specific actions for concept and methodological developments.

B. New technologies for environmental protection

Community effort will be concentrated on three priorities: *instrumentation technologies, technologies relating to industrial processes and products and technologies relating to the restoration* of the environment and the prevention of natural hazards.

Within the area of instrumentation technology, the objective is to contribute to the technological development necessary for observation, surveillance and environmental research. This requires in particular a contribution to Earth observation technologies from space. This includes sensors, observation technologies and monitoring of the various biosphere behaviours, environment analysis technologies and technologies relating to the treatment, validation and dissemination of data. This effort is also viewed as support for other Community policies.

Within the area of technologies relating to industrial processes and products, the objective is to contribute to: a) the development of techniques to reduce or prevent the negative impacts of industrial processes and substances on the environment, b) the development of methods of analysis for product life-cycles and impact evaluation methodologies for industrial processes and products, c) the development of technologies to treat, recycle and eliminate waste and to treat water, d) the development of technologies for the habitat and for transport that integrate environmental constraints and improve the quality of life in close coordination with the activities of other pertinent topics, e) the support of the development of value-added industries in the area of earth observation and (f) the adaptation of the technologies for exploiting marine resources in order to improve the environment and to fight against pollution.

Finally, within the area of restoration technologies, the accent will be placed upon the restoration of environmental quality, while in the area of natural hazards the emphasis will be placed upon monitoring and response.

The mechanisms for technological research will be concertation networks and integrated projects in the areas where the organisation of the research potential on a Community dimension is necessary. The JRC will contribute within its specific areas of competence. These actions can be managed in collaboration with EUREKA. Industrialists and product users will be associated. The effort will concentrate on multisectoral and diffusive techniques. Complementary stimulation actions are envisaged to improve technology transfer to companies.

As for the preceding area, socio-economic aspects of technological research will be treated simultaneously within each action and with specific measures for methodological and conceptual developments.

4. LIFE SCIENCES AND TECHNOLOGIES

A consideration of the specific difficulties facing European agriculture and industry, the needs of Member States' health care services, and the technological aspects of the implementation of Community policies suggests that there is much to be done in mobilising the research potential in life sciences and technologies in order that the socio-economic partners in the Community could be more readily given access to the anticipated technological benefits. Furthermore, Community resources are limited. It is therefore of the utmost importance that the supply of science and technology matches the economic and social demand, as expressed in Community policies and actions.

The scientific supply-side is characterised today in Europe not only by the excellence of fundamental research, but also by the excessive fragmentation of expertise into too many disciplines, whose respective contributions are often unbalanced. At the same time, social demands for a response to the needs of protecting and managing the living world are unprecedented in their strength and clarity. In a society undergoing dramatic demographic changes, increasing therapeutic, and thus economic, demands will be made which will impinge on disease research in a wider geographical and cultural context. The liberalisation of trade and the global scale of problems affecting the biosphere pose anew the issue of competitiveness for the many industrial sectors which have traditionally exploited biological resources.

The novelty at this stage lies in the abundance of new scientific challenges which can be met, in particular by the advanced methods of biotechnology, integrated as appropriate with other industrial technologies. Now that life sciences and technologies have clearly demonstrated their societal role, a more precise vision must be developed of where and how mankind should arrange its way of life for the greatest social and economic common good. The obligation of using life sciences and technologies in the most harmonious way possible in relation to current practice, with a view to meeting the basic needs of society, is the overall purpose of this research theme.

Member States' capabilities are now much more developed than they were only a decade ago, but remain very heterogeneous. In some key areas these capabilities are so fragmented that a critical size has not been reached and the value added-deriving from the integration of complementary approaches cannot be realised, while other efforts are wasted through redundancy. The operation of scientific networks has revealed the validity of this approach without, however, being sufficiently developed. The operational

choices indicated under this take into account, above all, the opportunities for facilitating the interplay of complementary national activities. These considerations will be addressed in the following three fields:

- biotechnology
- biomedicine and health
- agriculture and fisheries (including agro-industry, food technology, forestry, and rural development).

The most important activities will have to be upgraded through a range of measures aiming to promote a more positive environment for the timely application of life sciences and technology. Use will be made of demonstration activities to raise the profile and increase the attraction of alternative technological approaches. The selection of demonstration projects must be particularly rigorous in order to ensure the expected impact. Where appropriate, links will be established with the EUREKA programme. Special attention will be given to studies and debates which bring technological innovation within the scope of ethical and regulatory issues. Other measures will be implemented: training bursaries, special arrangements for the participation of SMEs (on the model of the CRAFT programme).

A. Biotechnology

A specific European weakness when faced with biotechnology breakthroughs is the dispersion of responsibilities and the lack of social consensus on what scientific tasks to undertake. This extreme reluctance to identify and mobilise relevant activities must be overcome by a more systematic consideration of the broad range of available scientific opportunities and by a concentration on those which relate to major issues of industry and society.

The Community programme should promote global rather than reductionist approaches and the integration of disciplines rather than excessive specialisation, and should pay careful attention to users' needs as expressed through various interest groups including consumer groups, regulatory bodies, industrial or professional associations, EUREKA projects and national programmes. It is clear that in this area the need is to restrict the number of topics selected to those where all the above conditions for a cooperative process at Community level are met.

In an attempt to focus biotechnology on where it differs fundamentally from alternative technologies, primacy must go to reaching an understanding of how the living cell itself manages to be so productive and how industry can learn from cellular processes. Significant progress will be expected from four priority integrated actions where national and Community efforts could converge. These will concentrate on:

- the understanding of the "cell factory" concept and its extension to the design of new industrial bioprocesses, which will require the integration of biological, technological and computerised approaches; this will also include the promotion of the multidisciplinary vision of biochemical engineering;

- the development of methods and infrastructures contributing to the analysis of genomes;
- the development of plant molecular and cellular biology, and plant physiopathology, notably with agricultural and agro-industrial applications in mind;
- the promotion of neurosciences by the combined support of several disciplines such as pharmacology, cellular biology, molecular biology and medical chemistry in order to understand the inter- and intra-cellular events by which nerve cells manage information.

Three other objectives will be addressed via R&D projects and concertation networks supporting national efforts. They will consist of:

- the development of scientific and technological research in animal physiology, immunology and structural biology;
- the maintenance of a coherent framework for prenormative research, as well as biodiversity and bioethical studies;
- the provision of informatics resources, telematics and genetic collections to serve the research described above.

These activities together will produce knowledge indispensable for industrial progress in the targeted fields supported by the Community participation, and they will achieve this goal by applying the multidisciplinary approach which characterises biotechnology. Their success will depend on how much attention can be given to the continuity of efforts on the generic activities developed in this area in relation to the other areas of biomedical or agro-industrial applications.

B. Biomedical and health research

Health, so highly valued by every European citizen, is one of the most important sectors of the economy, absorbing 6 to 8 % of GNP and creating work for more than 6 million people; the challenge for research is to control the greatest scourges. AIDS represents one of the most worrying epidemics which need a strengthening of the coordination of research activities. Cancer, cardio-vascular disease, mental and neurological disorders, the problems of the aged and handicapped also require serious attention. Rising costs have become a concern for all countries, while citizens in every Member State are demanding high-quality health care. New health technologies and health care systems are expected to face these common problems. The Community's available resources will be concentrated on the following fields of research:

- development of the scientific and technical basis required for the evaluation of new drugs, notably for the treatment of neurological, mental, immunological and viral illnesses (these actions must take account of the needs of the European Medicines Agency). New in vitro tests and animal models (primates and transgenic animals), their validation and multi-centre clinical tests and drug safety checks will be included. Research will be conducted through collaboration between industry, research centres, universities and the authorities responsible for verifying the efficacy, safety and quality of new drugs.

- development of biomedical technology and engineering, particularly through research concerning medical devices for minimally invasive surgery, imaging techniques, biosensors, biomaterials and modelling of human functions.
- participation in the "Decade of the Brain", notably by the development and use of methodology, of instrumentation and of the most advanced and costly infrastructures considered necessary for the study of the nervous system. This approach will integrate the contribution of several disciplines.

Three other objectives will be followed by coordinated actions and the support of national efforts:

- development of the collection and analysis of statistical and epidemiological data concerning illnesses with major socio-economic impact (cancer, AIDS, occupational illnesses, etc.) and the "orphan" illnesses; sharing and harmonisation of the databanks on genetic diseases comprising Community participation in the management of the international database of the human genome and in relation to the potential for somatic gene therapy.
- research on health systems and technologies, and on information and education on health matters. This will concentrate on primary care, the evaluation of health needs, performance measurements of health policy initiatives and the evaluation of health technologies. The impact of the Single Market on the supply of health care across internal frontiers will be examined, as well as the following: regulation and de-regulation; the balance between health systems financed by the private and public sectors; tax harmonisation measures; the need to define a European approach for the introduction of new technologies in health systems.
- research on medical ethics.

C. *Application of life sciences and technologies in agriculture and fisheries (including agro-industry, food technologies, forestry and rural development).*

In the field of agriculture, forestry, rural development, agro-industry and fisheries, the objectives and challenges are to provide an RTD base for competitive, efficient and sustainable primary production (agriculture, horticulture, forestry, and fisheries) and agro- industries (food, bioenergy and non-food); support the evolving Community policies (agriculture and fisheries especially); and respond to the needs of society for a wide range of healthy and nutritious foods and environmentally friendly non-food products. In order to meet the different objectives of the programme, four priorities have been identified and will be addressed by RTD projects and thematic and concertation networks in support of national efforts. They will consist of:

- integrated production and processing chains that gather all the necessary skills and technologies relating to the use of biological raw materials (including those of aquatic origin) in a specific sector and with the focus on production lines with the largest market potential and the greatest economic feasibility.
- scaling-up and downstream processing by pooling European resources; critical mass will be created to solve major problems and technological bottlenecks in this field using modelling, simulations and scale-up trials for testing the new approaches.

- generic food science and advanced technologies to better meet the consumer's needs for a safe and health-promoting diet; research will concentrate on generic food processing technologies which take account of the molecular basis of the conversion of biological raw materials into finished food stuffs and integrate new advanced technologies for the food sector.
- agriculture, forestry, rural development and fisheries in support of the reform of common policies and to identify solutions appropriate to the transformations in rural areas. The need is to develop new systems and chains of production which are economically viable in this area, which are protective of the environment and which maintain an adequate level of employment. An improvement in the economic situation of agriculture and of fisheries will also be sought by means of quality products, diversification of products (food and non-food) and activities, and by cost-reductions, which pre-suppose the introduction of new technologies and the better utilisation of more effective inputs. The demands of consumers and the completion of the Single Market require an effort to be made with regard to animal and plant health as well as to animal welfare. New land uses will be developed, for example for set-aside land. As regards forestry, the need is to develop a multi-functioned forestry management (production, leisure, protection). Finally, increased attention wil be devoted to rural development, in line with the strengthened Community policy in this area. The same will apply to coastal development.

In line with Community policies and in order to provide means for primary production (including of aquatic origin) which respond to the demands of the consumer and industry for a supply of raw material in adequate quantity and quality, and at the same time serving the interests of producers and benefiting the rural economy, three priority coordination/network actions will be carried out in support of the substantial, existing efforts of Member States as regards:

- networks for enhanced primary production in agriculture, forestry, fisheries and fish-farming with the main emphasis on sustainability, quality, security of supply and interactions with the environment;
- networks for rural and coastal development with particular attention on training and alternative economic activities;
- food production and processing integrating socio-economic, health and food safety aspects.

Activities will be carried out in this area by the JRC which will lend its support through:

- the use of a laboratory for analysis of wine and other food drinks, where the expertise will be progressively enlarged to all pharmaceutical and food products;
- by establishing a technical support project for the management and control of the application of the CAP, using data transmission by satellite;
- by continuing the teledetection project for agricultural statistics.

The aim in this area is to extend the application of the basic technologies developed in biotechnology, biomedicine and teledetection.

5. ENERGY

Energy policy, which seeks to ensure security of supply (notably through the promotion of indigenous resources and technologies and the diversification of usable sources) now faces a new challenge: that of compatibility between energy and the environment. Present and future uses of different energy sources, on a European and global scale, carry local, regional and global risks to man and the environment: increased pollution; greenhouse gases; emission of ionizing radiations, etc. The aim of Community activities is to develop and demonstrate effective, cleaner and more reliable technologies guaranteeing compatibility between energy usage, the equilibrium of the biosphere and economic development under its various headings (competitivity, economic and social cohesion).

During the period covered by the second and third framework programmes, Community activities of R&D and of demonstration/dissemination relating to energy have established networks of cooperation for research and networks for promotion and diffusion for those energy technologies which have achieved maturity (notably the OPET network). These activities will be continued, while seeking an appropriate balance between the three main lines under consideration (non-nuclear energies; nuclear fission; fusion) and strengthening the integration between R&D and demonstration (in succession to the THERMIE programme), thus contributing to the achievement of the Community's major goals in the energy field, sustainable development and support of competitivity. This work of integration will contribute to better evaluation of the relative efficiency of R&D and demonstration for each strand of technology and to better achievement of the synergies and adjustments required between upstream and downstream activities. Complementarity will be sought between shared-cost actions in these areas and JRC activities.

The R&D actions will be centred on critical scientific and technical aspects so as to achieve significant techo-economic breakthroughs in the medium- to long-term. The European and global dimension of this new energy question and the solutions which could be applied will also be taken into account. Modelling studies aimed at better understanding of the energy-environment-economy interfaces will contribute to the analysis and to the definition of the Community energy strategy and will permit better definition of the work to be undertaken. Research dealing with technologies which are reaching maturity (management of low-level radioactive wastes and techniques of nuclear decommissioning, sectoral activities concerned with energy saving in industry) will be reduced or abandoned, as will areas (like conventional geothermal energy) where intervention at Community level no longer appears either necessary or adequate (imbalance of available funds).

As far as demonstration and dissemination are concerned, special effort will be devoted to the areas of the rational use of energy, renewable energies and clean combustion of coal. This Community action will be necessary to ensure a stable supply at an acceptable price to the totality of European enterprises. It will also improve exploitation of resources in the different regions of the Community and will contribute significantly to cooperation, in terms of technology transfer, with developing countries.

A. Technologies for cleaner and more efficient production and use of energy

The Community's work on research (including pre-normative aspects), technological development, demonstration and dissemination/valorization will be focused on three principal axes. It will deal with the rational use of energy, the introduction of renewable energies on a large scale and with more effective production from the burning of fossil fuels (coal and hydrocarbons).

Rational use of energy will focus principally on the transport sector, with integrated projects relevant to urban transport and reasearch and development on technologies such as batteries, fuel cells and advanced fuels. For the residential and tertiary sectors, the work should especially concentrate on bringing more effective technologies to the market, on the restructuring of energy-intensive systems, on adjusting the behaviour of consumers to a more restrained use of energy and on prenormative research on the use of energy in buildings. In the industrial sector, the development and demonstration actions will focus on technologies which can reduce energy consumption substantially. Targeted projects aimed at stimulating a more efficient use of energy (the intelligent house) and integrated projects bearing on the pattern of consumption (combined heat and power, and planning of industrial zones) should reinforce this activity.

The objective of the second axis is to contribute to the development and demonstration of *renewable energies*, which are clean indigenous resources, in order to ensure better integration of the energy system with the environment and much greater security of supply. The planned activities are designed to establish a European industrial and technological framework favourable to a significant uptake of renewable energies. The programme should also encourage networks of excellence: specialized research centres, electrical power generation companies, towns, regions and islands, architects and building engineers.

The programme is characterized by a balance between continuity and novelty. In order to follow-up and accelerate the work already in hand, research, development and demonstration on the most promising technologies will be emphasized: solar photovoltaic, technologies for solar heating, cooling and natural-lighting for buildings, wind energy, biomass. Other exploratory options will also be investigated: marine energy, solar electricity using thermodynamic cycles, geothermal (hot dry rock), "solar" hydrogen.

The JRC will take part in these activities mainly through prenormative research in the field of photovoltaic energy and the conservation of energy in buildings. New initiatives will be aimed at easing the integration of renewable energies from the technological, economic and social points of view. Large-scale integrated projects such as the development of electricity production from renewable sources, especially biomass, or better integration of renewable energies into future electrical systems are priority targets. Large scale integration of renewable energies into the rural setting, in regions, towns and islands, is also very important; there is a huge potential for the use of renewables in rural development in the Third World and this has major implications. The efficient execution of these integrated projects will require that close links be established with other Community policies (Common Agricultural Policy, Structural Funds).

The third axis concerns the production and transformation of energy from fossil fuels. Combustion, which is an essential generic research topic common to the field of rational use of energy and to that of the conversion of fossil fuels, will be given priority. In the area of conversion, we will be looking for cleaner and more cost-effective disposal of the proceeds of conversion of fossil fuels. The work will concentrate on key technologies such as integrated combined cycles ("hot gas cleaning" and pressurized combustion) or fuel cells for the decentralized production of electricity. Substitution of coal by biomass or combustible waste will also be studied.

Complementary work should ensure better energy security in the much longer term: actions relating to better management of indigenous resources at the levels of both extraction and conversion will be started. For hydrocarbons, the work will focus on development and demonstration, principally for the oil service industries, of more efficient techniques of reservoir exploration (geophysics), exploitation and transport. In this context, a basic programme of research in the earth sciences could complement this action.

[B. Nuclear Safety and Safeguards
C. Controlled Thermonuclear Fusion
NB: Activities B and C between square brackets are included in this annex to give an overall picture of energy research activities to be undertaken. However, they are subject to a Council decision, the same day, concerning the framework programme for research and training for the European Atomic Energy Community.]

6. RESEARCH FOR A EUROPEAN TRANSPORT POLICY

Mobility of people and goods across Europe, its countries and regions as well as within urban areas has become a phenomenon of our modern society which it is increasingly difficult to master. In this context, the development of transeuropean networks for transport which facilitate the interconnection with and the interoperability of national networks and the access to these networks will be key questions in achieving an open and competitive market.

In this respect, the Communication from the Commission to the Council over the future developments for the Common Transport Policy ("Livre Blanc" COM(92)494) specifies that the essential aim of reasearch for a European Transport Policy is to contribute to the development, integration and management of a transport system which is more efficient, safer and compatible with the environment and with quality of life, promoting sustained mobility of people and goods.

In order for this goal to be achieved, a European approach will be developed to exploit the synergy between the different Community and national activities, as well as those of other international organisations. Research will be conducted within a coherent and coordinated framework, taking into account activities within the themes on industrial technologies, telematics, environment and energy wherever they relate to the objectives of the Common Transport Policy. Work focusing on generic technologies is, in effect, to be conducted under each of the relevant themes within the first activity.

The activities under this theme will focus, on the conditions for interoperability and the interconnection of networks, notably with regard to intermodality and accessibility. This will facilitate the design and management of infrastructures so that they are more compatible with the environment and safer for their users.

In this sense, the research activities will principally address the evaluation, integration and global validation of technological innovations developed in the other themes.

The objective is to contribute towards the optimisation of the Transeuropean Transport Networks, to the improved performance of transport modes and of individual operators, to the capacity of each to cooperate with the others, to accessibility for users as well as to support for the development of a multimodal transport system at urban, rural, regional and transeuropean levels.

With this aim in view, the RTD activities will follow a systems and integrating approach, taking into account the strategic orientations of the European Transport Policy and the results of research conducted within other themes of the first activity, so as to develop specific solutions applicable to the transport sector.

This work could lead, if necessary, to large-scale tests and to demonstration projects.

The research will place emphasis on the optimisation of transport systems, the improvement of safety, the reduction of harmful emissions, and on social acceptability. In particular:

- For **combined transport and rail transport,** it will, notably, set out to ensure the interoperability of rail networks, in particular those which operate at high speed, eliminating progressively the technical, regulatory and operational barriers. The research should lead to the specification of functional requirements for multimodal integrated routes, as well as pilot concepts to integrate and evaluate new technologies for interchanges, their management and control.

- In the case of **aeronautics** a similar systems approach is necessary, on one hand, to define those objectives of European interest related to reducing congestion of airspace and of airports as well as to improving human safety and the impact on the environment, and on the other hand to allow the integration and evaluation of the results of research on generic technologies dealing, in particular with air traffic management, aircraft safety, the reduction of engine emissions and noise, drag reduction and the critical technologies for very large aircraft.

- For **urban transport,** it will permit, through the integration of results achieved and tested in other research programmes on generic technologies, the development of specific solutions within a systems approach and appropriate modelling with the aim of reducing congestion, energy consumption and improving the balance between different modes, particularly between collective and personal transport.

- In the **maritime** area, integrated research and demonstration projects should permit optimisation of the performance of short sea shipping systems, new sea/land/river interfaces, which include new port facilities making use of manpower in a way which respects the needs of safety and the protection of the environment with an efficient traffic management system.

- For **road transport,** the development of the appropriate methodologies to define the instruments necessary for the realisation of a common policy for road safety and the optimisation of interurban travel modes, while integrating and evaluating technological solutions concerning, in particular, traffic management and the design of infrastructure.

With all these activities, particular attention will be given to ergonomics and human factors in an operational framework, as well as the protection of the environment.

These activities will be accompanied, at the strategic level, by research focused on **modelling and transport scenarios.** Research in this area will be undertaken with the global objective of reaching a better understanding of the generation of transport demand.

It consists of the development of harmonised methods at the Community level for analysing the development of transport and movements, the flows and their interactions. It also includes determination of the impact on demand of industrial location and distribution networks, the identification of changes in industrial structures, of logistic contraints and of the choice of modes of transport within the enlarged European economic area.

Moreover, in line with the European Transport Policy, technological innovations will be accompanied by research concerning their integration into new operational and institutional frameworks (including those associated with technical standards and the definition of transeuropean transport networks).

Finally, a new harmonised methodology for the evaluation of the global impact of European transport systems is necessary for this purpose and particularly to optimise transeuropean networks.

The JRC will participate in these activities, essentially through the analysis of the safety of transport systems as well as their impact on society and on the environment in general. It will also undertake work of scientific and technical support related to projects financed by the Commission.

7. TARGETED SOCIO-ECONOMIC RESEARCH

The close interrelationship between technology, growth and employment is the essential feature of the context in which the objective is to contribute to the identification of concrete RTD activites which can be carried out throughout the Community with the aim of encouraging the competitiveness of European industry and the emergence of a new pedagogic and social model which will capitalise on the diversity of European Society. This new research topic will allow a response to be made to the growing need felt by decision-makers, and in particular those in charge of research, technological

development and demonstration policies in Member States and at the Community level, to be able to benefit from a greater synergy between the natural sciences and engineering, and the economic and social sciences. The need, first and foremost, is to renew and enlarge for them the knowledge base for decision-making through activities to evaluate scientific and technological policy options, taking account of developments in technology and know-how.

As well as these horizontal activities of targeted research, socio-economic research will be carried out within each topic of RTD in the first activity (evaluation of socio-economic impact and risks), in the second activity (socio-economic aspects of international scientific and technical cooperation), in the third activity (improvement of the efficiency of the uptake of results of RTD) and in the fourth activity (training and mobility of researchers in the social and economic sciences). Close contacts will be continued with the COST projects in the field of social sciences and with European organisations working in this field.

A. *Evaluation of scientific and technological policy options*

The evaluation of scientific and technological policy options for Europe will provide the common knowledge base for policy makers in the fields of science and technology policy at both the national and Community levels and also for those people responsible for other fields of Community activity within which science and technology play a role.

These activities will follow the direction taken by the MONITOR programme (FAST, SAST, SPEAR), by the work of the Institute for Prospective Technological Studies of the JRC, by the activities in the framework of the VALUE, SPRINT or EUROSTAT programmes and on the base of the experience acquired through the specific programmes (evaluation of the socio-economic impact of research) in fulfilment of a decision taken at the time of the approval of the third framework programme.

The object is to put at the disposal of actors, policy makers and users of RTD a European instrument - which takes into account global developments - for the evaluation of the scientific and technological policy options the better to encourage growth and employment and, with this as objective, to integrate into a diversified ensemble the activities undertaken at the regional, national and European levels in the fields of prospective studies of relationships between science, technology and society, of economic and technological monitoring, of strategic analysis, principally of generic technologies, and of the evaluation of RTD programmes and policies. In particular, the aim will be to reinforce prospective studies on technology and industry and to improve coordination within the Community in order to provide a consistent and global framework which will enable European actors to take the steps and initiatives relevant to their responsibilities and to adapt their own strategies better to technological and industrial changes. This to be done by putting into place a limited number of dedicated networks, concertation activities and studies, activities related to the preparation and definition of new programmes, support activities (methodological research, open databases, collections of indicators, directories of "technology assessment" in Europe, etc.) and of dissemination (workshops, seminars, information weeks). This will offer to actors involved in the evaluation of scientific and technology policy a pluralistic framework for dialogue and discussion of approaches which will lead to the

identification of scientific and technological policy options for Europe and to recommendations which can be used by actors, policy makers and users in the field of RTD. This is why the activities foreseen are to be undertaken in close collaboration with governmental organisations and parliamentary offices for the evaluation of scientific and technological policy at regional, national and European level (in particular with STOA and the European Parliament Technology Assessment Network), with public sector organisations and those of the private sector which specialise in these fields as well as with the representatives for these questions of the various socio-economic actors in the field. A limited group of activities should be foreseen to be able to help with the launching of preparatory actions and definition phases for new Community RTD activities.

The JRC will support these activities through the Institute for Prospective Technological Studies which will establish a technology observatory in order to collect and analyse information on scientific advances and technological innovations and to undertake forward studies and technological evaluations essentially at the request of Community institutions.

B. *Research on education and training*

The rate of change of scientific and technological knowledge and associated skills on the one hand, and of the education and training system, including the training of instructors, on the other are becoming more and more out of phase and it is becoming extremely difficult to ensure that timely, appropriate and well balanced exchanges take place between the two. Considerable efforts have been made at the national level to try to overcome these difficulties. The recent developments at the European level of networks in research and training and of various industrial and commercial agreements between businesses call for a common understanding and mastery by Europeans of these problems, which are increasingly global in character.

The object of the Community research activities in this field is twofold: first, it is one of identifying the new generic processes which link research, education and training and the interfaces that it is necessary to build in order to master them; secondly, it is necessary to evaluate the implications of the process of Europeanisation and globalisation in order to identify the input of the Community to the improvement of education and training systems in Europe.

The activities foreseen will respect the principal of subsidiarity by centring on exchanges of experience, the comparison and inter-operability of practices, the diversity of which enriches the Community. Priority will be given to four broad research objectives. First, research into the development of the European open labour market for all professional categories and the education and training needs that such developments imply. Secondly, research into methods of education and training, at all levels, including into the tools used, psycho-pedagogic and organisational aspects. Thirdly, comparative analysis of the special training needs linked to the development of new methods of quality and process control. These new methods must provide an appropriate response with regard to systems of qualifications for different types of work which will permit mutual recognition of problems and practices at the European level. Fourthly, comparative research on systems of education and training will be supported, including into regional differences and links with economic development in the regions.

C. *Research into the problems of social integration*

The growth in poverty and the appearance of new forms of social exclusion constitute major problems which the Member States must face. The Community has contributed to the fight against poverty and social exclusion through Structural Funds initiatives thanks to certain aspects of the EUROFORM, NOW, HORIZON and LEADER intiatives, as well as the HELIOS and TIDE programmes, but above all through its three successive programmes designed to combat poverty.

Relative to the research effort of the Member States invested in these fields, Community research has a threefold objective: first, to contribute through a comparative analysis at the European level to a more systematic understanding of the processes of social exclusion and integration, their causes, their different forms and ways in which the problems manifest themselves and their implications for Community policies, in particular the structural policies; secondly, to allow all Member States through dissemination of appropriate information to benefit from successful experiences of social integration, through the circulation of information, the copying and application of the most innovative projects, starting with a thorough analysis of their results and of the lessons drawn from them by each Member State; thirdly,to evaluate in what way the actual process of European integration (in terms of markets, currency, etc.) gives rise to particular causes of social exclusion and integration as compared with those specific to the situation at national or local level. Such research work will help with better targeting of activities at the Community level to respond to the problems of social integration.

The place where currently new types of social exclusion and integration are seen most frequently is the town (conurbations, city-regions, medium sized towns, etc.), and it is at this level, as well as that of the networks which link towns together and which are becoming more and more dense, most noticeably in Europe, (information, transport and financial networks...) where best advantage can be had from these significant changes. On the basis of the knowledge gained as a result of national research programmes as well as on the experience acquired through networks of European towns and regions and on their increasing willingness to implement common projects on the ground, the Community's contribution will be centred around two principal objectives.

The first covers in particular multi-disciplinary research into concrete means of ensuring that those people who are excluded gain easier access to information, communications, public services, education and training, to the labour market which interest them both as citizens and socio-economic actors equally at the national and the European level. The second broad objective is to evaluate the contribution that technological developments make to the resolution of these problems in the larger context of experiments tried out across the Community. In effect it is necessary to put the emphasis on the complementarity of the different generic technologies developed under other topics of the first activity in relation to the socio-economic research work dealing with strategic, organisational and institutional aspects in order to contribute to the solution of the acute problems of urban life and to promote innovative approaches to this subject.

SECOND ACTIVITY

Promotion of cooperation in the field of Community Research, Technological Development and Demonstration with Third Countries and International Organizations.

This second activity covers various related forms of Community intervention. Scientific and technical cooperation will be developed and intensified at the same time with industrialised countries, central and Eastern European countries, the new independent states of the former Soviet Union and developing countries. Such cooperation can be on a bilateral or multilateral basis; it can take place directly or through international organisations. The objectives of such cooperation are both to reinforce Community capacities in the fields of science and technology and to support the implementation of Community policies vis-à-vis third countries and it will be based on the principle of mutual benefit.

In order to improve the competitiveness and the scientific and technological bases of the Community, the challenge is to increase the added value of RTD activities of the Community and the Member States, as well as of the other Community policies through selective cooperation with third parties, in coordination with the Member States. An important aspect of this challenge is the scientific contribution to the solution of regional or global problems or to advances in the situation of developing countries and of the countries of central and Eastern Europe. It is also necessary to be sufficiently flexible to react to possible developments in third countries. In cases where intellectual property rights are involved, the rules on the subject which the Council and the Commission adopted jointly in June 1992 which give general guidelines will be respected.

The main objectives are the strengthening of the scientific and technological capabilities of Europe, supporting the implementation of Community policies with respect to third countries and contributing to the solution of regional and global problems, through increasing coordination with the Member States.

A. Scientific and technological co-operation in Europe

1. Collaboration with other scientific and technological cooperation frameworks in Europe

The aim of this activity is to reinforce the coherence of research in Europe, in order to optimize it by taking into account national efforts, both those of Member States and those of EFTA countries, those of COST, EUREKA, and European organisations such as CERN, ESA, EMBL, ESF, etc. Besides this, the European position vis-à-vis international organisations at the world level (UN, OECD, etc.) should continue to be promoted.

The resulting objectives are to establish closer relations with these frameworks and organisations, not only at the political level, but also at the practical project level. This will foster the creation of networks of scientific and technical excellence, extending beyond the frontiers of the Community. The transfer of RTD results towards the market place will be improved, notably via EUREKA. Such relations will facilitate the setting of standards and legislation responding to requirements revealed during research actions.

The COST concerted action projects are complementary to those of the Community programmes, and retain their specific character with respect to the other European research structures.

With a view to strengthening the links between Community and EUREKA activities, the essential elements are better circulation of information concerning projects and support measures, taking into consideration in EUREKA projects the results of Community projects, taking into account in a more systematic way of the precompetitive phases of EUREKA projects within the framework programme and joint examination of large scale strategic projects proposed by industrialists. As regards the Community, this entails the establishment, after an extensive pilot phase, of new mechanisms for taking into account projects from the EUREKA framework, while respecting the specific character of the two frameworks, in particular, that of the Commission's procedures.

The financial resources to be allocated to this activity could be included on an indicative basis in the work programmes for the Community programmes. The Community's participation should respect the aims of the specific programmes, and only concern the precompetitive and generic parts of projects, which would be submitted for the opinion of the corresponding Committees.
As far as EFTA countries are concerned, account will be taken of the fact that several of them take part fully in the framework programme (European Economic Area) and that others are linked by bilateral cooperation agreements.

2. *Cooperation with Central and Eastern Europe and the new independent States of the former Soviet Union*

The objectives of this activity are to contribute, through cooperation in areas of mutual interest, to the safeguarding of the scientific and technological potential of these countries and to their restructuring. This will contribute to the rehabilitation of their production systems and to an improvement in the quality of life, which are key factors for stabilisation.

Synergy with other Community activities, notably PHARE and TACIS, and close liaison with the actions of the Member States, will be sought. In the energy field, use will be made of the 'energy centres'established by the Community in these countries under the THERMIE programme.

The participation of the countries concerned in the specific programmes within the first activity is foreseen. Community funding will be available to facilitate their participation.

The action will also include specific research themes appropriate to the current critical needs of these countries, notably in terms of the environment, energy, safety and technologies having an integrating effect on the economy.

B. Co-operation with industrialised non-European third countries

The objective of this co-operation is to promote the interests of the Community and to optimise the efforts made in the area of RTD, by facilitating access to sources of science and technology of the third countries in question : U.S.A., Japan, Canada, Australia and others.

It is worth emphasising that these countries are at the same time allies or partners for the Community as well as competitors, notably on the commercial and industrial level. Hence the importance of respecting the principles of selectivity in areas of co-operation, of concentration on a few carefully selected sectors, of flexibility in the modalities of co-operation, of balanced mutual benefit, of non-transfer of financial means.

The modalities of co-operation with these countries include : concertation for certain sectors such as megaprojects, execution of joint research and study projects, as well as the exchange of information and experts.

Co-operation with these countries supports the external political activities of the EC and must be seen in this policy context. Such co-operation also allows Member States to have access to sources of science and technology of the third countries in question in an equal manner. Coordination with Member States is necessary to avoid duplication of work and dispersion of financial resources and to give a better definition to the scope of Community action based on the principle of subsidiarity.

C. Scientific and technological cooperation with developing countries (DC's)

Each Member State conducts programmes of scientific cooperation with DC's, the importance of which is often a function of cultural traditions or long-standing relations. This Community action will be primarily a means of integrating different research initiatives in a global and coordinated way and in synergy with Community development actions.

It will permit a scientific effort relevant for developing country problems to be maintained in Europe and even to be enhanced in certain Member States with a view to achieving a better balance. At the same time it will facilitate the strengthening of research capacities in DC's through carrying out joint research work under shared cost contracts and the reinforcement of links through networks.

The priority topics to be covered, which are common to all DC's and of prime importance for their economic and social development, are renewable natural resources and their utilisation for improving sustainable agricultural production and environmental protection, and health research for development. The utilisation of new information and communications technologies for the strengthening of economic structures is also envisaged. These generic topics allow a degree of flexibility in the definition of more precise priorities in the work programmes, according to the region and to the needs expressed.

In addition, DC participation in certain specific programmes of the First Activity, on subjects of general interest or of clearly identified mutual interest, is envisaged, particularly for those countries with a scientific potential which is already developed. This could be achieved by the allocation of a Community financial contribution for concerted actions or shared cost contracts.

THIRD ACTIVITY

Dissemination and optimisation of the results of activities in Community research, technological development and demonstration.

This third activity comprises measures which are not linked to any particular aspect of research and technological development; rather, it concerns Community RTD activities as a whole. The objective is to ensure that these activities have positive repercussions on the competitiveness of industry and the achievement of the other objectives of the Treaty.

The competitiveness of European industry depends to a large degree on its ability to transform the outputs of its research into viable commercial products and processes. European industry is generally less efficient than its competitors at this transformation process, and, in the context of increasing global competition, the ability to secure a return on investment in R&D is becoming a crucial factor in many industrial sectors.

To remedy this situation, and taking into account developments in the United States and Japan, the Community must make a substantial contribution to improving the dissemination and utilisation of research results. However, it should also create better conditions for the transfer and absorption of new technologies, whatever their origin, by industry and especially SMEs, whilst taking into account the needs of society: in fact, the social acceptance of science and technology seems to meet increasing resistance.

The Member States of the Community have implemented at national and regional level a series of policies aimed at research exploitation and the diffusion of new technologies. But, on the one hand, these initiatives vary largely from one region to another and, on the other hand, the Community dimension is not sufficiently taken into account, although it could yield a significant amount of value added in the context of the Single Market.

The centralised action for the dissemination and utilisation of research results under the third framework programme, and the SPRINT and THERMIE (in the field of energy) programmes situated outside the framework programme, endeavour in cooperation with other Community actions in this field and with relatively modest resources to develop a coherent Community system for research utilisation and technology diffusion, building upon appropriate national and regional structures, thus observing the principle of subsidiarity. This effort needs to be continued and extended in the course of the fourth framework programme by implementing integrated larger scale Community actions.

Activities of dissemination and optimisation of results, moreover, have to be carried out in coordination with those implemented and financed by the specific programmes. They reflect the non-linear, complex and iterative nature of the innovation process and the specific character of technology transfer and utilisation, which call for special skills and a multi-sectoral approach.

The objectives of the Third Activity are the promotion of the inter-sectoral and transnational dissemination and exploitation of the results of RTD and demonstration activities, the support of technology transfer and absorption by firms and the improvement of the financial environment for firms in order to encourage the diffusion and utilisation of new technologies. Priority attention will be given to SMEs. The synergies with the EUREKA programme will be strengthened as will the links between dissemination and optimisation activities with the cohesion and rural development policy of the Community.

A. Dissemination and Exploitation of Results

The objective of this area is, building upon appropriate structures at the national and regional level, to promote the inter-sectoral and transnational dissemination and exploitation of the results of RTD and demonstration activities in order to strengthen their social and economic impact.

It is composed of the following activities:

- the establishment of a European infrastructure for RTD dissemination and optimisation, with the objective of improving knowledge of the Community's RTD and demonstrations activities, facilitating the dissemination of information and the exploitation of RTD outputs in Europe and promoting scientific and technological cooperation. This infrastructure is based, on the one hand, on the strengthening of the activities of the relay centres network, and, on the other hand, on the reinforcement of the European public information and dissemination service (mainly CORDIS).

- specialist services and direct assistance, which complement the established infrastructure and are directed at supporting SMEs, with the aim of promoting transnational and inter-sectoral utilisation of RTD results. They include assistance in the field of intellectual property rights, market research studies, training schemes, the stimulation of know-how transfer, the creation of technology clubs and support for projects on trans-sectoral applications.

- strategic and interdisciplinary reflections on improving the effectiveness of the transfer of RTD results (including acceptability and the evaluation of the social impact, management and economics of research, pilot projects on communication towards society).

The network of organisations which promote energy technology (OPET) will continue its activity in the energy field.

B. Dissemination of technologies to enterprises

The objective of this area, in accordance with the principle of subsidiarity, is to promote the wider use of technologies, especially by SMEs, and to contribute to the establishment of a European infrastructure for technology transfer, bringing together the competent organisations at national and regional levels.

Emphasis will be placed on improving the quality and efficiency of innovation and technology transfer support services, as well as on the improvement of the capacity of industry, especially SMEs and traditional industrial sectors, to absorb new technology. An integrated approach will be promoted based on the demands of firms ("bottom up") and covering all the aspects related to the transfer and utilisation of technologies. The proposed actions will not include RTD activities in the strict sense which are covered by the First Activity.

The foreseen activities are:

- the establishment of transnational networks of technology transfer and diffusion practioners, involving mainly organisations such as research and development organisations, sectoral technical centres, science parks, etc. in order to encourage the use of technologies in SMEs and the exchange of best practice;
- the application of tools designed to facilitate the diffusion of technological opportunities and the bringing together of suppliers, users, and intermediaries;
- the demonstration of mechanisms and conditions for the transfer of technologies and their use by new users via the implementation of inter-regional or trans-sectoral pilot projects. These projects will be based on intermediary organisations generating important multiplying effects on the diffusion of new technologies and management methods in SMEs;
- measures to improve firms' awareness of best practice methods in the management of technological resources;
- improving knowledge of the mechanisms involved and the reinforcement of the co-ordination of relevant policies and instruments.

C. The Financial environment for the dissemination of technology

Given that the financial environment influences the competitiveness of industry, the third area aims to improve, through an appropriate Community action respecting the subsidiarity principle, the European environment for the financing of the exploitation, adaptation and dissemination of technologies.

This area comprises:

- indirect measures which aim to reinforce the communication between financiers and the promoters of technological projects, to support the establishment of effective systems for mobilising private capital and the exit of investments ("exit"), to analyze and promote the most appropriate legal structures;
- pilot actions which aim to establish or to test financial mechanisms for the absorption of research results and technologies by SMEs. The technology performance financing scheme started under the SPRINT programme will be carried on and a new instrument compatible with those of the Member States and adapted to national contexts will be established. In accordance with established agreements, its management would be entrusted to public or private specialist financial intermediaries selected in the different Member States particularly for their ability to provide equity co-financing. This scheme should facilitate the granting of loan guarantees, interest-rate subsidies and measures to support associated technical and managerial assistance.

These activities will be implemented in close cooperation with the other Community actions in the field (Eurotech capital, European Investment Funds, enterprise policy).

D. Scientific services for Community policies

The JRC will give its technical support to activities of dissemination and utilisation of know-how resulting from its own research and technological developments activities which, due to their horizontal and trans-sectoral character, are an integral part of the third activity.

The different forms of know-how exploitation, especially transfer to industry, in particular SMEs, will be encouraged.

The optimisation of transfer of know-how, possibly in association with EUREKA projects, will also be encouraged.

These activities will be carried out in close collaboration with the Commission services responsible for dissemination and optimisation.

The JRC will also give its scientific support to Community policies, at the request of directorates in charge of these policies, where the need or the request is manifested.

These activities, which are in general of a limited and short term nature, do not fit in well, because of their very nature, with long term planning, because they follow the short term requests of the Directorates General. The opportunity to undertake them only becomes apparent during the execution of the framework programme, and when it appears that the JRC's scientific knowhow could contribute to the formulation or to the implementation of one or other of the Community's policies.

Certain examples can nevertheless be identified: remote sensing of specific pollutants and of the cultivation of certain hallucinatory plants (combating drugs); the analysis of complex systems with multiple operators and the analysis of specific datasets; remote sensing for fisheries.

FOURTH ACTIVITY

Stimulation of training and mobility of researchers in the Community

The specific objective of this activity, is to promote, the development at Community level, while respecting the principle of subsidiarity, of a factor representing a key variable for the scientific and technological system : human resources. Mobility is not a zero sum operation : it leads to a net increase in productivity.

The optimal utilisation of human resources is a basic parameter of all socio-economic activity. Although Europe possesses a human capital in research which ranks in second position at world level, its utilisation is often ponderous and slowed down by barriers which isolate Member States, separate different disciplines and hinder technology transfer. The development of human resources in the field of research through training, and their better utilization by transnational mobility and co-operation, are essential means to reinforce the basis of European industry and to improve its international competitiveness.

The proposed activity succeeds (with a number of required modifications) the specific programme "Human Capital and Mobility" (1992-1994) and, further back in time, the programmes "Science" (1988-1992) and "Access to large scale scientific and technical facilities" (1989-1992). Elements of continuity essentially concern the objectives (increase of the efficiency of research and of the efficient use of research facilities in the Community through training, mobility and co-operation). The adjustments required by the evolving situation essentially occur at the levels of strategy and management (reduced dispersion of financing efforts, simplification of contractual agreements, elimination of obstacles to free circulation of researchers, clear distinction between the areas covered by the programme and the objectives of the targeted research described in the First Activity of this framework programme). The fourth activity, which aims to give advanced training in centres of excellence distributed throughout the Community, will keep it open characteristic and put the emphasis on university-industry partnerships.

The general objectives of the activity, which encompass those of the former SCIENCE programme, are the following:

- to stimulate training through research and, by means of co-operation, to foster better utilization of high-level researchers in the Community;

- to improve the mobility of European researchers at geographical level, and also amongst different disciplines and between university and industry;
- to promote transnational co-operation for "free" research (as opposed to the targeted research foreseen in the first activities); i.e. : research activity proposed by the scientists themselves;
- to improve large-scale facilities which are indispensable for high-quality research, and to place them at the disposal of all European researchers;
- to improve the scientific and technological cohesion of the Community, by offering research opportunities to scientific institutions and to researchers, which may help them to reach the level of excellence.

This activity will cover the exact, natural, economic and management sciences, as well as social and human sciences of relevance to Europe.

The activities foreseen, following along the lines of the SCIENCE programme, are gathered into three sub-areas :

(a) Training through research and stimulation of mobility :

- Co-ordination of all training activities undertaken in the specific programmes defined in the first, second and third activities, with the aim of increasing their synergies;
- Harmonization of national policies and definition of the status of the European research trainee;
- Implementation of training activities through research and stimulation of researchers' mobility. This will consist of stays of three months to three years, which should allow European researchers to receive professional training and specialised experience outside their home countries. These training periods will be open to all researchers holding or preparing a doctor's degree. Grants will be awarded to host laboratories and will cover mobility and subsistence expenditure, and will provide a contribution to research and management costs. Particular attention will be paid to training in the field of the management of changes within enterprises as they relate to new technologies.
- Organization of Euroconferences and scientific prizes.

(b) Twinning of laboratories in different countries

This will allow researchers from different countries of the Community working in isolation to join their efforts in a "European Laboratory Without Walls" and to constitute, in this manner, research groups with a sufficient "critical mass". Grants will be awarded to help researchers to meet, to perform experiments in common, to support the exchange of results between researchers, to complete equipment or to reinforce research staffs through temporary contracts for visiting scientists (preferably from other countries).

(c) Large scale facilities. Community activities will include :

- support for researchers in order to facilitate their access to large installations and large instruments (necessary for research and rare in the Community);
- support for the development of new technologies;
- the coordination of large scale research facilities.

ANNEX IV

RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY

1. The financial participation by the Community in RTD activities undertaken within the specific programmes shall be:

(a) *Indirect action (shared cost actions with third parties)*

- for RTD projects, including *consortia integrated projects*: progressively lower participation the nearer the project is to the market place and normally not exceeding 50% of the costs of the project (in the case of universities and higher education establishments, this may take the form of 100% of *additional costs*);

- for *thematic networks of excellence* and training and mobility of researchers: normally 100% of the *additional costs*;

- for preparatory, accompanying, and support measures: up to 100% of the costs of the measure;

- for measures appropriate for certain specific programmes, such as *feasibility awards*: up to 100% of the costs of the measure.

(b) *Concerted action*

For concerted actions consisting of the coordination of RTD projects, such as concertation networks: up to 100% of the administrative costs of the concertation.

(c) *Direct action*

For direct action consisting of RTD programmes or parts of programmes carried out by the JRC: normally 100% of the costs of the research.

There may be no derogation from these general rules, except under the conditions set out in each specific programme.

2. The rules for any eventual financial participation by the Community in the activities foreseen in Article 2, paragraph 2, of this Decision will be specified in the measures concerning such activities taken by the Council in conformity with Article 130 Q[1] of the Treaty[2].

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(1) Replace by: "Article 130 O".

(2) Add a paragraph 3 as follows: "The rules for the financial participation of undertakings, research centres, and universities in the implementation of the specific programmes will be specified in the measures foreseen by Article 130 J of the Treaty".

Proposal for a

COUNCIL DECISION

concerning a framework programme of Community activities in the field of research and training for the European Atomic Energy Community (1994 to 1998)

THE COUNCIL OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Atomic Energy Community, and in particular Article 7 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 Community activities in the field of nuclear research and training can be the subject of a multiannual framework programme and of specific programmes both determined in accordance with Article 7 of the Treaty;

Whereas by Decision 90/221/Euratom, EEC[a] the Council adopted a third framework programme for the period 1990 to 1994 in the field of research and technological development (hereinafter referred to as "RTD") both within the scope of the EEC Treaty and in the nuclear area and whereas that programme is in the process of being implemented; whereas Council Decision 93/167/Euratom, EEC[b] provided for supplementary financing for the last two years of implementation of the third framework programme;

Whereas on 9 April 1992 the Commission presented an assessment of progress in implementing the third framework programme of RTD; whereas on 22 April 1992 it also presented an evaluation of all the specific programmes carried out under the second framework programme of RTD;

Whereas, in view of the rapid pace of technological development, it has been judged appropriate to adopt a new framework programme on nuclear research and training for the period 1994 to 1998 in order to ensure the continuity of multiannual Community activities in this field;

Whereas, Article 4(1) of the Treaty provides for Community nuclear research and training activities designed to supplement the activities carried out by the Member States and that whereas it is appropriate, to that end, to define the criteria which will allow value to be added to efforts undertaken by the Member States; whereas compliance with the criteria laid down in this Decision implies that decisions on the areas for Community intervention must be very selective;

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[a] OJ No L 117, 8.5.1990, p. 28.

[b] OJ No L 69, 20.3.1993, p. 43.

Whereas, in the application of the above criteria, research activities in the fields of nuclear safety and safeguard of controlled thermonuclear fusion should be pursued; whereas these activities are implemented by means of specific programmes based on cooperation with and between undertakings, research centres and universities;

Whereas cooperation in the field of Community research with third countries and international organizations should be promoted; whereas in this field of activity it is necessary to take account of the Community's international responsibilities, on nuclear fission safety, in particular, with the countries of Central and Eastern Europe and the States which have emerged from the former USSR; whereas it is also important to continue international cooperation activities with third countries in the field of controlled thermonuclear fusion where appropriate; whereas it is important systematically to reinforce complementarity and to improve links between Community activity and research activities undertaken in the framework of specialized European organizations;

Whereas action should be taken to promote the dissemination and optimization of the results of Community research activities; whereas the Treaty contains precise provisions regarding the dissemination of knowhow which apply principally to the nuclear research programmes and that these provisions are applied jointly by the specific programmes and a centralized activity;

Whereas action should also be taken to promote the stimulation of the training and mobility of researchers, particularly young researchers, in the Community;

Whereas activities involving international cooperation and stimulation of the training and mobility of researchers should be carried out within each specific programme;

Whereas the Joint Research Centre is called upon to contribute to the implementation of the framework programme;

Whereas the framework programme is to be implemented through specific programmes;

Whereas there should be continual and systematic monitoring of progress with the framework programme as regards the criteria and objectives laid down in this Decision; whereas there should also be an independent assessment of management of the programme and of progress with the activities undertaken, in due time and before the proposal for the next framework programme; whereas the Commission shall also present an annual report to the Council;

Whereas, without prejudice to the entry of the amounts needed to implement the programmes in the framework of the annual budgetary procedure in accordance with the third paragraph of Article 7 of the Treaty, it is necessary to make an estimate of the Community financial means necessary for the realization of the research and development activities envisaged;

Whereas it is expedient to maintain coherence between all Community RTD activities and whereas this framework programme and the fourth framework programme for Community RTD activities[c] should therefore be adopted jointly for the same period;

Whereas the Scientific and Technical Committee has been consulted by the Commission,

HAS DECIDED AS FOLLOWS:

Article 1

1. A framework programme for Community activities in the field of nuclear research and training is hereby adopted for the period 1994 to 1998.

2. The framework programme shall include all activities regarding research, technological development, international cooperation, dissemination and optimization of results, as well as training, in the fields of:

   - nuclear safety and safeguards,
   - controlled thermonuclear fusion.

3. Without prejudice to the third paragraph of Article 7 of the Treaty, the amount deemed necessary for Community financial participation in the framework programme as a whole shall be ECU 1 475 million. Annex I sets out the breakdown between the two fields referred to in paragraph 2.

4. The selection criteria to be applied in the implementation of the framework programme are laid down in Annex II.

5. Annex III sets out the scientific and technological objectives and main features of the proposed activities, in accordance with the criteria referred to in paragraph 4.

Article 2

The framework programme shall be implemented through specific programmes. These programmes shall be adopted in accordance with Article 7 of the Treaty. Each specific programme shall specify its precise objectives in accordance with the guidelines set out out in Annex III.

Article 3

The detailed rules for financial participation by the Community in the framework programme as a whole shall be those provided for by the specific provisions regarding RTD funding of the Financial Regulation applicable to the General Budget of the European Communities, as specified in Annex IV.

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[c] See p. of this Official Journal

Article 4

1. The Commission shall continually and systematically monitor progress with the framework programme as regards the criteria and objectives set out in Annexes II and III. 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 the framework programme according to the results of such monitoring.

2. Before presenting its proposal for the next framework programme, the Commission shall have an assessment conducted by independent experts into the management of and progress with Community activities carried out during the five years preceding such assessment. It shall communicate the assessment, accompanied by its comments, to the Parliament, the Council and the Economic and Social Committee at the same time as its proposal for the next framework programme.

Done at Brussels,

For the Council
The President

ANNEX I

FRAMEWORK PROGRAMME (1994–1998) :
AMOUNT AND BREAKDOWN

	MECU (Current prices)
Nuclear safety and safeguards	495
Controlled thermonuclear fusion	980
AMOUNT DEEMED NECESSARY*	1475

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* of which JRC : 343 MECU allocated as follows : Nuclear safety and safeguards 293 MECU and controlled thermonuclear fusion 50 MECU.

ANNEX II

SELECTION CRITERIA FOR COMMUNITY ACTIVITIES

The following criteria which guide the selection of scientific and technical objectives of the framework programme should also be applied in the definition of specific programmes:

1. Community research, technological development and demonstration (RTD) activities must focus on clearly defined objectives which will contribute towards:

   - strengthening the technological base of Community industry and providing it with the knowledge and know-how (skills) required to make it more competitive at international level;

   - defining and implementing Community policies;

   - meeting the needs of society and promoting a sustainable development.

   This approach will also yield short-term, medium-term or long-term economic benefits and should contribute to the strengthening of economic and social cohesion in the Community, while being consistent with the pursuit of scientific and technical quality.

2. On this basis, the following types of action could warrant Community activities:

   - action on a very large scale for which Member States could not provide the necessary facilities, finance and personnel, or could only do so with difficulty ("critical mass");

   - activities tackling ambitious themes, addressing large-scale problems or of long-term scientific benefit. Activities of this type require specific research at Community level and can thus often enhance the Community's overall contribution to the solution of international problems;

   - activities producing obvious financial benefits which justify joint action even allowing for the extra costs inherent in all international cooperation;

   - activities which are complementary to those being carried out nationally and which aim at strengthening the scientific and technological base of the Community as a whole and where there is a better chance of applying the results at Community level;

- activities contributing to the achievement of a common policy, such as completion of the single market or of a common objective such as the unification of the European scientific and technical area, and, where the need is felt, to the establishment of common rules and standards.

3. The Community's RTD activities must be implemented through projects which are to be assessed on the basis of their scientific and technical excellence.

   In this process of selecting the projects to be carried out in the specific programmes, priority will be given to projects:

   - allowing closer coordination of the research being conducted in the Member States, at Community level and within other European and international cooperation forums;

   - making it possible to respond as effectively as possible to the Community's objectives regarding economic and overall industrial competitiveness.

ANNEX III

SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES

Nuclear Safety and Safeguards

The objective is to ensure the safety of all nuclear activities whatever they are ,the production of electricity from fission, the use of radioactivity or ionising radiation, or the presence of natural radioactivity. In spite of the progress achieved by the nuclear electricity industry, the accident at Chernobyl has shown that nuclear safety should still be improved, particularly in the East. It is necessary to consolidate the nuclear option by showing our ability to control it in all areas of application. This demonstration of a full nuclear safety capability will be made through four priority routes:

- the development of a dynamic approach to nuclear safety contributing to the consolidation of a "safety culture " on a world scale; the joint use of the large European facilities to arrive at a better understanding of the crucial phenomena linked to the nuclear fuel cycle and waste ; pursuing the development of techniques to control nuclear safety ; the integration of radiological protection into a global system for the protection of man and the environment.

As far as the first priority is concerned and in close cooperation with the competent international organisations the areas of activities will concern the study of new systems of control and monitoring, aspects related to severe accidents, and the evaluation of the safety characteristics of new reactor concepts. The ageing of installations and their prolonged operation will require complementary studies in the frame of research networks. The decommissioning of installations in the EC , the Eastern and central European countries, as well as the restoration of sites will be studied in coordination with the national authorities.

As far as the second priority is concerned, the work carried out by the JCR in the field of the nuclear fuel cycle and radioactive waste will focus on the problems of safety related to nuclear fuel and on final disposal. Prenormative approaches will be developed. The joint use of underground installations by research workers of all the Member States will have to be increased.
The research activities at the JRC in the field of control of safeguards and in the framework of networks of national laboratories, will be aimed at obtaining results, or the development of new techniques necessary to assure the respect of the obligations concerning safeguards relevant to treaties and to those following from the Treaty on non-proliferation. Moreover, the JRC will pursue its activities in supporting the fulfilment of the tasks which are the responsibility of the Commission in this field, as well as with its participation in establishing a coherent and reliable international system of control of safeguards through its cooperation with the IAEA and its cooperation with the countries wishing to contribute to such a system, in particular with the Eastern countries.

In the field of radioprotection, the thorough understanding of the biological mechanisms arising from radiation exposure remains the key to achieving a better quantification of the effects of low doses. The reduction of exposure from all sources, taking into account social and economic constraints, remains the objective of the protection of man and his environment.

The problems of radioactive pollution originating from accidents or operational errors in the Eastern and central European countries, in particular Chernobyl, require cooperation with these countries. The setting up of a network of international centres will stimulate international collaboration and contribute to a better coordination of bilateral and international initiatives.

Controlled Thermonuclear Fusion

The long term objective of the Community action, embracing all activities undertaken in Member States (plus Sweden and Switzerland) in the field of controlled thermonuclear fusion by magnetic confinement, is the joint creation of safe, environmentally sound prototype reactors. The long time span and the large human and financial efforts required before reaching this objective make necessary the total cohesion of the network of organizations associated in the Community action, as well as the full exploitation of the cooperation with the large fusion programmes outside the Community.

Safety and environmental issues will play a central role in the realization of the large devices included in the strategy which is envisaged for moving towards a prototype reactor. During the period 1994-1998, the simultaneous development of three themes of activity is necessary for implementing this strategy : the Next Step activities, on the first experimental reactor; the improvement of concepts, in plasma physics and engineering, for the subsequent step, the demonstration reactor; the long term technology, essential for progressing towards the exploitation of fusion as an energy source.

For the period 1994-1998, the objective of the Next Step activities will be to complete the engineering design of an experimental reactor, in the frame of the quadripartite international agreement ITER, between EURATOM, Japan, the Russian Federation and the USA. For EURATOM, the activities, other than the participation in the "Joint Central Team", will be coordinated by the NET team and carried out by JET, the Associations, the JRC and industry. A European candidate site for the construction of the Next Step will be identified. The JET Joint Undertaking will end after a phase of operation with tritium; the expertise will be transferred, in particular to ITER; available equipment will be utilised in organizational frames to be defined. The optimisation of concepts, on which tokamaks and similar configurations are based, will be continued by the Associations; the upgrading of existing devices, as well as the construction of new ones, such as a stellarator, could be necessary. The possibility of using other fusion reactions will be studied. The long term technology will concern tritium breeding blankets, materials and safety; the specialized laboratories, in particular at the JRC, will contribute in demonstrating the safe handling of tritium.

The research will continue to focus principally on controlled thermonuclear fusion by magnetic confinement. However, it is important that alternative ways, such as fusion by inertial confinement, for example with the aid of beams of particles, receive due attention, if possible in the frame of international collaboration, in particular for a possible experimental activity.

The synergy between research and training will be developed. The mobility of scientists will be increased, in particular in the frame of consortia for integrated actions, grouping several Associations on joint projects. The decentralized management of the Programme will be maintained.

ANNEX IV

RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY

1. The financial participation by the Community in RTD activities undertaken within the specific programmes shall be:

(a) *Indirect action (shared cost actions with third parties)*

- for RTD projects, including *consortia integrated projects*: progressively lower participation the nearer the project is to the market place and normally not exceeding 50% of the costs of the project (in the case of universities and higher education establishments, this may take the form of 100% of *additional costs*);

- for *thematic networks of excellence* and training and mobility of researchers: normally 100% of the *additional costs*;

- for preparatory, accompanying, and support measures: up to 100% of the costs of the measure.

(b) *Concerted action*

For concerted actions consisting of the coordination of RTD projects, such as concertation networks: up to 100% of the administrative costs of the concertation.

(c) *Direct action*

For direct action consisting of RTD programmes or parts of programmes carried out by the JRC: normally 100% of the costs of the research.

There may be no derogation from these general rules, except under the conditions set out in each specific programme.

2. The rules for the participation of the Community in the Joint Undertaking, JET, and ITER activities are specified in the specific programme relating to controlled thermonuclear fusion.

FINANCIAL STATEMENT

Part 1: Financial implications

1. TITLE OF THE OPERATION

Fourth framework programme of Community activities in the field of research and technological development and framework programme for the European Atomic Energy Community (1994-1998)

2. BUDGET HEADING CONCERNED

Sub-section B6

3. LEGAL BASIS

Article 130 Q(1) of the EEC Treaty (to be replaced by article 130i, paragraph 1 of the EC treaty after the entry into force of the Maastricht Treaty) and article 7 of the EAEC Treaty.

4. DESCRIPTION OF THE OPERATION

4.1 **Specific objectives**

Implementation of research, technological development and demonstration programmes by promoting cooperation with and between enterprises, research centres and universities;

Promotion of cooperation in the field of Community research, technological development and demonstration with third countries and international organizations;

Dissemination and application of results of Community research, technological development and demonstration activities;

Stimulation of the training and mobility of researchers in the Community.

4.2 **Duration**

1994-98

4.3 **Target population for the operation**

Industrial enterprises - including especially SMEs - research centres and universities in their research and technological development activities.

5. CLASSIFICATION OF THE EXPENDITURE AND REVENUE

51. **Non-compulsory expenditure.**

5.2 **Differentiated appropriations.**

5.3 **Type of revenue involved**

The EFTA countries as defined in Article 2 of the Protocol amending the Agreement on the European Economic Area (EEA) will contribute to proportional additional financing for this framework programme, if the EEA Joint Committee provided for in the Agreement so decides, probably limited to the non-nuclear activities.

6. TYPE OF EXPENDITURE OR REVENUE

Research, development and demonstration projects carried out by external contractors may receive a Community contribution to the cost of research, with a ceiling of 50% of the costs or the equivalent (100% of additional costs for universities and similar organisations).

Networks, training and the mobility of researchers, concerted actions, which consist of the coordination of research and development projects, and accompanying activities, may receive a contribution of up to 100% of the cost of these activities.

Research activities carried out by the Joint Research Centre will in principle be 100% funded.

7. FINANCIAL IMPACT

7.1 Method of calculating the total cost of the operation

The framework programmes have been defined so as not to exceed two-thirds of the amount allocated to category 3 of the proposed financial perspective for 1993-99.

The amounts will cover scientific, technical, demonstration and related horizontal support measures as well as personnel costs and administrative, scientific and technical expenses directly linked to the execution of the activities and measures. As far as activities carried out by the JRC are concerned, these amounts will cover the infrastructure for the institutes.

7.2 Breakdown

The four activities correspond to the four objectives listed at 4.1 above.

4th framework programme 1994-98	
	MECU (current prices)
First Activity (Research, Technological Development and Demonstration Programmes)	10925
Second Activity (Cooperation with Third Countries and International Organizations)	790
Third Activity (Dissemination and Application of Results)	600
Fourth Activity (Stimulation of the Training and Mobility of Researchers)	785
OVERALL AMOUNT	13100

	MECU (current prices)
Indicative breakdown between themes in the first activity	
- Information and Communications Technologies*	3900
- Industrial Technologies *	1800
- Environment *	970
- Life Sciences and Technologies *	1325
- Energy *	2525
- nuclear	1475
- non-nuclear	1050
- Research for a European transport policy*	280
- Targeted Socio-economic Research *	125
	10925

* of which JRC 1067 MECU. N.B.: in addition to participating in the first activity, the JRC will also participate in the third activity to the tune of 70 MECU.

7.3 **Indicative schedule**

MECU - current Prices

YEARS	Financial Perspectives	Actual Amounts 4th FP
1994	4325	pm
1995	4715	2928
1996	5078	3153
1997	5450	3384
1998	5852	3635
Total 1994-1998		13100

The deflators used are respectively for 92-93: 1.023, for 92-94 : 1.059, for 92-95 : 1.091, for 92-96 : 1.123, for 92-97 : 1.157 and for 92-98 : 1.192.

The definitive annual amounts will be fixed by the budgetary authority.

8. **ANTI-FRAUD MEASURES PLANNED UNDER THE OPERATION**

Audit programme of the Directorate-General. Supervision by the officials formally responsible for the actions.

Part 2 : Basis for cost/effectiveness analysis

1. **OBJECTIVES**

The framework programme corresponds to the objectives established by the Treaty on European Union and notably its Article 130f(1) which states: "The Community shall have the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting all the research activities deemed necessary by virtue of other chapters of this Treaty." The four activities selected reflect Article 130g.

2. **JUSTIFICATION OF THE OPERATION**

The operation is justified by the need for the Community to help strengthen the scientific and technological bases of Community industry and to encourage it to become more competitive at international level, while contributing to the definition and implementation of Community policies and to meeting the needs of society.

3. **MONITORING AND EVALUATION OF THE OPERATION**

The form and frequency of the process of evaluation will be such as to enable the Commission to respond to the requirements under Article 4 of the draft Decisions in the proposal above, and to evaluate Community RTD programmes and policies.

The principal factors of uncertainty which can affect the results of the operation include any delay which may occur in the implementation of activities under the present proposal, the ability and readiness of private enterprises to take full advantage of the benefits which these activities will offer them, and the unavoidable difficulty in making a direct link, especially in the short term, between research expenditure on the one hand and industry's competitive success on the other, notably in the light of the fact that innovation is not a linear process from fundamental research, through applied research to commercial application.

The indicators and quantitative or qualitative criteria which make it possible to measure the results will be determined at the level of each specific programme.

During the implementation of the fourth framework programme, the Commission will examine the state of its progress in relation to criteria and objectives indicated in annexes II and III. It will assess, on a permanent and systematic basis, in particular, if the objectives, the priorities as well as the financial means are still adapted to the changing situation (see Article 4(1) of the draft Decision). It will submit if necessary proposals aiming to adapt or to complete the framework programme according to this assessment. Similarly, before submitting its proposal for the fifth framework programme, it will commission independent experts to carry out an evaluation of management and achievements of Community RTD activities during the five years preceding this evaluation (see Art.4(2) of the draft decision).

BUSINESS IMPACT STATEMENT

THE IMPACT OF THE PROPOSAL ON BUSINESS

WITH SPECIAL REFERENCE TO SMALL AND MEDIUM-SIZED

ENTERPRISES (SMEs)

Title of proposal: Commission proposal concerning the fourth framework programme of Community activities in the field of research and technological development (1994–98)

Reference number:

The proposal

1. Taking account of the principle of subsidiarity, why is Community legislation necessary in this area and what are its main aims ?

The objectives of the Community's research and technological development activities are to strengthen the scientific and technological bases of Community industry and to encourage it to become more competitive at international level. The need for Community action is acknowledged by Title VI of the EEC Treaty and by Chapter I of the Euratom Treaty. In addition, the EC Treaty (in Article 130f as introduced by the Treaty on European Union) stipulates that the Community shall promote all the research activities deemed necessary by virtue of other Chapters of the Treaty. The subsidiarity of the Community RTD activities proposed has been determined in accordance with the approach described in Article 3b as introduced into the EEC Treaty by the Maastricht Treaty.

The impact on business

2. Who will be affected by the proposal ?

- Which sectors of business ?

The Community's RTD activities must concentrate more on generic technologies for widespread use in all sectors of economic activity in Europe. The joint research funded by the budget allocated to the fourth framework programme on, for example, information technologies, industrial technologies, materials or biotechnology will assist very many sectors.

- Which sizes of business (what is the proportion of small and medium-sized firms)?

The Community encourages RTD and cooperation by businesses, including SMEs, research centres and universities. The complementarity between the comparative advantages of small firms and big companies has prompted the Commission successfully to encourage small firms to become involved in the Community's research programmes, notably with the aid of special incentives. SMEs have also benefited most from the improvements made to the management of Community research, e.g. simplification of the information packages, support in seeking partners and targeted proposer days, etc. The fourth framework programme expands this approach by providing for technology promotion activities for SMEs, by focusing the

dissemination measures on small firms and proposing a completely new financial instrument specially designed to encourage SMEs to apply the results of Community research. This instrument forms part of the third activity and is a new addition to the package of measures designed to ensure more effective participation by SMEs in the Community's RTD activities.

- *Are there particular geographical areas of the Community where these businesses are found ?*

In principle, the Community's RTD activities serve no geographical or regional objective. Although the objectives of strengthening economic and social cohesion in the Community and of promoting harmonious development also apply to RTD policy, scientific and technical excellence is the overriding selection criterion applied for this particular policy. This criterion in itself is a factor encouraging cohesion in so far as it enables scientists from the least favoured regions to participate in the most advanced research activities in Europe. The evaluation panel's September 1991 report on the impact of the framework programme on economic and social cohesion in the Community revealed increasing involvement by firms from the least favoured regions (most of them SMEs) in the Community partnerships. The fourth framework programme should help to continue this trend, building on the results of the operations carried out under the Structural Funds (and in particular STRIDE) to bolster RTD structures in the least favoured regions. Specific measures are also planned under the third and fourth activities for these regions.

3. *What will business have to do to comply with the proposal ?*

The proposal imposes no formal obligations on businesses in the Community. On the contrary, it provides them with greater means to participate in joint research. The private sector will retain primarily responsibility for fully seizing the opportunities opened up and for applying the results of the research projects for the manufacture and successful marketing of innovatory products.

4. *What economic effects is the proposal likely to have ?*

- *on employment, on investment and the creation of new businesses and on the competitive position of businesses ?*

By making European businesses more competitive at international level, the Community's RTD activities will create jobs and encourage investment. The Commission communication evaluating the second framework programme for Community research and technological development (SEC(92)675 of 22 April 1992) and the subsequent analysis of this evaluation by CREST give an idea of the economic impact of the Community's RTD activities. The proposed fourth framework programme follows the concentration strategy started in the third. More selective allocation of the funds requested for the individual activities should ensure that the activities have greater relevance and impact.

5. *Does the proposal contain measures to take account of the specific situation of small and medium-sized firms (reduced or different requirements, etc.) ?*

Arrangements specifically for small firms will continue to be developed and, in certain cases, tested. New approaches have also been proposed (cf. paragraph 2 above).

Consultation

6. *List the organizations which have been consulted about the proposal and outline their main views.*

This proposal concerning the Fourth framework programme is the fruit of a policy debate within the Commission, which keeps in constant contact with the advisory bodies responsible for RTD (CREST, IRDAC and CODEST), the European Parliament and the Economic and Social Committee, UNICE, the national authorities, researchers and the relevant European and national organizations.

PROPOSED TIMETABLE[1]

Plenary debate on the Parliament's own initiative report	June 1993
Transmission of the proposal of the Commission for the Fourth framework programme to the Council and Parliament	June 1993
Preliminary political agreement on the main lines in the Council	June 1993
Official submission to the Parliament and Economic and Social Committee by the Council	plenary session in July 1993
Examination of the proposal in Parliamentary committee	September/October 1993
(Entry into force of the Maastricht Treaty (?)	October 1993)
Adoption in Parliamentary Committee in accordance with the provisions of the Maastricht Treaty	November 1993
Opinion of the Economic and Social Committee	November 1993
Adoption in plenary by EP in accordance with the provisions of the Maastricht Treaty	November 1993
Adoption of Common Position by the Council	December 1993
Transmission of the Common Position	plenary January 1994
Second reading (and final reading ?)	February 1994
Adoption of specific programmes	April/May 1994[2]

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1 Considered by the informal "Research" Trilogue of 26 May 1993 as a basis for organising work.

2 The transmission of informal texts of specific programmes should in principle take place well before the final adoption of the decision on the Fourth framework programme, during the second half of 1993.

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