



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 21.2.2001
COM (2001) 94 final

2001/0053 (COD)
2001/0054 (CNS)

Proposal for a

DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

**CONCERNING THE MULTIANNUAL FRAMEWORK PROGRAMME 2002-2006 OF
THE EUROPEAN COMMUNITY FOR RESEARCH, TECHNOLOGICAL
DEVELOPMENT AND DEMONSTRATION ACTIVITIES AIMED AT
CONTRIBUTING TOWARDS THE CREATION OF THE EUROPEAN RESEARCH
AREA**

Proposal for a

COUNCIL DECISION

**CONCERNING THE MULTIANNUAL FRAMEWORK PROGRAMME 2002-2006 OF
THE EUROPEAN ATOMIC ENERGY COMMUNITY (EURATOM) FOR
RESEARCH AND TRAINING ACTIVITIES AIMED AT CONTRIBUTING
TOWARDS THE CREATION OF THE EUROPEAN RESEARCH AREA**

(Presented by the Commission)

EXPLANATORY MEMORANDUM

1. THE EUROPEAN RESEARCH AREA: REALITY IN THE MAKING

In the space of just over a year, the European Research Area (ERA) has become the reference framework for research policy issues in Europe.

Proposed by the Commission in January 2000, this project was endorsed by the Lisbon European Council in March 2000 as a central component of the process of developing a knowledge-based economy and society in the EU to promote innovation, competitiveness and employment, sustainable economic growth and social cohesion.

The conclusions of the June 2000 Feira European Council also referred to it, as do the conclusions of the November 2000 Nice European Council, which called for a progress report on its implementation for the Spring European Council in Stockholm.

The ERA is more necessary and urgent than ever:

- The EU's major technological rivals are not resting on their laurels. On the contrary, they are stepping up their efforts. In the US, public spending on research will grow by over 9% in 2001 in the context of a steady increase in industrial efforts over the last decade.
- Following on from the breakthroughs in recent years, the prospects in life sciences and technologies are promising. At the dawn of the 21st century, the immediate challenge facing science is to make use of the advances achieved in the analysis of the human genome and other living organisms, heralding the advent of the post-genomic era with all its spin-offs in terms of public health and the competitiveness of the biotechnology industries.
- Information and communication sciences and technologies are playing a growing role in strengthening the competitiveness of the European economy as a whole, improving living conditions in Europe and preserving the European model of society.
- As highlighted in particular by the BSE crisis and other recent developments in the area of food safety, the EU is now facing, and will in all probability have to face in the future more and more, problems significantly affecting the economy, society and citizens for which science holds the key to a large extent.
- Sustainable development, in all its various dimensions, has become a major political objective on the EU's agenda. Implementing it will generate constantly growing needs for specific research in many areas and on themes often necessitating recourse to interdisciplinary approaches.

The issues at stake and the challenges associated, generally speaking, with the prospects opened up by the technologies of the future, require European research efforts and capacities that are integrated to a far greater extent than at present. This process must fully involve the candidate countries which need to be encouraged to join forces in the European research effort to get research to play its proper role in the dynamics of EU enlargement.

The first concrete steps have been taken in this direction with the first stages in the implementation of the ERA project. Following on from the Research Council resolutions of 15 June and 16 November, work has started on the benchmarking of research and innovation policies, the mapping of excellence and the identification of obstacles to researcher mobility.

The report in preparation for the Stockholm European Council on progress towards making a reality of the European Research Area will take stock of what has been achieved, what remains to be done and the additional steps to be taken to make this concept more concrete.

The European Research Area will by definition be the product of a joint effort by the EU and its Member States, which have a clear responsibility in the implementation of the project, as well as the other European countries, especially the candidate countries.

However, the EU has a specific role to play through its legal instruments, such as, for example, the Community patent and also its financial instrument for promoting research and European cooperation in this area, namely the framework programme.

2. A RECONSIDERED DESIGN FOR THE FRAMEWORK PROGRAMME

As stressed in the Commission's January 2000 Communication "Towards a European Research Area"¹, the EU's framework programme for Research and Technological Development (RTD) needs to be thoroughly re-thought out in the light of the ERA project.

The Commission's October 2000 communication setting out guidelines for future EU research activities² made suggestions as to how this should be done, and launched a debate on the subject.

The present proposal makes these suggestions more concrete. Following on from the guidelines set out, it is based on the preliminary conclusions of the debate in the European Parliament, the Council and the other institutions, and also takes into account the views expressed by the Member States, the scientific community and industry as part of a very wide-ranging consultation, notably involving an electronic forum³.

The EU's framework programme for research has so far been an instrument to promote cooperation and support collaboration.

This proposal is designed to enable it to step up its contribution to the development of scientific and technical excellence in Europe, in EU countries and non-EU countries, especially candidate countries, both in universities and in industry. It should also have the effect of increasing its impact on the innovation process in Europe and reinforcing its contribution to the efforts to integrate European research.

The *raison d'être* of this new framework programme is to help to make a reality of the European Research Area with a view to stepping up innovation in Europe, in conjunction with all the efforts made to this end at national, regional and European level.

¹ COM (2000) 6.

² COM (2000) 612.

³ http://europa.eu.int/comm/research/area_en.htm.

The relationship between the EU's research efforts and the national research efforts is changing. Implementing the framework programme (2002-2006) will require a genuine partnership between the EU and its Member States and with other European scientific cooperation organisations, a partnership which will, in turn, be enhanced through it.

The new framework programme will be based on the following main principles:

- concentrating on a selected number of priority research areas in which EU action can add the greatest possible value;
- defining the various activities in such a way as to enable them to exert a more structuring effect on the research activities conducted in Europe thanks to a stronger link with national, regional and other European initiatives;
- simplifying and streamlining the implementation arrangements, on the basis of the intervention methods defined and the decentralised management procedures envisaged.

In the framework programme as a whole, and especially in research activities specifically geared to helping implement Community policies, a special effort will be made to maximise the dissemination of results and to express them in terms that are readily understandable to decision-makers, so as to help them implement public policies.

Two fundamental aspects of this new framework programme are the opportunity for the candidate countries to participate fully in all the activities as countries associated with its implementation⁴, and the fact that to a large extent it opens up EU research activities to the rest of the world, more particularly on account of the possibility of third country⁵ researchers and organisations having access to a substantial proportion of the activities.

In the spirit of the Commission Communication "Towards a European Research Area"⁶, the regional dimension of European research will be fully taken into account in the implementation of the framework programme, by encouraging interregional cooperation, by taking into consideration specific regional economic and social situations and by supporting regional technological dynamics.

In accordance with the objectives and guidelines of the Action Plan being implemented following the Commission Communication "Women and Science"⁷ and the resolutions adopted by the Council⁸ and the European Parliament⁹ on this theme, a special effort will be made to increase the participation of women in all the activities of the framework programme and boost, through these activities, the place and role of women in science and research in Europe.

⁴ The countries associated with implementation of the Framework Programme are the European Economic Area countries, Switzerland and Israel.

⁵ Throughout this document, the term "third country" refers to countries that are not members of the EU and not associated with the Framework Programme.

⁶ COM(2000) 6.

⁷ COM(1999) 76.

⁸ Resolution of 20 May 1999, OJ C 201, 16 July 1999.

⁹ Resolution of 3 February 2000, PE 284.656.

3. FOCUSING EFFORTS

The priority thematic areas of research proposed have been defined on the basis of the "European added value" criteria set out in the Commission's communication of October 2000, e.g. the need to assemble a critical mass of financial and human resources to combine the complementary areas of expertise found in the different countries or to undertake comparative studies at a European level; links with EU priorities and interests; and the necessarily transnational nature of the research in question.

These criteria have been applied in accordance with the two relevant principles: ranking the foreseeable priorities as a function of objectives and excluding possible areas in which an EU contribution would have less impact.

The October 2000 communication gave examples of a number of topics that met these criteria at first glance. The suggestions made gave rise to considerable comment and were discussed widely by the scientific community, industry and national research authorities through the intermediary of an electronic forum.

The list has been developed and refined and the approach defined has been followed as regards the choice of both the priority thematic areas and the specific subjects within each of them. **Seven thematic areas have been selected** as have, within each of them, a number of subjects linked to economic and societal issues that are especially important to the EU and where its action adds specific value for reasons which may vary according to the themes in question.

To ensure the **focusing** of efforts in these priority thematic areas, EU action will be exclusively implemented through **three major instruments** capable of exerting a particularly significant impact on account of their integrating effect and the scale of the human and financial resources mobilised.

The scientific and technological needs connected with the implementation of **EU policies** also have a high priority. They will be the subject of a **special effort** in addition to the contribution made in this respect by activities carried out in the priority thematic areas.

However, making a reality of the European Research Area will, for some themes, require intervention across the whole field of science and technology.

In this spirit, several categories of activities, particularly those intended to help structure the European Research Area, will be opened up to all themes and areas.

4. THREE MAIN AVENUES OF APPROACH IN IMPLEMENTING THE EUROPEAN RESEARCH AREA

The overall organisation of the framework programme reflects the broad avenues of approach in the implementation of the European Research Area. The framework programme comprises three main blocks of activities.

4.1. Integrating research

4.1.1. *In the priority thematic areas*

The arrangements proposed to implement the activities carried out in the priority research areas of the framework programme have been defined in such a way as to maximise the impact of the efforts made in these areas in Europe.

Each of them corresponds to a type of need in terms of the organisation of research in Europe.

The **three main instruments** used in these areas are the **networks of excellence**, **integrated projects** and the **participation of the EU** in programmes carried out jointly by several Member States pursuant to **Article 169 of the Treaty**.

Using these instruments will help mobilise financial resources well in excess of those harnessed so far for joint activities and will result in more marked cross-linkage of national activities between themselves and with EU activities.

The objective of **networks of excellence** is to boost European excellence by putting together, in a way that will last, research capacities present in the various European regions in a series of areas of key importance by helping research entities come together to carry out "common programmes of activities". Setting up and operating these networks should result in the creation of veritable "virtual centres of excellence" of very significant dimensions.

Designed as large-scale activities and preferably conducted as public/private partnerships, **integrated projects** will help mobilise significant resources around precisely defined objectives in terms of products and processes but also, in many cases, in terms of scientific and technological knowledge.

The arrangements for operating the networks and integrated projects, which will be set up following calls for proposals, will be defined to ensure a large measure of managerial autonomy for the consortia which implement them. Aspects relating to innovation, infrastructure, human resources and science/society will be included in the way these two categories of actions are implemented.

The EU's participation in the research programmes of the Member States carried out jointly is one of the possibilities offered by the Treaty which has not been used so far. Making use of this option requires a considerable amount of exploratory work and consultation, which are at present under way in several areas.

4.1.2. *Other dimensions of the integration of research*

The EU's Research framework programme is also intended to meet science and technology needs arising from the implementation of other **Community policies**.

For this purpose, the activities to be carried out under the heading "Integrating research" will include a specific segment, entitled "Anticipating the EU's scientific and technological needs". They should also help the EU to anticipate emerging needs, react rapidly to new scientific and technological developments and be present at the frontiers of knowledge.

The activities conducted in this connection will entail projects on a scale commensurate with the specific nature of the needs and research in question.

On account of their nature and their objective, these activities will be carried out on the basis of annual decisions following calls for proposals. The choice of topics for the activities carried out will be made by the Commission on the basis of an assessment carried out by an Internal User Group representing the different Community policies, taking account of the opinion of an independent consultative structure consisting of high-level scientific and industrial experts.

The JRC will be involved in these activities within its spheres of competence in accordance with its role of providing scientific and technological support to EU policies. Its budgetary priorities will also be determined by an internal group of users. The priorities for action of the JRC will have as their common denominator the safety of citizens in its various aspects.

The participation of **SMEs** in networks of excellence and integrated projects should be significant. Moreover, specific additional activities are proposed for this type of enterprise.

To this end, the framework programme 2002-2006 will introduce two innovations designed to promote the development of the knowledge-based economy in the European Research Area: an extension of the "cooperative research" activities conducted in collaboration by SMEs, research centres and universities to include high-tech SMEs; and the establishment on a European scale of a "collective research" scheme whereby research is carried out by technical research centres for entire sectors of industry.

International cooperation will be an important aspect of the activities carried out in this part of the framework programme.

The activities carried out in this connection will take several forms. In the priority thematic areas, initiatives will be taken to ensure the coherence of Europe's contribution to international efforts, as well as integrated bilateral cooperation activities with third countries or groups of third countries, for example the emerging economies. Third country researchers and organisations will also have the possibility in some cases of participating in the networks of excellence and integrated projects in areas of special interest for those countries. This participation should represent a substantial proportion of the international cooperation activities under the framework programme.

Specific cooperation activities will also be carried out with certain countries or groups of countries. This will particularly apply to Mediterranean third countries, Russia and the States of the CIS, and developing countries, in support of the EU's foreign and development aid policies.

All international cooperation activities will tie in with the objectives of external policy and the Union's development aid policy, bearing in mind the need to maximise the dissemination of knowledge and technology at world level.

4.2. Structuring the European Research Area

The second major block of activities under the framework programme comprises four categories of activities intended to structure the European Research Area in four of its most important aspects mentioned in the Commission's January 2000 Communication:

- **Research and innovation**, in liaison with the objectives of the Communication on innovation in a knowledge-driven society¹⁰, with in particular the stepping-up of economic and technological intelligence activities.
- **Human resources and researcher mobility**: the funds assigned to this area will be increased considerably. New types of support will be offered, especially in order to make Europe more attractive to third-country researchers, as well as a support scheme for excellent EU research teams.
- **Research infrastructures**, including broadband communication infrastructures for research, with in particular the introduction of an arrangement whereby integrated initiatives covering activities on several levels could be supported: transnational access, networking, research projects, services on a European scale.
- **Science/society issues**, following on from the guidelines set out in the Commission Staff Working Paper of November 2000 on science, society and citizens¹¹.

4.3. Strengthening the foundations of the European Research Area

Last but not least, the framework programme 2002-2006 will help achieve the European Research and Innovation Area by making a contribution towards strengthening its foundations. It will do so in two ways.

First of all, through activities intended to strengthen the coordination of research and innovation activities conducted in Europe at both national and European level:

- Support for the networking of national research and innovation activities as well as for the mutual opening-up of the national programmes in these areas.
- Support for scientific cooperation in the various European science and technology cooperation forums; closer links between EU activities and the activities of other organisations such as the European Science Foundation (ESF), CERN, the EMBL, the ESO¹² and other organisations of this type, and support for their collaboration, since these organisations have drawn closer together and envisage joint initiatives.

Concrete proposals will be made to this end, and for the coordination of projects integrated with Eureka and for the coordination of various activities under the framework programme with "Innovation 2000 Initiative" of the European Investment Bank (EIB).

Strong complementarity will be sought with the activities carried out in the context of COST¹³ cooperation, which is particularly suited to the networking of national activities.

Secondly, through activities supporting the development of coherent research and innovation policies in Europe:

¹⁰ COM (2000) 567.

¹¹ SEC (2000) 1973.

¹² ESA: European Space Agency; CERN: European Organisation for Nuclear Research; EMBL: European Molecular Biology Laboratory; ESO: European Southern Observatory.

¹³ COST: European Cooperation in the field of the Scientific and Technical Research.

- Support for carrying out the work needed to attain the objectives set by the Lisbon European Council for the ERA as regards benchmarking of research policies, mapping of excellence, and obstacles to mobility.
- Work concerning science and technology foresight, statistics and indicators and work needed to improve the innovation environment in Europe.

5. EFFICIENT AND STREAMLINED IMPLEMENTATION

The arrangements for implementing the framework programme are characterised by a clear desire for simplification, streamlining and increased efficiency.

The scientific community and industry have repeatedly advocated simplifying the procedures for managing the EU's research programmes and making them more flexible. The need for a change of this kind is also one of the conclusions of the five-year assessment report for the framework programme.

The current programme management system entails the approval by the Commission of any, even minor, change in the research projects carried out. This makes for inflexibility and complexity which cause delays. In addition, the centralised nature of the system is not in tune with the needs of high-quality research. What is more, an implementation system based on projects on a small-scale is also not appropriate for the sort of research activities to be carried out at a European level. The new framework programme therefore introduces a system which would allow enterprises, research centres and universities greater freedom and flexibility to implement their research activities carried out jointly.

framework programme participants will also be encouraged to define and present for funding, after evaluation on a competitive basis, longer-term programmes including a range of individual components of a varying scale as required.

The networks of excellence and the integrated projects will thus be administered to a large extent autonomously by the participants. The latter will have the possibility to:

- involve other partners in the activities which they undertake;
- define small-scale projects as components of their research programme, and have the possibility of carrying out calls for proposals on a competitive basis to implement these;
- adapt their programme of research to meet changing needs.

The programmes of activities will be regularly subjected to evaluation. Measures will be taken to encourage participation by SMEs from all EU regions.

The envisaged move towards greater decentralisation of responsibilities for implementing research activities will enable the Commission to propose a reduction in the overall administrative costs of administering the programmes. Certain aspects of the specific research activities for SMEs and support for researcher mobility will be entrusted to external organisations operating under the Commission's responsibility.

With a view to improving the performance of Community research activities in terms of cost-efficiency and to maximise the use of European public funds, the proposals for specific

programmes will have to be formulated in a way that defines measurable objectives that can be used for regular monitoring.

6. NEXT STEPS

This proposal sets out a framework programme specifically designed to help bring about a European Research Area in accordance with the conclusions of the debate which took place on the subject in the Institutions throughout the year 2000.

It is vital to ensure that it is discussed, adopted and implemented under the best possible conditions.

The Commission intends to submit proposals for specific programmes worked out on the basis of the broad lines of the framework programme once the various Institutions have had an opportunity to give their opinions on this proposal.

To enable this new framework programme to be implemented on schedule, the aim is that it should be adopted no later than the first half of 2002.

Proposal for a

Decision of the European Parliament and of the Council

concerning the multiannual framework programme 2002-2006 of the European Community for research, technological development and demonstration activities aimed at contributing towards the creation of the European Research Area

(Act with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 166(1) thereof,

Having regard to the proposal from the Commission,

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

Having regard to the opinion of the Committee of the Regions,

Acting in accordance with the procedure laid down in Article 251 of the Treaty

Whereas:

- (1) Article 163 of the Treaty gives the Community the objective of strengthening the scientific and technological bases of Community industry and encouraging it to become more competitive at international level, while promoting research activities deemed necessary by virtue of other Community policies.
- (2) Pursuant to Article 165 of the Treaty, the Community and its Member States are required to coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent.
- (3) Article 166 of the Treaty provides for the adoption of a multiannual framework programme setting out all Community research, technological development and demonstration (RTD) activities.
- (4) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area¹⁴, and on making a reality of the European Research Area and guidelines for EU research activities in the period 2002-2006¹⁵. In 2000 the Commission also submitted a communication on "Innovation in a knowledge-driven economy"¹⁶.

¹⁴ COM(2000) 6 final, 18.1.2000.

¹⁵ COM(2000) 612 final, 4.10.2000.

¹⁶ COM(2000) 567 final, 20.9.2000.

- (5) The European Councils in Lisbon in March 2000 and Santa Maria de Feira in June 2000 adopted conclusions aimed at the rapid establishment of a European research and innovation area with a view to job creation and economic growth.
- (6) The European Parliament¹⁷,¹⁸, the Council¹⁹,²⁰, the Economic and Social Committee²¹ and the Committee of the Regions²² have also supported the creation of the European Research Area.
- (7) On 19 October 2000 the Commission submitted the conclusions of the external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations²³.
- (8) It is therefore necessary to adopt a framework programme for the period 2002-2006 capable of exercising a structuring effect on research and technological development in Europe and making a significant contribution to bringing about the European Research Area.
- (9) In accordance with Article 166(1) of the Treaty, it is necessary to set the scientific and technological objectives and priorities for the activities envisaged, the maximum overall amount, the detailed rules for the Community's financial participation in the programme for the period 2002-2006, as well as the respective shares for each of the activities envisaged, and to indicate the broad lines of the activities in question, while respecting the objective of protecting the financial interests of the Community.
- (10) The Joint Research Centre is called on to contribute to the implementation of the framework programme, in particular in those areas in which it can offer objective and independent expertise and in which it can play a role in the implementation of other Community policies.
- (11) Research activities carried out within the framework programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (12) Following the Commission Communication "Women and Science"²⁴ and the Resolutions of the Council²⁵ and the European Parliament²⁶ on this theme, an action plan is being implemented in order to reinforce and increase the place and role of women in science and research.
- (13) The Commission should submit regular progress reports on the implementation of the framework programme for 2002-2006 and, in good time and before submitting its proposal for the next framework programme, have an independent assessment carried out of the implementation of the activities undertaken,

¹⁷ Resolution of 18 May 2000 PE 290.465 p.48.

¹⁸ Resolution of 15 February 2001

¹⁹ Resolution of 15 June 2000, OJ C 205, 19.7.2000 p.1

²⁰ Resolution of 16 November 2000, OJ C 374, 28.12.2000 p.1

²¹ Opinion of 24 May 2000, OJ C 204, 18.7.2000 p.70

²² Opinion of 12 April 2000, OJ C 226, 8.8.2000 p.18

²³ COM(2000) 659 final, 19.10. 2000

²⁴ COM(1999) 76.

²⁵ Resolution of 20 May 1999, OJ C 201, 16.7.1999.

²⁶ Resolution of 3 February 2000, PE 284.656.

HAVE DECIDED AS FOLLOWS:

Article 1

1. A multiannual framework programme for Community research, technological development and demonstration activities, hereinafter referred to as the "framework programme 2002-2006" is hereby adopted for the period 2002-2006.
2. The framework programme 2002-2006 shall comprise all Community activities envisaged in Article 164 of the Treaty.
3. Annex I sets out the scientific and technological objectives and the related priorities and indicates the broad lines of the activities envisaged.

Article 2

1. The maximum overall amount for Community financial participation in the entire framework programme 2002-2006 shall be EUR 16.270 billion: the proportion assigned to each of the activities is fixed in Annex II.
2. The detailed rules for financial participation by the Community shall be governed by the Financial Regulation applicable to the General Budget of the European Communities, supplemented by Annex III.

Article 3

All the research activities carried out under the framework programme 2002-2006 must be carried out in compliance with fundamental ethical principles.

Article 4

Progress with implementing the framework programme 2002-2006, and in particular progress towards achieving its objectives and meeting its priorities, shall be presented in detail in the report to be published by the Commission each year pursuant to Article 173 of the Treaty.

Article 5

Before submitting its proposal for the next framework programme, the Commission shall have an assessment carried out by independent high-level experts of the implementation of Community activities during the five years preceding that assessment. The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions.

Article 6

The framework programme 2002-2006 is open to the participation of:

- the EEA countries, in accordance with the conditions established in the EEA agreements;
- the central and eastern European candidate countries (CEEC), in accordance with the conditions established in the Europe Agreements, in the additional protocols thereto and in the decisions of the respective Association Councils;
- Cyprus, Malta and Turkey, on the basis of bilateral agreements to be concluded with these countries;
- Switzerland and Israel, on the basis of bilateral agreements to be concluded with these countries.

Done at Brussels, [...]

For the European Parliament

For the Council
The President
[...]

ANNEX 1 : SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES AND BROAD LINES OF THE ACTIVITIES

Activities under the framework programme for research and technological development (2002-2006) will be carried out in accordance with the three general objectives set out in the Treaty :

- strengthening the scientific and technological bases of Community industry;
- encouraging it to become more competitive;
- promoting research activities deemed necessary by virtue of other Chapters of the Treaty.

In order to achieve these objectives more effectively, the framework programme will be restructured around three targets:

1. integrating European research;
2. structuring the European Research Area;
3. strengthening the foundations of the European Research Area.

The activities carried out in order to achieve the last two targets are intended to structure various dimensions of the European Research Area that are closely connected with research and constitute its environment, as well as helping to establish or consolidate the foundations underpinning its operation. They will therefore be implemented across the whole field of science and technology.

The activities carried out to further the first objective, which will represent the bulk of the efforts deployed under the framework programme, are intended to integrate research efforts and activities on a European scale. They will be carried out:

- in a limited number of priority thematic areas exclusively by means of strongly integrating and powerful instruments: networks of excellence, integrated projects and EU participation in national research programmes implemented jointly pursuant to Article 169 of the Treaty;
- in areas related to the anticipation of EU science and technology needs in the form of certain specific needs of EU policies or new emerging needs;
- in the field of science and technology as a whole in the case of complementary research activities for SMEs.

International cooperation activities will be an integral part of the activities carried out under the first target of the framework programme. They may take the form:

- in the priority thematic areas:
 - of initiatives aimed at securing for Europe a leading role in international research efforts on global issues, and ensuring a coherent contribution by Europe to these;

- of integrated bilateral cooperation activities with third countries²⁷ or groups of third countries;
- of participation of third country researchers and organisations in projects and networks in areas of particular interest to those countries.
- as regards anticipating EU science and technology needs, of specific cooperation activities with certain third countries or groups of third countries.

As a fundamental and general principle, the rule of support on the basis of competitive calls for proposals and the evaluation of the scientific and technological quality of those proposals by means of peer review will be used to implement the bulk of the activities under the framework programme.

²⁷ Third countries: countries that are not members of the EU and are not associated with the Framework Programme. The countries associated with the Framework Programme, whose organisations and researchers can, by virtue of this, participate in Framework Programme activities under the same conditions as those of the Member States of the EU are: the European Economic Area countries, the candidate countries, Switzerland and Israel.

1. INTEGRATING EUROPEAN RESEARCH

1.1. Priority thematic areas of research

The activities carried out under this part of the framework programme are intended to assemble a critical mass of resources and support a high level of integration of research capacities in Europe in areas in which this is especially necessary on account of the particular importance of those areas for the competitiveness of European industry or the major political and social implications of the issues in question.

Seven priority thematic areas have been selected.

1.1.1. Genomics and biotechnology for health

Objective

The activities carried out in this area are intended to help Europe exploit, by means of an integrated research effort, breakthroughs achieved in decoding the genomes of living organisms, more particularly for the benefit of public health and citizens and to increase the competitiveness of the European biotechnology industry.

Justification of the effort and European added value

"Post-genomic" research based on analysis of the human genome and genomes of model (animal, plant and microbial) organisms, will culminate in numerous applications in various sectors, and notably in the development of new diagnostic tools and new treatments capable of helping to combat diseases that are not at present under control, offering major potential markets.

However, this work requires considerable and sustained financial outlay. In the United States, public and private spending on post-genomic research is rising steadily and significantly: nearly 2 billion dollars of public-sector funding per annum, essentially managed by the NIH²⁸ (the total budget for which will increase by 14.4% in 2001) and twice as much industrial funding.

Europe's spending on research is at present much lower and less coherent. The launching of publicly funded research programmes on post-genome research in several Member States is a big step in the right direction. All in all, however, the efforts made are inadequate and dispersed.

European industry also spends much less on research than US industry does: 70% of genomics companies are located in the United States and a substantial and increasing proportion of European private-sector investment is made in that country.

To enable the EU to improve its position in this area and benefit fully from the economic and social spin-offs of the expected developments, it is necessary both to increase investment significantly and integrate the research activities conducted in Europe within a coherent effort.

²⁸ National Institutes of Health

Actions envisaged

The Community activities carried out to this end will address the following aspects:

- Fundamental knowledge and basic tools for functional genomics:
 - gene expression and proteomics;
 - structural genomics;
 - comparative genomics and population genetics;
 - bioinformatics;
- Application of knowledge and technologies in the field of genomics and biotechnology for health:
 - technological platforms for the development of new diagnostic, prevention and therapeutic tools;
 - support for innovative research in genomics start-up companies.
- Application of medical genomics knowledge and technologies in the following fields:
 - combating cancer, degenerative diseases of the nervous system, cardiovascular diseases and rare diseases;
 - combating resistance to drugs;
 - studying human development, the brain and the ageing process.

A broader approach will be pursued with regard to combating the three poverty-linked infectious diseases (Aids, malaria and tuberculosis) which have priority in terms of disease control at EU and international level.

1.1.2. Information Society technologies

Objective

The activities carried out in this area, pursuant to the conclusions of the Lisbon European Council and the objectives of the e-Europe initiative, are intended to stimulate the development in Europe of technologies and applications at the heart of the creation of the Information Society in order to increase the competitiveness of European industry and allow European citizens in all EU regions the possibility of benefiting fully from the development of the knowledge-based society.

Justification of the effort and European added value

At the dawn of the 21st century, information and communication technologies are revolutionising the functioning of the economy and society, and are generating new ways of producing, trading and communicating. The effort devoted to these technologies in Europe is still insufficient, particularly when compared with the

United States. In that country, public and private sector funding combined is three times as much for this sector as the corresponding spending in Europe.

This has become the EU's second most important sector of the economy, with an annual market of EUR 2000 billion and employing more than 2 million persons in Europe, a number that is steadily rising.

Industrial and commercial successes of the kind that Europe has achieved in mobile communications as a result of the GSM standard will not be repeated unless a concerted effort is made to invest a critical mass of research resources in this area, by integrating public and private sector efforts on a European scale.

The objective of ambient intelligence

With a view to exerting maximum impact in economic and social terms, effort should focus on the future generation of those technologies in which computers, interfaces and networks will be more integrated into the everyday environment and will render accessible, through easy and "natural" interactions, a multitude of services and applications. This vision of "ambient intelligence" seeks to place the user, the human being, at the centre of the future development of the knowledge-based society.

Community actions will concentrate on the technological priorities that will make it possible to realise this vision. They will aim at mobilising the community of researchers around targeted initiatives, such as the development of the next generations of mobile communication systems, so as to achieve medium and long-term objectives while being able to react to the new needs and demands of markets as well as public policy.

Actions envisaged

The actions undertaken will therefore address the following technological priorities:

Integrating research into technological areas of priority interest for citizens and businesses.

Completing and building on progress expected in the development of basic technologies, research aimed at finding solutions for major societal and economic challenges and, accordingly, focusing on:

- ambient intelligence systems offering access to the information society for all, whatever their age and situation, as well as interactive and intelligent systems for health, mobility, security, leisure, preservation of the cultural heritage and environmental monitoring;
- electronic and mobile commerce, as well as technologies for secure transactions and infrastructures, new tools and new methods of work, technologies for learning and systems for corporate knowledge management, for integrated business management and for *e*-government;
- large-scale distributed systems and platforms, including GRID-based systems that provide effective solutions to complex problems in areas such as the environment, energy, health, transport and industrial design.

Communication -and computing infrastructures

Information access, transmission, storage, distribution and location systems intended to meet the growing needs for the connectivity and processing of information, with the research effort relating to communication and computing infrastructure addressing as a matter of priority:

- the new generations of wireless and mobile communications systems and networks; satellite communications systems; all-optical technologies; integration and management of communication networks; capacity-enhancing technologies necessary for the development of systems, infrastructures and services, in particular for audiovisual applications;
- software technologies and architectures assuring multifunctional services and distributed systems; engineering and control of complex and large-scale systems to ensure reliability and robustness.

Components and microsystems

Miniaturised and low-cost components based on new materials and integrating extended functionalities, with the effort focusing on:

- the design and production of micro- and opto-electronic and photonic components,
- nanoelectronics, microtechnologies and microsystems, and multidisciplinary research into new materials and quantum devices; new computing models and concepts.

Information management and interfaces

Research into information management tools and interfaces, with a view to enabling easier interaction everywhere and at all times with knowledge-based services and applications, addressing:

- knowledge representation and management systems based on context and semantics, including cognitive systems, as well as tools for creating, organising, sharing and disseminating digital content;
- multisensorial interfaces capable of understanding and interpreting the natural expression of human beings through words, gestures and the various senses, virtual environments, as well as multilinguistic and multicultural systems indispensable to the establishment of the knowledge-based society on a European scale.

1.1.3. *Nanotechnologies, intelligent materials, and new production processes*

Objective

The activities carried out in this area are intended to help Europe achieve a critical mass of capacities needed to develop and exploit, especially for greater eco-efficiency, leading-edge technologies for the knowledge- and

intelligence-based products, services and manufacturing processes of the years to come.

Justification of the effort and European added value

Manufacturing industry in Europe at present produces goods and services valued at around EUR 4000 billion a year. In an increasingly competitive world market, it must maintain and increase its competitiveness while meeting the requirements of sustainable development. To do so, it is necessary to put substantial effort into the design, development and dissemination of advanced technologies: nanotechnologies, knowledge-based materials and new production processes.

Lying at the frontier of quantum engineering, materials technology and molecular biology, and one of the foreseeable hubs of the next industrial revolution, nanotechnologies are attracting considerable investment on the part of the EU's competitors (500 million dollars of public funding in 2001 in the United States, i.e. twice as much as current spending there and five times as much as Europe spends at present).

Europe has significant expertise in certain sectors such as nanomanufacturing and nanochemistry, and needs to increase and coordinate its investment effort in this area.

Where materials are concerned, the aim is to develop intelligent materials which are expected to add considerable value in terms of applications in sectors such as transport, energy and the biomedical sector and for which there is a potential market of several tens of billions of euros.

The development of flexible, integrated and clean production systems will also require a substantial research effort concerning the application of new technologies to manufacturing and management.

Actions envisaged

Nanotechnologies:

- long-term interdisciplinary research into understanding phenomena, mastering processes and developing research tools;
- supramolecular architectures and macromolecules;
- nano-biotechnologies;
- nanometre-scale engineering techniques to create materials and components;
- development of handling and control devices and instruments;
- applications in areas such as health, chemistry, energy, optics and the environment.

Intelligent materials:

- development of fundamental knowledge;

- technologies associated with the production and transformation of new materials;
- support engineering.

New production processes :

- the development of flexible and intelligent manufacturing systems incorporating advances in virtual manufacturing technologies, interactive decision-aid systems and high-precision engineering;
- systems research needed for waste management and hazard control;
- development of new concepts optimising the life-cycle of industrial systems, products and services.

1.1.4. Aeronautics and space

Objective

The aim of activities carried out in this area is two-fold: to consolidate, by integrating its research efforts, the position of the European aerospace industry vis-à-vis increasingly strong world competition; and to help exploit the potential of European research in this sector with a view to improving safety and environmental protection.

Justification of the effort and European added value

The aerospace industry consists of two technologically and economically separate sectors but they are closely associated on account of their industrial and political implications and the stakeholders involved and they are examples of European economic and commercial success stories. However, US investment in aerospace is three to six times higher, depending on the sector.

In an increasingly demanding competitive environment, foreseeable aviation requirements world-wide correspond to some 14 000 new aircraft over the next 15 years, representing a market worth EUR 1 000 billion. The efforts made to integrate industrial capacities and development activities which have brought about European successes in this area, now need to be matched by similar efforts to integrate research into priority themes and subjects.

With this aim in view, the "*Vision for 2020*"²⁹ report of eminent European personalities in this sector of industry recommends optimising European, national and private sector research efforts around a common vision and a strategic research agenda.

On space, following on from the Commission's communication "*Europe and space: Turning to a new chapter*"³⁰, the EU will support research designed to make use of space for the benefit of markets and society.

²⁹ "European Aeronautics: A Vision for 2020" (Report of the Group of Personalities)
³⁰ COM(2000) 597.

Actions envisaged

Aeronautics

Community aeronautical research activities will address research and technological development activities necessary to:

- increase the competitiveness of the European industry with regard to commercial aircraft, engines and equipment;
- reduce environmental nuisances and loads (CO₂ and NO_x emissions, noise);
- increasing aircraft safety in the context of the substantial rise in air traffic;
- increase the capacity and safety of the aviation system , in support of a “Single European Sky” (air traffic control and management systems).

Space

Community space activities carried out in close coordination with the ESA, the other space agencies and industry, in order to strengthen the coherence of the very major investment involved, will address the implementation of:

- the Galileo satellite navigation project;
- the GMES platform for monitoring for environment and security;
- advanced research needed to integrate the space segment and the Earth segment in the field of communications.

1.1.5. Food safety and health risks

Objective

The activities carried out in this area are intended to help establish the integrated scientific and technological bases needed to develop a system of production and distribution of safe and healthy food and control food-related risks, relying in particular on biotechnology tools, as well as health risks associated with environmental changes.

Justification of the effort and European added value

The recent food crises, and in particular BSE, have highlighted both the complexity of food safety issues and the fact that in most cases they have international and cross-border implications. The integration of the European internal market as regards agriculture and food makes it necessary to address the problems that arise in this area, and hence to carry out related research, on a European scale. It is against this background that the European Food Authority will shortly be established.

Citizens and consumers expect that research will help to guarantee that the food and products marketed are safe and healthy and can be consumed in total safety.

This requires the availability of the most complete, precise and up to date scientific knowledge. Apart from the public health aspect, the prosperity of a sector

representing some EUR 600 billion in terms of annual turnover and 2.6 million jobs is at stake.

Europe also needs to be able to make a substantial contribution to the research efforts on these issues, which now arise at world level, as well as a coherent contribution to the international debate on them, based on the most precise and complete knowledge.

The same remarks apply to the various aspects of the problems associated with the health impact of environmental changes which are a source of growing concern for European citizens, and which often manifest themselves on an international scale. For all these reasons, but also in order to derive the benefit of the combination of the best sources of expertise available in complex areas, the research in question should be carried out at European level in such a way as to ensure genuine coordination of national activities.

Actions envisaged

Community activities will cover research relating to various aspects of the control of health risks and links between health and food:

- methods of analysis and detection of chemical contaminants and pathogenic microorganisms (viruses, bacteria, parasites, and new agents of the prion type);
- impact of animal feed, and the use of sub-products of different origins for that feed, on human health;
- “traceability” processes, in particular relating to genetically modified organisms, including those based on recent biotechnology developments;
- safer production methods and healthier foodstuffs, including those based on biotechnologies and on organic farming processes;
- epidemiology of food-related diseases and genetic susceptibilities;
- impact of food, and in particular products containing genetically modified organisms, on health;
- environmental health risks, with emphasis being placed on cumulative risks, transmission routes to human beings, long-term effects and exposure to small doses, as well as the impact on particularly sensitive groups, and especially children.

1.1.6. Sustainable development and global change³¹

Objective

The activities carried out in this area are intended to strengthen the scientific and technological capacities needed for Europe to be able to implement sustainable development and make a significant contribution to the

³¹ The priority objectives for nuclear research are set out in the Annex “Scientific and technological objectives” of the proposal for the Euratom Framework Programme.

international efforts to understand and control global change and preserve the equilibrium of ecosystems.

Justification of the effort and European added value

The global implementation of sustainable development requires more particularly:

- the design, development and dissemination of technologies making it possible to ensure more rational use of natural resources, less waste production and a reduction in the impact of economic activity on the environment;
- a better understanding of the mechanisms of global change, and in particular climate change and our related forecasting capacities.

Where technology is concerned, as highlighted in the Commission Green Paper "Towards a European strategy for the security of energy supply"³², two areas concerned as a matter of priority are energy and transport, which are responsible for over 80% of total emissions of greenhouse gases and more than 90% of CO₂ emissions.

Under the Kyoto Protocol, the EU is required to reduce its greenhouse gas emissions by 8% compared with the 1990 levels in the period 2008-2012.

Achieving this objective in the **short term** requires a major large-scale effort to deploy technologies currently under development.

Above and beyond this objective, the **long-term** implementation of sustainable development in the coming decades makes it necessary to ensure the availability, under economic conditions, of the most appropriate energy sources and carriers in this respect. This will require a sustained longer-term research effort.

Medium and long-term research efforts will also be necessary to develop the sustainable European transport system that is likely to be mentioned as a priority objective for the EU in the White Paper on the Common Transport Policy currently being prepared by the Commission.

On the study of climate change, the efforts made today at world level represent some EUR 2 billion per annum. Europe spends EUR 500 million compared with EUR 900 million in the case of the United States.

The European Union is a party to the international agreements in the various areas associated with global change such as the Kyoto Protocol on Climate change and the UN Conventions on Biodiversity and Desertification. It has a duty to make a substantial and coherent contribution to the efforts made through the major international research programmes on these themes.

Action by the Community can help to ensure this vital coordination of Europe's contribution to the world effort.

³² COM(2000) 769.

Actions envisaged

Technologies for sustainable development

The Community's effort in the short and medium term will concentrate on a limited number of large-scale actions in the following areas:

- renewable energy sources, energy savings and energy efficiency, especially in the urban environment, as well as clean transport, with the development of new vehicle concepts in particular for road transport, as well as the development of alternative motor fuels;
- intelligent transport, especially in the form of technologies making possible a rebalancing as well as the integration and increasing intermodality of different modes of transport, for example by means of innovations in the management of the logistic chain (in particular containers).

Turning to the longer term, activities will concentrate as a matter of priority on:

- fuel cells for stationary applications and in transport;
- hydrogen technology;
- new concepts in solar photovoltaic technologies and advanced uses of biomass.

Global change

Community activities will address the following aspects as a matter of priority:

- impact and mechanisms of greenhouse gas emissions on climate and carbon sinks (oceans, forests and soil);
- water cycle;
- biodiversity, protection of genetic resources, operation of terrestrial and marine ecosystems and interactions between human activities and the latter;
- mechanisms of desertification and natural disasters connected with climate change;
- global climate change observation systems.

1.1.7. Citizens and governance in the European knowledge-based society

Objective

The activities carried out in this area are intended to mobilise in a coherent effort, in all their wealth and diversity, European research capacities in economic, political, social and human sciences with a view to understanding and addressing issues related to the emergence of the knowledge-based society and new forms of relationships between its citizens and institutions.

Justification of the effort and European added value

At the European Councils in Lisbon in March 2000 and Nice in November 2000, the European Union set itself the ambitious objective of becoming "*the most competitive and dynamic knowledge-based economy in the world, capable of sustained economic growth providing more and better jobs and greater social cohesion*".

In this perspective, the European Council in Lisbon underlined that "*human resources are Europe's main strength*", stressing the need for Europe's education and training systems to "*adjust both to the needs of the knowledge-based society and to the need to raise the level of employment and improve quality*".

Europe's transition towards a knowledge-based economy and society, and its sustainable development in the interests of the quality of life of all citizens will be all the easier if it takes place in a way which is properly understood and managed. This requires a substantial research effort concerning the issues of integrated and sustainable economic and social progress based on the fundamental values of justice and solidarity which characterise the European model of society. In this respect, economic, political, social and human sciences research should more particularly help to ensure the harnessing and exploitation of an exponentially increasing quantity of information and knowledge and an understanding of the processes at work in this area.

In Europe, this issue arises in particular in connection with the functioning of democracy and new forms of governance, and in the general context of this. What is at stake is the relationship between citizens and institutions in a complex political and decision-making environment characterised by the coexistence of national, regional and European decision-making levels and the increasing role of civil society and its representatives in the political debate.

Issues such as these have a clear and intrinsic European dimension, and there is much to be gained by examining them from a global perspective.

This European dimension is only just starting to be taken into account in research conducted at national level, and is not yet receiving all the attention that it requires.

It seems highly appropriate to address these aspects on the European scale. What is more, action taken at EU level will make it possible to ensure the requisite degree of methodological coherence and guarantee that full benefit is derived from the rich variety of approaches existing in Europe and European diversity.

Actions envisaged

Action by the Community will focus on the following themes:

Knowledge-based society

- improving the production, transmission and utilisation of knowledge in Europe;
- options and choices for the development of a knowledge-based society serving the EU objectives set at the Lisbon and Nice European Councils, in particular as regards improving the quality of life, employment and labour market policies, life-long education and training, and strengthening social cohesion and sustainable development;

- variety of transition dynamics towards the knowledge-based society at local, national and regional level.

Citizenship, democracy and new forms of governance

- consequences of European integration and enlargement of the EU for democracy, the concept of legitimacy, and the functioning of the institutions;
- redefinition of areas of competence and responsibility, and new forms of governance;
- security issues connected with the resolution of conflicts and restoration of peace and justice;
- emergence of new forms of citizenship and identities, forms and impact of cultural diversity in Europe.

In operational terms, Community activities will focus on support for:

- transnational research and comparative studies and the coordinated development of statistics and qualitative and quantitative indicators;
- interdisciplinary research in support of public policies;
- the establishment and exploitation on a European scale of research infrastructures and data and knowledge bases.

1.2. Anticipating the EU's scientific and technological needs

The activities carried out under this heading are intended to:

- respond to the scientific and technological needs of the policies of the Community and of the Union in all the areas corresponding to those policies, including the priority thematic areas which do not require recourse to the three major instruments used in the priority areas but which require specific actions and methods of intervention;
- respond flexibly and rapidly to emerging scientific and technological needs and major unforeseeable developments, as well as needs appearing at the frontiers of knowledge, more specifically in multithematic and interdisciplinary areas, including areas linked to the priority areas.

These activities will be carried out in the following areas and will address the following themes:

1.2.1. Activities carried out on the basis of calls for proposals

These will cover two non-exclusive categories of research:

- research necessary for the formulation, implementation and enforcement of Community and EU policies:
 - research in support of the implementation of common policies such as the common agricultural policy and the common fisheries policy;

- research in support of EU policy objectives such as, for example, those set out in the 6th Environment Programme³³ and the Green Paper "Towards a European Strategy for the Security of Energy Supply"³⁴;
- research in support of the objectives set for the EU by the European Council, for example the objectives set by the Lisbon and Feira European Councils with regard to economic policy, Information Society and e-Europe, enterprise, social policy and employment, education and training, including the requisite statistical methods and tools;
- research necessary for other Community or EU policies in areas such as, for example, health, in particular public health, regional development, trade, external relations and development aid or justice and home affairs;
- research that responds to needs in new, interdisciplinary and multidisciplinary areas or areas at the leading edge of knowledge, especially in order to help European research cope with unexpected major developments, including in areas linked to the priority fields.

The activities carried out in these areas will be implemented under the following conditions, on the basis of the following principles and with the help of the following mechanisms:

- The activities concerned will essentially take the form of:
 - specific targeted projects generally of a limited scale carried out in partnerships of a size commensurate with the needs to be met;
 - the networking of research activities carried out at national level, where the existing capacities in the Member States need to be mobilised in order to achieve the objectives.

In certain duly justified cases, where the objectives in question can be better achieved by these means, limited use may be made of the instruments used in the priority thematic areas such as the networks of excellence or, where appropriate, the integrated projects.

- The choice of research topics, areas and subjects will be made by the Commission on the basis of assessment by an internal group of users, taking account of the opinion of an independent consultative body made up of high-level scientific and industrial experts.
- For the implementation of these activities, recourse may be had to a two-step mechanism: calls for expressions of interest open to any entity or organisation in the EU to identify needs precisely and then evaluate them; calls for proposals on themes selected on this basis.
- Of the projects judged to be of sufficient scientific and technical quality by peer review, the Commission will select those most likely to help support the policies it is responsible for implementing.

³³ COM(2001) 31

³⁴ COM(2000) 769.

- In accordance with their spirit and objective, the activities carried out under this heading will be implemented on the basis of annual decisions.

These activities will also comprise in particular:

- Specific research activities for SMEs

SMEs will participate in the **framework programme** essentially in the context of the activities carried out in the priority thematic areas.

Carried out in support of European competitiveness and enterprise and innovation policy, these specific actions are intended to help European SMEs in traditional or new areas to boost their technological capacities and develop their ability to operate on a European and international scale.

These actions, which may be carried out in the entire field of science and technology, will take the form of:

- *Collective research activities*

Large-scale medium-term research activities carried out by technical research centres for industrial associations or industry groupings in entire sectors of industry dominated by SMEs at the European level;

- *Cooperative research activities*

Research activities carried out by research centres for a number of SMEs in different European countries on themes of common interest or by high-tech SMEs in collaboration with research centres and universities;

- Specific international cooperation activities:

These specific activities, carried out in support of the EU's foreign policy and development aid policy, will be in the field of cooperation with, in particular:

- Mediterranean third countries;
- Russia and the States of the CIS;
- Developing countries.

1.2.2. Joint Research Centre activities³⁵

In accordance with its mission of providing scientific and technical support for EU policies, the JRC will focus on priority themes relating to the formulation and implementation of

³⁵ The JRC's activities in the field of nuclear research are described in the Annex "Scientific and technological objectives" to the proposal for a Euratom Framework Programme. The JRC will also carry out activities in connection with the structuring of the European Research Area, and will be able to participate in all the research activities under the Framework Programme carried out on the basis of calls for proposals in the priority areas and under the heading "Anticipating the EU's scientific and technological needs". It will carry out a limited amount of exploratory research in connection with those activities.

sectoral policies. The activities carried out will have a strong European dimension, and will draw on a range of specific expertise.

These activities will be carried out by the JRC within its areas of specific competence, for which it has special or even unique facilities, as well as in the areas in which its impartiality in terms of national and private sector interests allows it to conduct as efficiently as possible research activities related to the formulation and implementation of Community policies, and the performance of the resulting tasks, some of which are the Commission's responsibility.

The JRC will carry out these activities in close cooperation and by networking with scientific circles, national research organisations and businesses in Europe.

The essential common denominator of the JRC's activities will be the safety of citizens in its different aspects: health, environment, nuclear safety, public security, combating fraud.

To these ends, two specific research areas have been selected (a third being covered by the activities to be carried out by way of Euratom actions):

- Food, chemical products and health:

Food safety and quality, in particular to combat BSE; genetically modified organisms; chemical products; biomedical applications (more particularly establishment of references in this area).

- Environment and sustainability:

Climate change (carbon cycle, modelling, impacts) and technologies for sustainable development (renewable energy sources, tools for the integration of policies); protection of the European environment; development of reference measurements and networks; technical support for the objectives of GMES.

Three types of activities of a general nature will also be carried out:

- Technology foresight:

Technological and economic foresight work based on the activities of European networks;

- Reference materials and measurements³⁶:

The Community Reference Bureau (BCR) and certified reference materials: validation and qualification of chemical measurement methods.

- Public security and combating fraud:

Detection of antipersonnel mines; prevention of natural and technological hazards; networks in support of cybersecurity in the EU; fraud control technologies.

³⁶ Metrology activities in the nuclear field are described in the Annex "Scientific and technological objectives" to the proposal for a Euratom Framework Programme.

2. STRUCTURING THE EUROPEAN RESEARCH AREA

2.1. Research and innovation

Objective

These activities are intended to stimulate technological innovation, utilisation of research results, transfer of knowledge and technologies and the setting up of technology businesses in the Community and in all its regions.

Justification of the effort and European added value

Europe's comparatively poor ability to transform the results of research work and scientific and technological breakthroughs into industrial, economic and commercial successes, is one of its most notable weaknesses. Actions to stimulate business innovation at European level can help to raise the overall level of Europe's performance and increase European capacities in this area, by helping businesses and innovators in their efforts to operate on a European scale and on international markets, and by giving stakeholders in all regions of the EU the benefit of the experience and knowledge acquired in other regions through initiatives undertaken at this level.

Actions envisaged

Activities will be carried out under this heading to complement activities relating to innovation included in those carried out under the heading "Integrating research".

These will be in the form of actions providing general support to innovation, complementing and in liaison with national and regional activities, with a view to increasing the coherence of efforts in this area.

The activities carried out in this area will take the form of support for:

- networking of stakeholders in the European innovation system and carrying out analyses and studies in order to promote exchanges of experience and good practice;
- actions to encourage trans-regional cooperation regarding innovation and support for the setting-up of technology businesses, as well as for the preparation of regional strategies in this area;
- actions to experiment with new tools and new approaches concerning technological innovation;
- establishment or consolidation of information services and in particular electronic services, such as Cordis, and assistance services relating to innovation (technology transfer, protection of intellectual property, access to risk capital);
- economic and technological intelligence activities (analyses of technological developments, applications and markets and processing and dissemination of information which may help researchers, entrepreneurs, and in particular SMEs, and investors in their decision-making);

- analysis and evaluation of innovation activities carried out in the framework of Community research projects and exploitation of lessons which can be drawn from innovation policies.

Some of these activities will be carried out in liaison with those of the EIB (in particular by means of the EIF) under its "Innovation 2000 Initiative" as well as the Structural Funds.

2.2. Human resources and mobility

Objective

The activities carried out under this heading are intended to support the development of abundant world class human resources in all the regions of the Community by promoting transnational mobility for training purposes, the development of expertise or the transfer of knowledge, in particular between different sectors; supporting the development of excellence; and helping to make Europe more attractive to third country researchers. This should be done with the aim of making the most of the potential offered by all sectors of the population, especially women, taking appropriate measures for this purpose

Justification of the effort and European added value

Promoting transnational mobility is a simple, particularly effective and powerful means of boosting European excellence as a whole, as well as its distribution in the different regions of the EU. It creates opportunities for significantly improving the quality of the training of researchers, promotes the circulation and exploitation of knowledge, and helps to establish world-class centres of excellence that are attractive throughout Europe. EU level action in this area (as in human resources in general) leading to the attainment of critical mass will inevitably have a major impact.

Actions envisaged

These activities, which will be carried out in the whole field of science and technology, will take in particular the following forms:

- global support measures for universities, research centres, businesses and networks, for the hosting of European and third country researchers;
- individual support measures for European researchers for the purposes of mobility to another European or a third country, and for top-class third-country researchers wishing to come to Europe;
- mechanisms for return to the countries and regions of origin, as well as professional (re-)integration mechanisms, in particular linked to the granting of global and individual support;
- financial contribution to national or regional programmes in support of researcher mobility open to researchers from other European countries;
- support for European research teams of the highest level of excellence, more particularly for leading edge or interdisciplinary research activities;

- scientific prizes for work of excellence carried out by a researcher having received EU financial support for mobility .

2.3. Research infrastructures

Objective

The activities carried out under this heading are intended to help establish a fabric of research infrastructures of the highest level in Europe and to promote their optimum use on a European scale.

Justification of the effort and European added value

The development of a European approach with regard to research infrastructures, and the carrying out of activities in this area at EU level, can make a significant contribution to boosting European research potential and its exploitation: by helping to ensure wider access to the infrastructures existing in the different Member States and increasing the complementarity of the facilities in place; by promoting the development or establishment of infrastructures ensuring a service on a European scale, as well as optimum construction choices in European terms and in terms of regional technological development.

Actions envisaged

These activities will be carried out in the whole field of science and technology, including in the priority thematic areas. The need for European research in all areas and disciplines to have a high-capacity and high-speed communication infrastructure (based more particularly on GRID-type architectures), as well as electronic publishing services, will in particular receive special attention. These activities, which will be defined and carried out using the scientific advice of the European Science Foundation in particular, will take the form of support for:

- transnational access to research infrastructures;
- implementing integrated activities, by means of European-scale infrastructures or consortia of infrastructures, making it possible to ensure the provision of services on a European scale and possibly covering, in addition to transnational access, the establishment and operation of cooperation networks, and the execution of joint research projects; raising the level of the performance of the infrastructures concerned;
- carrying out feasibility studies and work in preparation for the creation of new European scale infrastructures;
- optimising of European infrastructures by providing limited support for the development of new infrastructures. This support may supplement contributions from the EIB or the Structural Funds to the funding of these infrastructures; the feasibility studies should systematically explore the possibilities of such a contribution.

2.4. Science/society

Objective

The activities carried out under this heading are intended to encourage the development of harmonious relations between science and society and the opening-up of innovation in Europe as a result of the establishment of new relations and an informed dialogue between researchers, industrialists, political decision-makers and citizens.

Justification of the effort and European added value

Science/society issues need to a large extent to be addressed at European level on account of their strong European dimension. This is bound up with the fact that very often they arise on a European scale (as the example of food safety problems shows), with the importance of being able to benefit from the often complementary experience and knowledge required in the different countries and with the need to take into account the variety of views on them, which reflects European cultural diversity.

Actions envisaged

In line with the Commission Staff Working Paper "Science, Society and Citizens in Europe"³⁷, the activities carried out in this area in the whole field of science and technology will particularly address the following themes:

- *Bringing research closer to society* : Science and governance; scientific advice; involvement of society in research; foresight;
- *Ensuring that use of scientific and technological progress takes place in a responsible fashion*: risk; expertise; implementing the precautionary principle; European reference system; ethics;
- *Stepping up the science/society dialogue*: new forms of dialogue; knowledge of science by citizens; young people's interest in scientific careers; women in science and research.

They will take the form of activities in support of:

- networking and establishment of structural links between the institutions and activities concerned at national, regional and European level;
- exchange of experience and good practice;
- carrying out specific research;
- high-profile awareness-raising initiatives such as prizes and competitions;
- establishing data and information bases and carrying out studies, in particular statistical and methodological studies, on the different themes.

3. STRENGTHENING THE FOUNDATIONS OF THE EUROPEAN RESEARCH AREA

Objective

³⁷ SEC (2000) 1973.

The activities carried out under this heading are intended to step up the coordination and to support the coherent development of research and innovation-stimulation policies and activities in Europe.

Justification of the effort and European added value

Making a reality of the European Research Area depends first and foremost on improving the coherence and coordination of research and innovation activities and policies conducted at national, regional and European level. Action by the Community can help to promote efforts to this end, as well as to lay the foundations in terms of the information, knowledge and analyses that are essential for the successful completion of this project.

Actions envisaged

These activities, to be carried out in the whole field of science and technology, will take the following forms:

- To step up the coordination of research activities carried out in Europe, at both national and European level, financial support for:
 - the mutual opening-up of national programmes;
 - networking of research activities conducted at national level;
 - scientific and technological cooperation activities carried out in other European cooperation frameworks, in particular the cooperation activities of the European Science Foundation;
 - collaboration and joint initiatives of specialised European scientific cooperation organisations such as CERN, EMBL, ESO and the ESA.³⁸

These actions will be implemented in the general context of efforts undertaken to optimise the overall performance of European scientific and technological cooperation and ensure that its different components, including COST and Eureka, are complementary.

- In order to support the coherent development of research and innovation policies in Europe:
 - carrying out analyses and studies, and work relating to scientific and technological foresight, statistics and indicators;
 - setting-up and support for the operation of specialised working groups and forums for concertation and political debate;
 - support for work on the benchmarking of research and innovation policies at national, regional and European level;
 - support for carrying out work on the mapping of scientific and technological excellence in Europe;

³⁸ CERN: European Organisation for Nuclear Research; EMBL: European Molecular Biology Laboratory; ESO: European Southern Observatory; ESA: European Space Agency.

- support for carrying out the work needed to improve the regulatory and administrative environment for research and innovation in Europe.

**ANNEX II: MAXIMUM OVERALL AMOUNT, RESPECTIVE SHARES AND
INDICATIVE BREAKDOWN**

The maximum overall financial amount and the respective shares of the various activities as referred to in Article 164 of the EC Treaty are as follows:

	EUR million
First activity ³⁹ :	13 570
Second activity ⁴⁰ :	600
Third activity ⁴¹ :	300
Fourth activity ⁴² :	1 800
Maximum overall amount*	16 270

***Indicative breakdown :**

1) Integrating research^{43 44}	12 770
• Genomics and biotechnology for health	2 000
• Information Society technologies	3 600
• Nanotechnologies, intelligent materials, new production processes	1 300
• Aeronautics and space	1 000
• Food safety and health risks	600
• Sustainable development and global change	1 700
• Citizens and governance in the European knowledge-based society	225
• Anticipating the EU's scientific and technological needs ⁴⁵	2 345

³⁹ Covering the activities carried out under the heading "Integrating research", with the exception of international cooperation activities; research infrastructures, and the theme "Science/Society" carried out under the heading "Structuring the European Research Area; and activities carried out under the heading "Strengthening the foundations of European Research Area".

⁴⁰ Covering the international cooperation activities carried out under the heading "Integrating research", in the priority areas and under the heading of anticipating the EU's scientific and technological needs.

⁴¹ Covering the specific activities on the theme "Research and innovation" carried out under the heading "Structuring the European Research Area" in addition to innovation activities carried out under the heading "Integrating research".

⁴² Covering the activities concerning human resources and support for mobility carried out under the heading "Structuring the European Research Area".

⁴³ The aim is to allocate at least 15% of the financial resources assigned to this heading to SMEs.

⁴⁴ Including EUR 600 million in total for international cooperation activities.

⁴⁵ Including EUR 715 million for JRC activities.

2) Structuring the European Research Area	3 050
• Research and innovation	300
• Human resources	1 800
• Research infrastructures	900
• Science/society	50
3) Strengthening the foundations of the European Research Area	450
• Support for the coordination of activities	400
• Support for the coherent development of policies	50
TOTAL	16 270⁴⁶

⁴⁶ To which should be added the sum of EUR 1,230 million under the Euratom Framework Programme, broken down indicatively as follows: Treatment and storage of nuclear waste EUR 150 million; Controlled thermonuclear fusion EUR 700 million [of which EUR 200 million is foreseen for participation in the ITER project]; other activities EUR 50 million; JRC activities EUR 330 million [of which EUR 110 million for the treatment and storage of waste].

ANNEX III: INSTRUMENTS AND DETAILED RULES FOR COMMUNITY FINANCIAL PARTICIPATION

To help bring about the European Research Area, the Community will contribute financially, under the specific programmes, to the research and technological activities, including demonstration activities, carried out in the priority thematic areas of the **framework programme** as well as in other areas and other themes in the field of science and technology.

The Community's financial contribution to these activities, which will incorporate measures to encourage innovation, will be carried out by means of a range of instruments described below.

1. INSTRUMENTS

1.1. Instruments to integrate research

1.1.1. Networks of excellence

In the priority thematic areas of research under the framework programme, financial contribution to networks of excellence

Support to these networks is intended to promote excellence in Europe by means of a deep and lasting integration of excellence capacities existing in universities, research centres and industries in several Member States into a critical mass of expertise by creating "virtual centres of excellence".

Integration will be ensured by means of a joint programme of activities representing a substantial part of the activities of the entities networked. The entities will need to have or acquire the operational autonomy necessary to gradually integrate their activities with those of other entities.

The programmes of activities, representing an order of magnitude of several millions of euros per annum, will be defined on the basis of precise research themes and topics, but not on the basis of pre-defined objectives or results. Implementing them will entail the gradual integration of the work programmes in the areas concerned, a precise breakdown of activities, a significant volume of exchanges of personnel, and intensive use of electronic information and communication networks and virtual and interactive working methods. These programmes will necessarily and in a verifiable manner involve activities to manage, transfer and exploit the knowledge produced.

The networks of excellence will be selected on the basis of calls for proposals.

Opening up participation in the networks of excellence to researchers from other European countries than those of the associated entities will be encouraged by means of measures in support of mobility. Participation in the networks of excellence will in addition be open to third country organisations and European scientific cooperation organisations.

1.1.2. Integrated projects.

In the priority thematic areas of research of the framework programme, financial contribution to integrated projects

These projects, representing an order of magnitude of up to several tens of millions of euros, will be carried out by consortia often involving intense university/industry collaboration.

The projects may cover “risky” research and will in all cases have clearly defined objectives in terms of scientific and technological knowledge or products, processes or services. The integrated projects may in some cases be made up of clusters dedicated to different aspects of one and the same objective, integrated into a single action by industry and public sector research partners on the basis of a regularly updated timetable.

Carrying them out will necessarily and in a verifiable manner entail activities relating to dissemination, transfer and exploitation of knowledge as well as analysis and evaluation of the economic and social impact of the technologies concerned and the factors involved in their successful exploitation.

They will preferably be carried out on the basis of overall financing plans involving significant mobilisation of public and private sector funding, and recourse to other collaboration or funding schemes, in particular Eureka and the instruments of the EIB and the EIF.

The integrated projects will be selected on the basis of calls for proposals. Participation in them will be open to third country organisations and organisations for European scientific cooperation. There will be specific measures to encourage SME participation.

The networks of excellence and the integrated projects will be administered by the participants with a high level of autonomy. They will in particular have the possibility:

- of associating other partners with the activities that they undertake;
- of defining projects of limited scale as components of their programmes of activity and launching calls for proposals;
- of adapting the content of those programmes according to needs.

The implementation of the programmes of activities carried out by the networks of excellence and in the context of the integrated projects will be regularly evaluated.

1.1.3. Participation in national programmes carried out jointly

In the priority thematic areas of research of the framework programme, financial contribution to national programmes carried out jointly pursuant to Article 169 of the Treaty.

The programmes concerned will be clearly identified programmes implemented by governments or national research organisations. Their joint implementation will entail recourse to a specific implementation structure. This may be achieved by means of harmonised work programmes and common, joint or coordinated calls for proposals. In appropriate cases, the development or operation of common infrastructures may be involved.

The Community may contribute financially to the programmes carried out jointly. Where those programmes are open to other European countries, the Community may also support the participation of researchers, teams or institutions from those countries.

1.1.4. *Anticipating the EU's scientific and technological needs*

The instruments for implementing the activities carried out under the heading "Anticipating the EU's scientific and technological needs" are described in Annex 1.

1.2. Instruments to structure the European Research Area

The instruments for implementing the activities carried out in the following areas are described in Annex 1:

- research and innovation;
- human resources and mobility;
- research infrastructures;
- science/society.

1.3. Instruments to strengthen the foundations of the European Research Area

The instruments for implementing the activities carried out under this heading are described in Annex 1.

2. DETAILED RULES FOR FINANCIAL PARTICIPATION BY THE COMMUNITY

The Community will contribute financially towards implementing the instruments defined below in compliance with the Community framework for state aid to research and development, as well as international rules in this area, and in particular the WTO Agreement on Subsidies and Countervailing Measures. It will need to be possible to adjust the scale and form of financial participation under the *framework programme* on a case-by-case basis, in particular if funding from other public sector sources is available, including other sources of Community financing such as the EIB and EIF.

In the case of participation of bodies from regions lagging in development, when a project receives the maximum intensity of co-financing authorised under the *framework programme* or an overall grant, an additional contribution from the Structural Funds, pursuant to Council Regulation (EC) No 1260/99,⁴⁷ could be granted.

In the case of participation of bodies from the candidate countries, an additional contribution from the pre-accession financial instruments could be granted under similar conditions.

Financial participation by the Community will be granted in compliance with the principle of co-financing, with exception of financing for studies, conferences and public tenders. Depending on the nature of the different instruments, financial participation by the

⁴⁷ OJ L 161, 26.6.99

Community may be of an overall nature or take the form of a grant to the budgets for each of the steps in the implementation of the instruments.

Financial participation by the Community will, as a general principle, be decided following open calls for proposals or invitation to tender procedures.

The Community may also contribute in the form of grants to the capital needed to develop research infrastructures.

The Commission will carry out the research activities in such a way as to ensure the protection of the Community's financial interests by means of effective controls and, if irregularities are detected, by means of dissuasive and proportionate penalties.

In the decisions adopting the specific programmes implementing this Framework Programme, there can be no derogations from the rules set out in the table below.

Instruments	Financial participation by the Community under the framework programme
Integrating research	48
1. Financial contribution to networks of excellence.	The Community may award an overall grant on the basis of the results from implementation of a common programme of activities.
2. Financial contribution to integrated projects.	The Community may award a grant to the budget of these projects corresponding to a maximum of 50% of their total cost.
3. Financial contribution to national programmes carried out jointly.	The Community may award a grant to the budget of jointly-executed activities corresponding to a maximum of 50% of their total cost; it may cover on an overall basis the participation of third country researchers and organisations in the activities.
4. Financial contribution to activities carried out in order to anticipate the EU's scientific and technological needs, including specific research activities for SMEs and specific international cooperation activities	The Community may award a grant to the budget of these activities corresponding to a maximum of 50% of their total cost and assume responsibility for the entire budget of the JRC.
Structuring the European Research Area.	
1. Financial contribution to activities to promote interaction between research and innovation.	The Community may award a grant for the budget for these activities.
2. Financial contribution to the development of human resources and	The fellowships and support for excellence will be of a

⁴⁸ In the three categories of activities undertaken under "Integrating research" Community funding can cover the participation of bodies and researchers from third countries.

increased mobility.	global nature.
3. Financial contribution in support of research infrastructures.	The Community may award a grant to the budgets for the preparatory technical work, including feasibility studies, to a maximum of 50% of their total cost; it may award an overall grant for transnational access and network development activities and, on the basis of the results, for the implementation of integrated initiatives; it may award a grant to the budgets for the development of new infrastructures corresponding to a maximum of 10% of their total cost.
4. Financial contribution towards the development of harmonious relations between science and society.	The Community may award a grant for the budgets for these initiatives.
Strengthening the foundations of the European Research Area.	
1. Financial contribution to coordination activities.	The Community may award a grant for the budgets for these activities.
2. Financial contribution to measures in support of the coherent development of research policies.	The Community may award a grant for the budgets for these measures.

LEGISLATIVE FINANCIAL STATEMENT

Policy area(s): Research

Activity(ies): Research activities under the EC Treaty

TITLE OF ACTION:

Proposal for a Decision of the European Parliament and of the Council concerning the multiannual framework programme 2002-2006 of the European Community for research, technological development and demonstration activities aimed at contributing towards the creation of the European Research Area, hereinafter referred to as the "framework programme".

1. BUDGET LINE(S) + HEADING(S)

Subsection B6

2. OVERALL FIGURES

2.1. Total allocation for action (Part B): € 16 270 million for commitment

2.2. Period of application:

2002-2006

The arrangements for renewal of the action are provided for in Article 166 of the EC Treaty.

2.3. Overall multiannual estimate of expenditure

a) Schedule of commitment appropriations/payment appropriations (financial intervention)
(see point 6.1.1)

€ million (to 3 decimal places)

	Year n	n + 1	n + 2	n + 3	n + 4	n + 5 and subs. years	Total
Commitments							
Payments							

b) Technical and administrative assistance and support expenditure (see point 6.1.2)

Commitments							
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Payments							
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Subtotal a+b							
Commitments							
Payments							

c) Overall financial impact of human resources and other administrative expenditure (see points 7.2 and 7.3)

Commitments/ Payments							
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TOTAL a+b+c							
Commitments	0	3759.0	4004.0	4190.0	4317.0	0	16 270
CP							

2.4. Compatibility with the financial programming and the financial perspective

- Proposal compatible with the existing financial programming
- This proposal will entail reprogramming of the relevant heading in the financial perspective
- This may entail application of the provisions of the Interinstitutional Agreement

2.5 Financial impact on revenue:

- No financial implications (involves technical aspects regarding implementation of a measure)

OR

- Financial impact – the effect on revenue is as follows:

Certain Associated States will contribute to the funding of the framework programme.

Certain Member States may contribute to the funding of programmes established pursuant to Article 169 of the Treaty.

In accordance with Articles 92 and 96 of the Financial Regulation, the Joint Research Centre may benefit from revenue from various types of competitive activities and from other services provided for outside bodies.

In accordance with Article 27 of the Financial Regulation, certain revenue may be reused.

€ million (to 1 decimal place)

		Prior to action (Year n-1)	Situation following action					
Budget line	Revenue		<u>Year</u> <u>n</u> ³	<u>n+1</u>	<u>nN+2</u>	<u>n+3</u>	<u>n+4</u>	<u>n+5</u>
	<i>a) Revenue in absolute terms¹</i>							
	<i>b) Change in revenue²</i>	Δ						

3. BUDGET CHARACTERISTICS

Type of expenditure		New	EFTA participation	Participation applicant countries	Heading Financial Perspective
Comp/ Non-comp	Diff/Non Diff	YES/NO	YES/NO	YES/NO	No

4. LEGAL BASIS

Article 166 of the EC Treaty

5. DESCRIPTION AND GROUNDS

5.1 Need for Community intervention

Research is a central component of the knowledge-based economy and society developing worldwide. More than ever, it is proving to be one of the driving forces for economic and social progress, a key factor in business competitiveness, employment and the quality of life. In addition, science and technology are key elements in the policy-making process.

However, Europe still has structural weaknesses where research is concerned. In 1999 the EU invested EUR 70 billion less than the US in research and development. It is now lagging behind the United States and Japan in terms of research spending as a proportion of GDP (1.8% compared with 2.7 % and 3.1 % respectively), but also in terms of the number of researchers, patents and high-tech exports per capita.

Research needs to play a stronger and more pivotal role in the workings of the economy and society in Europe. This will entail stepping up public and private sector efforts in the EU, but will also entail coordinating the Member States' research efforts and coordinating these efforts with the EU's efforts.

It was in this connection that in January 2000 the Commission proposed the creation of a "European Research Area"⁴⁹. Bringing it about will necessarily be the product of a joint effort by the EU, its Member States and research stakeholders.

This will require first of all a number of initiatives, in particular of a legislative and regulatory nature, to remove the obstacles to the free movement of researchers, knowledge and technologies in Europe.

Alongside initiatives of this kind, EU financial support actions for research have an important role to play.

In general, the public authorities are entitled to support research activity where the results generated have a "public good" value in addition to the benefit to the research performer. This is the case with fundamental research, but also with many targeted research activities. Public funding is legitimate and necessary where the research in question can contribute towards or is indispensable for implementing public policies, but also where it can help to resolve problems facing society and increase European competitiveness, by encouraging businesses to carry out risky or long-term research which is not immediately profitable in itself, and helping to increase the transparency of the knowledge market.

Support at European level, and more particularly at Community level, is justified more specifically on the basis of its *"European added value"*

This covers the following aspects:

- cost and scale of research beyond the possibilities of a single country, and necessitating a "critical mass" of financial and human resources;
- importance of collaboration in economic terms (economies of scale) and on account of the beneficial effects on private sector research and industrial competitiveness ;
- need to combine complementary expertise in the different countries, particularly in the face of interdisciplinary problems, and to carry out comparative studies on a European scale;
- links with the EU's priorities and interests, and with Community legislation and policies;
- the necessarily transnational nature of research, on account of the scale on which the problems arise (environment) or for reasons of a scientific nature (comparative studies, epidemiology).

Moreover, the European added value of Community action in the research field has been assessed and confirmed by an **ex-ante evaluation**, which also indicated certain desirable developments as regards its implementation, as well as the **ex-post evaluation** of actions under way.

- Measures taken in connection with ex-ante evaluation

⁴⁹ COM (2000)612 of 4 October 2000.

An ex-ante evaluation was carried out by the Commission services when preparing the framework programme proposal. It is based in particular on:

- the recommendations of the five-year assessment of the framework programmes and specific programmes carried out by independent experts in the course of the year 2000;
- the Commission's mid-term review of the Fifth framework programme (1998-2002) presented in COM(2000)612 of 4 October 2000 and detailed in Commission Staff Paper SEC(2000)1780 of 23 October 2000;
- the replies received following the wide-ranging consultation on the two communications on the European Research Area in 2000;
- the work in progress under the Lisbon process, particularly concerning the benchmarking of RDT policies, the mapping of scientific and technological excellence, and support for research infrastructures.

This evaluation gave rise to the following conclusions:

- A new framework programme is needed in order to help bring about the European Research Area.
- This will require major changes compared with the past, both in terms of its field of action and in terms of its means of intervention, in particular:
 - strengthening the links with national research activities in order to increase the efficiency of spending on research in Europe
 - refocusing actions on a limited number of objectives which can only be achieved at Community level
 - adapting the means of intervention to the objectives in order to achieve in particular greater efficiency, impact and visibility.

With a view to improving the performance of Community research activities in terms of cost and efficiency these ex-ante evaluation measures will be supplemented by the definition, in the proposals for specific programmes, of measurable objectives that can be used for regular monitoring.

- Measures taken following ex-post evaluation

The recommendations of the five year assessment of the framework programmes carried out by independent experts during the year 2000 have been taken into account in preparing the proposal for the framework programme 2002-2006 and in particular those concerning:

- the beneficial impact of concentrating the framework programme which "fills a gap in Europe by enabling researchers in universities and in industry to carry out applied work together";

- the administrative burden of administering the programme for the period 1998-2002 and the need to "rethink the structures and procedures for managing the framework programme";
- placing EU research activities in the broader context of a European research policy;
- reinforcing the concentration of the programmes;
- continuing with the research needed to achieve the objectives of EU policies;
- the desired move towards an adapted range of instruments that are more flexible, taking account of all the possibilities offered by the Treaty.

In addition, the mid-term review of the 5th framework programme has resulted in particular in adjustments to the annual work programmes for the specific programmes, aimed at concentrating efforts to a greater extent and launching relevant pilot projects for the measures envisaged for the next framework programme.

5.2 Actions envisaged and means of budget intervention

European added value is first and foremost connected with the specific form that EU activities must take in the research area. Pursuant to the Treaty, these activities are intended to supplement those undertaken by the Member States.

It is therefore proposed that the Community will contribute financially:

- in the priority thematic areas of research, to networks of excellence aimed at promoting excellence by means of deep and lasting integration of the excellence capacities existing in several Member States;
- in the priority thematic areas of research, to integrated projects, of an order of magnitude of around EUR 10 million carried out by consortia often involving strong university/industry collaboration;
- in the priority thematic areas of research, to national programmes carried out jointly by the governments or research organisations in the Member States; they can be carried out through harmonised work programmes;
- to research activities carried out with a view to anticipating scientific and technological needs in support of Community policies and in order to respond rapidly to emerging needs;
- to collective research activities and cooperative research activities carried out for the benefit of SMEs in the entire field of science and technology, in order to strengthen European competitiveness;
- to activities aimed at promoting the interaction between research and innovation in order to promote technological innovation, the exploitation of research results, the transfer of knowledge and the setting up of technology

businesses in the priority thematic areas of research or in other areas of importance for European competitiveness;

- to the development of human resources and mobility of researchers through the granting of global or individual support in all the fields of science and technology and by supporting research teams of the highest level of excellence;
- to support for research infrastructures, including communication infrastructures for research in all fields of science and technology, from the point of view of transnational access, for the implementation of integrated initiatives, for carrying out feasibility studies, and, to a limited extent, for the development of new infrastructures;
- to activities in support of the development of harmonious relations between science and society in all the areas in the field of science and technology by establishing structural links between organisations and activities at European level, the exchange of experience, the carrying out of research and awareness raising initiatives;
- to activities for coordinating research and technological development policies: mutual opening-up of national programmes, networking of national research activities, initiatives for scientific cooperation carried out in other European cooperation fora and collaboration between the organisations concerned;
- to activities in support of the coherent development of research and innovation policies in Europe.

The Community's budgetary intervention is aimed at businesses (and in particular SMEs), research centres, universities and national or European organisations which fund research activities. The latter may also act as intermediaries for the Community budgetary intervention.

The Community carries out research and development activities directly through the Joint Research Centre.

5.3 Priorities and themes for intervention

The principle of "European added value" must, however, also constitute the basic rule for **selecting priorities and themes for EU intervention** in the research field.

- 1) Consequently, the priority fields with regard to the **integration of research** selected for the framework programme are as follows:

Priority thematic areas

Genomics and biotechnology for health

The activities carried out in this area are intended to help Europe exploit, by means of an integrated research effort, breakthroughs achieved in decoding the genomes of living organisms for the benefit of public health and citizens and to increase the competitiveness of the European biotechnology industry.

Europe's spending on research is at present much lower and less coherent than in the USA. The launching of publicly funded research programmes on post-genome research in several Member States is an important step in the right direction. All in all, however, the efforts made are inadequate and dispersed.

To enable the EU to improve its position in this area and benefit fully from the economic and social spin-offs of the expected developments, it is necessary both to increase investment significantly and integrate the research activities conducted in Europe within a coherent effort.

Information Society technologies

The activities carried out in this area, in line with the conclusions of the European Council in Lisbon and the objectives of the *e-Europe* initiative, are intended to stimulate the development in Europe of technologies and applications at the centre of the creation of the Information Society in order to increase the competitiveness of European industry and allow European citizens the possibility of benefiting fully from the development of the knowledge-based society.

Information and communication technologies are revolutionising the functioning of the economy and society, and are generating new ways of producing, trading and communicating. The effort devoted to these technologies in Europe is still insufficient particularly when compared with the United States. In that country public and private sector funding combined for this sector is three times as much as the corresponding spending in Europe.

Industrial and commercial successes of the kind that Europe has achieved in mobile communications as a result of the GSM standard will not be repeated unless a concerted effort is made to invest a critical mass of research resources in this area, by integrating public and private sector efforts on a European scale.

With a view to exerting maximum impact in economic and social terms, the effort should focus on the future generation of these technologies in which computers, interfaces and networks will be more integrated into the everyday environment and will render accessible, through easy and "natural" interactions, a multitude of services and applications.

Nanotechnologies, intelligent materials, and new production processes

The activities carried out in this area are intended to help Europe achieve a critical mass of capacities needed to develop and exploit, for eco-efficiency in particular, leading edge technologies for the knowledge and intelligence based products, services and manufacturing processes of the years to come.

Manufacturing industry in Europe at present produces goods and services valued at around EUR 4000 billion a year. In an increasingly competitive world market, it must maintain and increase its competitiveness while meeting the requirements of sustainable development. To do so, it is necessary to put a lot of effort into the design, development and dissemination of advanced

technologies: nanotechnologies, knowledge-based materials and new production processes.

Aeronautics and space

The activities carried out in this area are intended, by integrating its research efforts, to consolidate the position of the European aerospace industry vis-à-vis increasingly strong world competition.

The aerospace industry consists of two technologically and economically separate sectors but they are closely associated on account of their industrial and political implications and the stakeholders involved and they are examples of European economic and commercial success stories. However, US investment in aerospace is three to six times higher depending on the sector.

With this aim in view, the "*Vision for 2020*"⁵⁰ report of eminent European personalities from this industrial sector recommends optimising European, national and private sector research efforts around a common vision.

On space, following on from the Commission's communication "*Europe and space: Turning to a new chapter*", the Community will support research designed to make use of space for the benefit of markets and society.

Food safety and health risks

The activities carried out in this area are intended to help establish the integrated scientific and technological bases needed to develop a system of production and distribution of safe and healthy food in Europe and control food-related risks, relying in particular on biotechnology tools, as well as health risks associated with environmental changes.

The recent food crises in Europe, and in particular BSE, have highlighted both the complexity of food safety issues and the fact that in most cases they have international implications. The integration of the European internal market as regards agriculture and food makes it necessary to address the problems that arise in this area, and hence to carry out related research, on a European scale. It is against this background that the European Food Authority will shortly be established.

Issues relating to the impact of environmental changes on health also have a strong European dimension justifying action at this level.

Sustainable development and global change

The aim of the activities carried out in this area is to strengthen the scientific and technological capacities needed for Europe to be able to implement sustainable development and make a significant contribution to the international efforts to understand and control global change.

⁵⁰

"European Aeronautics: A Vision for 2020" (Report of the Group of Personalities)

The European Union is a party to the international agreements in this area such as the Kyoto Protocol on Climate change and the UN Conventions on Biodiversity and Desertification. It has a duty to make a substantial and coherent contribution to the efforts made through the major international research programmes in this area.

Implementing sustainable development in the short and medium term will also require a major effort in terms of research and dissemination of the most appropriate technologies in this connection in the transport and energy sectors which are the two key areas in this respect.

Citizens and governance in the European knowledge-based society

The activities carried out in this area are intended to mobilise in a coherent effort, in all their wealth and diversity, European research capacities in economic, political, social and human sciences with a view to understanding and addressing issues related to the emergence of the knowledge-based society and new forms of relationships between its citizens and institutions.

It seems highly appropriate to address these aspects on the European scale. What is more, action taken at EU level will make it possible to ensure the requisite degree of methodological coherence and guarantee that full benefit is derived from the rich variety of approaches existing in Europe and European diversity.

EU action will focus on themes such as improving the production, transmission and utilisation of knowledge in Europe, the consequences of European integration and enlargement of the EU for democracy, and the emergence of new forms of citizenship and identities.

In operational terms, it will focus on support for transnational research and comparative studies and the development of qualitative and quantitative indicators, and the establishment of data and knowledge bases

Anticipating the EU's scientific and technological needs, including the activities of the Joint Research Centre

The activities carried out under this heading are intended to:

- respond to the scientific and technological needs of Community and EU policies which are not covered by the activities carried out through the three major instruments used exclusively in the priority areas and which require specific actions and means of intervention;
- respond flexibly and rapidly to emerging scientific and technological needs and major unforeseeable developments, as well as needs appearing at the frontiers of knowledge, more specifically in multithematic and interdisciplinary areas.

These activities, which will include specific research activities for SMEs and international cooperation, will be carried out in the following areas and will address the following themes:

- Activities carried out on the basis of dedicated calls for proposals

These will cover:

- research necessary for the formulation, implementation and enforcement of EU policies in areas such as agriculture and fisheries, energy, environment, transport, health, employment and social affairs, economic and monetary affairs, education, culture, external relations, development aid, justice and home affairs;
 - research that responds to needs in new, interdisciplinary and multidisciplinary areas or areas at the leading edge of knowledge, especially in order to help European research cope with unexpected major developments. On account of their nature and their objectives, these activities will be carried out on an annual budgetary basis, relying on rigorous specific mechanisms for evaluating the political relevance of the intervention themes selected and the scientific and technological relevance of the subjects selected.
- Joint Research Centre activities⁵¹

In accordance with its mission of providing scientific and technical support for EU policies, the JRC will focus on priority themes relating to the formulation and implementation of sectoral policies. The activities carried out will have a strong European dimension, and will draw on a range of specific expertise.

These activities will be carried out by the JRC within its areas of specific competence, for which it has special or even unique facilities, as well as in the areas in which its impartiality with respect to national and private sector interests allows it to conduct as efficiently as possible research activities related to the formulation and implementation of Community policies, and the performance of the resulting tasks, some of which are the Commission's responsibility.

The JRC will carry out these activities in close cooperation with and by networking with scientific circles, national research organisations and businesses in Europe.

The essential common denominator of the JRC's activities will be the safety of citizens in its different aspects: health, environment, nuclear safety, public security, combatting fraud.

- 2) The measures to **structure the European Research Area** will concern the following themes:

Relations between research and innovation

⁵¹ The JRC's activities in the field of nuclear research are described in the Annex "Scientific and technological objectives" to the proposal for a Euratom Framework Programme. The JRC will also carry out activities in connection with the structuring of the European Research Area, and will be able to participate in all the research activities under the Framework Programme carried out on the basis of calls for proposals in the priority areas and under the heading "Anticipating the EU's scientific and technological needs". It will carry out a limited amount of exploratory research in connection with those activities.

These activities are intended to stimulate technological innovation, exploitation of research results, transfer of knowledge and technologies and the setting up and financing of technology businesses in Europe.

Actions to stimulate business innovation at European level can help to raise the overall level of Europe's performance and increase European capacities in this area, by helping businesses and innovators in their efforts to operate on a European scale and on international markets, and by giving stakeholders in all regions of the EU the benefit of the experience and knowledge required in other regions through initiatives undertaken at this level.

Human resources and mobility

The activities carried out under this heading are intended to support the development in all the regions of the Community of abundant world-class human resources by promoting mobility, supporting excellence and helping to make Europe more attractive to third country researchers. This will be done with the aim of making the most of the potential offered by all sectors of the population, especially women, taking appropriate measures for this purpose.

Action undertaken at EU level in this area, conducted at a critical mass level, can help to boost European excellence as a whole, as well as its distribution in the different regions of the EU, creating opportunities for significantly improving the quality of the training of researchers, promoting the circulation and exploitation of knowledge, and helping to establish world-class centres of excellence that are attractive throughout Europe

Research infrastructures

The activities carried out under this heading are intended to help establish a fabric of research infrastructures of the highest level in Europe and to promote their optimum use on a European scale.

The development of a European approach with regard to research infrastructures, and the implementation of activities in this area at EU level, may make a significant contribution to boosting European research potential and its exploitation; by helping to ensure wider access to the infrastructures existing in the different Member States and increasing the complementarity of the facilities in place; by promoting the development or establishment of infrastructures ensuring a service on a European scale, as well as optimum construction choices in European terms and in terms of regional technological development.

Links between science and society

The activities carried out under this heading are intended to encourage the development of harmonious relationships between science and society in Europe as a result of the establishment of new relations and an informed dialogue between researchers, industrialists, political decision-makers and citizens.

Science/society issues need to a large extent to be addressed at European level on account of their strong European dimension. This is bound up with the fact

that very often they arise on a European scale, and also with the importance of being able to benefit from the often complementary experience and knowledge acquired in the different countries, as well as with the need to take into account the variety of views on them.

- 3) Actions to **strengthen the foundations of the European Research Area** aimed in particular at:

Promoting the mutual opening-up of national programmes and the networking of national, European and international research activities, economic and statistical analyses and foresight, the benchmarking of research policies, the mapping of excellence, and supporting the improvement of the regulatory and administrative environment for research and innovation in Europe.

5.4 Means of implementation

The framework programme sets out the maximum overall amount and the detailed rules for the Community's financial participation, as well as the respective shares for each of the activities envisaged.

These amounts cover the funding of the research activities as well as staff and administrative expenditure.

6. FINANCIAL IMPACT

6.1. Total financial impact on Part B (over the entire programming period)

For the record, the reference allocation for the framework programme of the European Atomic Energy Community (Euratom) is EUR 1 230 million. The total amount for the framework programmes 2002-2006 is EUR 17 500 million.

6.1.1 Financial intervention: Commitments in € million (to 3 decimal places)

Breakdown	Year n	n + 1	n + 2	n + 3	n + 4	n + 5 and subs. Years	Total
Action 1							
Action 2							
Etc.							
TOTAL							

6.1.2 Technical and administrative assistance, support expenditure and IT expenditure (commitments)

	Year n	n + 1	n + 2	n + 3	n + 4	n + 5 and subs. Years	Total
1) Technical and administrative assistance							

a) Technical assistance offices							
b) Other technical and administrative assistance: - intra-muros: - extra-muros: <i>of which for construction and maintenance of computerised management systems</i>							
Subtotal 1							
2) Support expenditure							
a) Studies							
b) Meetings of experts							
c) Information and publications							
Subtotal 2							
TOTAL							

6.2. Calculation of costs by measure envisaged in Part B (over the entire programming period)

(Where there is more than one action, give sufficient detail of the specific measures to be taken for each one to allow the volume and costs of the outputs to be estimated.)

Commitments in € million (*to 3 decimal places*)

Breakdown	Type of outputs (projects, files)	Number of outputs (total for years 1...n)	Average unit cost	Total cost (total for years 1...n)
	1	2	3	4=(2X3)
<u>Action 1</u> - Measure 1 - Measure 2 <u>Action 2</u> - Measure 1 - Measure 2 - Measure 3 Etc.				
TOTAL COST				

If necessary explain the method of calculation

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

With a view to prudent use of resources, staff costs and administrative expenses will be closely scrutinised in the light of the new structure of the framework programme. This examination will take place when the Decisions adopting the specific programmes implementing the framework programme are taken.

The envisaged move towards greater decentralisation of responsibilities for implementing research activities will enable the Commission to propose a reduction in the administrative costs of managing the programmes.

Thanks to the new instruments and implementation methods, staff costs and administrative expenses will represent a smaller proportion of the resources than hitherto. Nevertheless, the administration of projects in progress under earlier framework programmes will still have to be assured.

8. FOLLOW-UP AND EVALUATION

8.1 Follow-up arrangements

Progress towards making a reality of the European Research Area will be regularly evaluated.

The new framework programme, the first to be designed to help bring about the European Research Area, is an instrument that will be implemented in parallel with other activities by the Community and the Member States in pursuit of the same objectives. The very nature of research and the different types of actions at different levels complicates monitoring and evaluation.

Nevertheless, a series of instruments has already been or is in the process of being developed to monitor and evaluate the results and impact of the framework programme. These instruments are based essentially on data from the specific programmes implementing the framework programmes. They will be set out in more detail in the decisions on the specific programmes.

A series of indicators specifically adapted to the framework programme will be developed, to make it possible to quantify in particular the production, management and networking, exploitation and impact of the knowledge arising from the activities carried out under the framework programme. They will be defined so as to take account of the objectives fixed by the Treaty, notably that of promoting equality between men and women mentioned in Article 3(2) and that of reinforcing economic and social cohesion, mentioned in Article 158.

8.2 Arrangements and schedule for the planned evaluation

- **Annual monitoring:** The Commission will, where appropriate by calling upon suitable expertise, continuously monitor the implementation of the framework programme in the light of the objectives set. It will assess, in particular, whether the objectives, priorities, instruments, financial resources and management are still appropriate to the changing situation.
- **Annual report :** Progress with implementing the framework programme will be published in the annual report submitted to the European Parliament and the Council pursuant to Article 173 of the Treaty. It will set out in particular the results of the annual monitoring, a description of the activities carried out in the field of research and technological development and dissemination of results during the preceding year, and the work programme for the current year.
- **Five-year assessment:** Before submitting its proposal for the next framework programme, the Commission will have an assessment carried out by independent high-level experts of the implementation of Community activities during the five years preceding that assessment in the light of the objectives applicable to the periods in question. The Commission will communicate the conclusions of this assessment, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions

9. ANTI-FRAUD MEASURES

The anti-fraud arrangements will be described with the specific programmes implementing the framework programme.

Proposal for a

Council Decision

Concerning the multiannual framework programme 2002-2006 of the European Atomic Energy Community (EURATOM) for research and training activities aimed at contributing towards the creation of the European Research Area

THE COUNCIL OF THE EUROPEAN UNION,

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:

- (1) A multiannual framework programme covering all research activities, including demonstration and training activities in the field of nuclear energy, to be implemented by means of research and training programmes, may be adopted pursuant to Article 7 of the Treaty.
- (2) In 2000 the Commission submitted two communications, respectively on the prospects for and the objectives of creating a European Research Area⁵², and on making a reality of the European Research Area and guidelines for EU research activities in the period 2002-2006⁵³. In 2000 the Commission also submitted a communication on "Innovation in a knowledge-driven economy"⁵⁴.
- (3) The European Councils in Lisbon in March 2000 and Santa Maria de Feira in June 2000 adopted conclusions aimed at the rapid establishment of a European Research and Innovation Area with a view to job creation and economic growth.
- (4) The European Parliament^{55, 56}, the Council^{57, 58}, the Economic and Social Committee⁵⁹ and the Committee of the Regions⁶⁰ have also supported the creation of the European Research Area.

⁵² COM(2000) 6 final, 18.1.2000.

⁵³ COM(2000) 612 final, 4.10.2000.

⁵⁴ COM(2000) 567 final, 20.9.2000.

⁵⁵ Resolution of 18 May 2000 PE 290.465 p.48.

⁵⁶ Resolution of 15 February 2001

⁵⁷ Resolution of 15 June 2000, OJ C 205, 19.7.2000 p.1

⁵⁸ Resolution of 16 November 2000, OJ C 374, 28.12.2000 p.1

- (5) On 19 October 2000⁶¹ the Commission submitted the conclusions of an external assessment of the implementation and results of the Community activities carried out in the five years preceding that assessment, accompanied by its observations.
- (6) It is therefore necessary to adopt a new framework programme for the period 2002-2006 aimed at making a contribution to bringing about the European Research Area.
- (7) The framework programme 2002-2006 sets out the scientific and technological objectives and priorities of the activities envisaged and indicates the broad lines of those activities which will be implemented in compliance with the objective of protecting the Community's financial interests.
- (8) A financial reference amount within the meaning of point 34 of the Interinstitutional Agreement between the European Parliament, the Council and the Commission on budgetary discipline and improving the budgetary procedure⁶² is included in this Decision for the entire duration of the framework programme without thereby affecting the powers of the budgetary authority as defined in the Treaty.
- (9) The Joint Research Centre (JRC) is called on help implement the framework programme, in particular in those areas in which it can offer objective and independent expertise and in which it can play a role in the implementation of other Community policies.
- (10) Research activities carried out within the framework programme should respect fundamental ethical principles, notably those which appear in the Charter of Fundamental Rights of the European Union.
- (11) Following the Commission Communication "Women and Science"⁶³ and the Resolutions of the Council⁶⁴ and the European Parliament⁶⁵ on this theme, an Action Plan is being implemented in order to boost and increase the place and role of women in science and research in Europe.
- (12) It is appropriate that the Commission should submit regular progress reports on the implementation of the framework programme 2002-2006 and that it should have an independent assessment carried out concerning the implementation of the activities in good time and before submitting its proposal for the next framework programme.
- (13) The Scientific and Technical Committee has been consulted by the Commission and has delivered its opinion,

⁵⁹ Opinion of 24 May 2000, OJ C 204, 18.7.2000 p.70

⁶⁰ Opinion of 12 April 2000, OJ C 226, 8.8.2000 p.18

⁶¹ COM(2000)659 final, 19.10.2000.

⁶² OJ C 172, 18.6.1999, p.1.

⁶³ COM(1999) 76.

⁶⁴ Resolution of 20 May 1999, OJ C 201, 16.7.1999.

⁶⁵ Resolution of 3 February 2000, PE 284.656.

HAS DECIDED AS FOLLOWS:

Article 1

1. A multiannual framework programme for research and training activities in the field of nuclear energy, hereinafter referred to as the "framework programme 2002-2006" is hereby adopted for the period 2002-2006.
2. The framework programme 2002-2006 shall comprise all research, technological development, international cooperation, dissemination and exploitation activities as well as training in the following fields:
 - treatment and storage of waste;
 - controlled thermonuclear fusion;
 - other Euratom activities;
 - the Joint Research Centre's Euratom activities.
3. The Annex sets out the scientific and technological objectives and the related priorities and indicates the broad lines of the activities envisaged.

Article 2

1. The financial reference amount for the implementation of this framework programme for the period 2002-2006 shall be EUR 1 230 million, of which EUR 150 million for the treatment and storage of waste, EUR 700 million for controlled thermonuclear fusion, EUR 50 million for other Euratom activities, and EUR 330 million for the Joint Research Centre's Euratom activities.
2. The detailed rules for financial participation by the Community shall be governed by the Financial Regulation applicable to the General Budget of the European Communities, supplemented where appropriate by the research and training programme(s) which the Council will adopt in order to implement this Decision.

Article 3

All the research activities carried out under the framework programme 2002-2006 shall be carried out in compliance with fundamental ethical principles.

Article 4

Progress with implementing the framework programme 2002-2006, and in particular progress towards achieving its objectives and meeting its priorities, shall be presented in detail in the report to be published by the Commission each year pursuant to Article 7 of the Treaty.

Article 5

Before submitting its proposal for the next framework programme, the Commission shall have an assessment carried out by independent high-level experts of the implementation of Community activities during the five years preceding that assessment. The Commission shall communicate the conclusions thereof, accompanied by its observations, to the European Parliament, the Council and the Economic and Social Committee.

Article 6

The framework programme 2002-2006 is open to the participation of:

- the EEA countries, in accordance with the conditions established in the EEA agreements;
- the central and eastern European candidate countries (CEEC), in accordance with the conditions established in the Europe Agreements, in the additional protocols thereto and in the decisions of the respective Association Councils;
- Cyprus, Malta and Turkey, on the basis of bilateral agreements to be concluded with these countries;
- Switzerland and Israel, on the basis of bilateral agreements to be concluded with these countries.

Done at Brussels,

For the Council

ANNEX : SCIENTIFIC AND TECHNOLOGICAL OBJECTIVES

1. PRIORITY THEMATIC AREAS OF RESEARCH

1.1 Waste treatment and storage

Nuclear fission energy today supplies 35% of electricity in the EU. It is an element in the debate on how to combat climate change and reduce Europe's dependence on imported energy. The power plants at present in operation will continue to be operated for at least 20 years.

Looking to the longer term, new technologies for the safe exploitation of nuclear fission energy could be developed in order to meet European energy needs in the decades ahead in such a way as to take into account the requirements of sustainable development.

The exploitation of nuclear fission energy for energy production is now encountering the problem of waste, and more particularly the individual implementation of technical solutions for the management of long-lived waste.

European public and private sector research efforts with regard to nuclear waste treatment and storage technologies are significant. Through its coordination effects, EU action in this area makes it possible to assemble them into a critical mass and ensure the coherence of the guidelines adopted by the waste management organisations and industries concerned.

EU action will cover both the immediate problem of waste storage and the longer term question of reducing its impact. In this connection, it will address the following aspects:

- research into processes for long term storage in deep geological strata, with the networking of the activities carried out on various sites in the three main types of geological formations envisaged;
- research aimed at reducing the impact of waste, more particularly as a result of the development of new concepts for reactors producing less waste and the development of technologies to reduce the hazards associated with waste by means of partitioning and transmutation techniques.

1.2 Controlled thermonuclear fusion

Controlled thermonuclear fusion is one of the long term options for energy supply in conditions of sustainable development, in particular for the centralised supply of base-load electricity.

For reasons bound up with the complexity of fundamental knowledge in physics and the technological problems to be resolved, the developments needed for the possible application of fusion for energy production will necessarily take the form of a process in several steps each of which, possibly taking several tens of years, has an impact on the next.

The efforts deployed in the context of the integrated European research programme on controlled thermonuclear fusion implemented by the EU have enabled Europe to become a world leader in the field of research into fusion by magnetic confinement.

The progress made on the research and the results obtained, in particular with the European JET Tokamak, now make it possible to consider moving on to the "Next Step": the production of a machine capable of producing fusion reactions in conditions comparable to that of an energy production reactor.

The completion of the preparatory work on the detailed design of the "Next Step" in the context of the ITER international cooperation project makes it possible to take a decision about the launching of this project and the construction of the machine.

The objective of this will be to demonstrate the scientific and technological feasibility of fusion energy production. The precise arrangements for implementing the project will depend on the outcome of the negotiations at present under way in the framework of international cooperation and subsequent developments, more particularly the decisions taken concerning Europe's contribution to the ITER project and the site where the machine is to be installed. An appropriate legal framework will need to be established.

EU participation in the ITER initiative requires the implementation of an accompanying programme including the following elements:

- Operation of the JET machine in such a way as to derive benefit from the improvements currently being made, as well as possible participation in the research activities needed to complete the decommissioning of JET at the end of its life cycle.
- The continuation of research into fusion physics and technology, including: study and evaluation of alternative magnetic confinement formulas, with in particular the continuation of the construction of the Wendelstein 7-X "stellarator" and operation of the existing installations in the Euratom Associations; coordinated activities regarding technological research, in particular research into materials for fusion.

Realising the "Next Step" will mobilise significant human and financial resources. The current efforts of Euratom's European partners with regard to fusion should be adjusted accordingly, once a decision is taken about the construction of ITER.

2. OTHER ACTIVITIES IN THE FIELD OF NUCLEAR SAFETY AND SAFEGUARDS

On the basis of calls for proposals and in support of EU policies in the fields of health, energy and the environment:

- Research in the field of radiation protection, more particularly with regard to the quantification of the risks associated with low levels of exposure;
- Studies of innovative concepts for new and safer processes for the exploitation of nuclear energy;
- Education and training concerning nuclear safety and radiation protection.

3. ACTIVITIES OF THE JOINT RESEARCH CENTRE

In accordance with its task of providing scientific and technical support for EU policies, the JRC will focus its activities on the following fields:

3.1 Nuclear safety and security:

Waste treatment and storage, in particular separation and transmutation techniques for long-lived actinides; radiation protection; safety of existing reactors (with priority for reactors in the candidate countries), as well as reactors of the new generation; control of fissile materials and support for their non-proliferation; monitoring the decommissioning of obsolete nuclear installations.

3.2 Measurements and reference materials:

Radionuclide metrology, in particular in the case of low activity and round robin tests in the framework of networks of laboratories of excellence; interaction between neutrons and matter for the generation of base data for studies concerning the transmutation of waste and the development of new systems.

LEGISLATIVE FINANCIAL STATEMENT

Policy area(s): Research

Activity(ies): Research and training activities under the Euratom Treaty

TITLE OF ACTION:

Proposal for a Council Decision concerning the multiannual framework programme 2002-2006 of the European Atomic Energy Community (Euratom) for research and training activities aimed at contributing towards the creation of the European Research Area, hereinafter referred to as the "framework programme".

1. BUDGET LINE(S) + HEADING(S)

Subsection B6

2. OVERALL FIGURES

2.1. Total allocation for action (Part B): € 1 230 million for commitment

2.2. Period of application:

2002-2006

The arrangements for renewal of the action are provided for in Article 7 of the Euratom Treaty.

2.3. Overall multiannual estimate of expenditure

a) Schedule of commitment appropriations/payment appropriations (financial intervention) *(see point 6.1.1)*

€ million *(to 3 decimal places)*

	Year n	n + 1	n + 2	n + 3	n + 4	n + 5 and subs. Years	Total
Commitments							
Payments							

b) Technical and administrative assistance and support expenditure *(see point 6.1.2)*

Commitments							
-------------	--	--	--	--	--	--	--

Payments							
----------	--	--	--	--	--	--	--

Subtotal a+b							
Commitments							
Payments							

c) Overall financial impact of human resources and other administrative expenditure (see points 7.2 and 7.3)

Commitments/ Payments							
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TOTAL a+b+c							
Commitments	0	296.0	306.0	310.0	318.0	0	1230.0
CP							

2.4. Compatibility with the financial programming and the financial perspective

- Proposal compatible with the existing financial programming
- This proposal will entail reprogramming of the relevant heading in the financial perspective
- This may entail application of the provisions of the Interinstitutional Agreement

2.5 Financial impact on revenue:

- No financial implications (involves technical aspects regarding implementation of a measure)

OR

- Financial impact – the effect on revenue is as follows:

Certain Associated States will contribute to the funding of the framework programme.

In accordance with Articles 92 and 96 of the Financial Regulation, the Joint Research Centre may benefit from revenue from various types of competitive activities and from other services provided for outside bodies.

In accordance with Article 27 of the Financial Regulation, certain revenue may be reused.

€ million (to 1 decimal place)

		Prior to action (Year n-1)	Situation following action					
Budget line	Revenue		<u>Year</u> <u>n</u>	<u>n+1</u>	<u>n+2</u>	<u>n+3</u>	<u>n+4</u>	<u>n+5</u>
a) Revenue in absolute terms ¹								
b) Change in revenue ²		Δ						

3. BUDGET CHARACTERISTICS

Type of expenditure		New	EFTA participation	Participation applicant countries	Heading Financial Perspective
Comp/ Non-comp	Diff/Non diff/	YES/NO	YES/NO	YES/NO	No

4. LEGAL BASIS

Article 7 of the Euratom Treaty

5. DESCRIPTION AND GROUNDS

5.1 Need for Community intervention

Research is a central component of the knowledge-based economy and society developing worldwide. More than ever, it is proving to be one of the driving forces for economic and social progress, a key factor in business competitiveness, employment and the quality of life. In addition, science and technology are key elements in the policy-making process.

However, Europe still has structural weaknesses where research is concerned. In 1999 the EU invested EUR 70 billion less than the US in research and development. It is now lagging behind the United States and Japan in terms of research spending as a proportion of GDP (1.8% compared with 2.7 % and 3.1 % respectively), but also in terms of the number of researchers, patents and high-tech exports per capita.

Research needs to play a stronger and more pivotal role in the workings of the economy and society in Europe. This will entail stepping up public and private sector efforts in the EU, but will also entail coordinating the Member States' research efforts and coordinating these efforts with the EU's efforts.

It was in this connection that in January 2000 the Commission proposed the creation of a European Research Area⁶⁶. Bringing it about will necessarily be the product of a joint effort by the EU, its Member States and research stakeholders.

⁶⁶ COM (2000)612 of 4 October 2000.

This will require first of all a number of initiatives, in particular of a legislative and regulatory nature, to remove the obstacles to the free movement of researchers, knowledge and technologies in Europe.

Alongside initiatives of this kind, actions in support of EU research have an important role to play.

In general, the public authorities are entitled to support research activity where the results generated have a "public good" value in addition to the benefit to the research performer. This is the case with fundamental research, but also with many targeted research activities. Public funding is legitimate and necessary where the research in question can contribute towards or is indispensable for implementing public policies, but also where it can help to resolve problems facing society and increase European competitiveness, by encouraging businesses to carry out risky or long-term research which is not immediately profitable in itself, and helping to increase the transparency of the knowledge market.

Support at European level, and more particularly at Community level, is justified more specifically on the basis of its "*European added value*"

This covers the following aspects:

- cost and scale of research beyond the possibilities of a single country, and necessitating a "critical mass" of financial and human resources;
- importance of collaboration in economic terms (economies of scale) and on account of the beneficial effects on private sector research and industrial competitiveness ;
- need to combine complementary expertise in the different countries, particularly in the face of interdisciplinary problems, and to carry out comparative studies on a European scale;
- links with the EU's priorities and interests, and with Community legislation and policies;
- the necessarily transnational nature of research, on account of the scale on which the problems arise (environment) or for reasons of a scientific nature (comparative studies, epidemiology).

Moreover, the European added value of Community action in the research field has been assessed and confirmed by an **ex-ante evaluation**, which also indicated certain desirable developments as regards its implementation, and the **ex-post evaluation** of actions under way.

Measures taken in connection with ex-ante evaluation

The ex-ante evaluation carried out by the Commission services when preparing the framework programme proposal gave rise to the following guidelines:

- A new Euratom framework programme is needed in order to help bring about the European Research Area.

- In the case of the part on fission, this will require major changes compared with the past, both in terms of its field of action and in terms of its means of intervention, and in particular.
 - strengthening the links with national research activities in order to increase the efficiency of spending on research in Europe
 - refocusing actions on a limited number of objectives which can only be achieved at Community level
 - adapting the means of intervention to the objectives in order to achieve in particular greater efficiency, impact and visibility.
- In the case of the fusion part, the completion of the preparatory work on the detailed design of the "Next Step" in the context of the ITER international cooperation project makes it possible to take a decision about the launching of this project and the construction of the machine. The objective of this will be to demonstrate the scientific and technological feasibility of fusion energy production. The precise arrangements for implementing the project will depend on the outcome of the negotiations at present under way in the framework of international cooperation and subsequent developments, more particularly the decisions taken concerning Europe's contribution to the ITER project and the site where the machine is to be installed.

With a view to improving the performance of EU action in terms of cost and efficiency, these ex-ante evaluation measures will be completed by the definition of testable objectives in the proposals for specific programmes.

Measures taken following ex-post evaluation

The recommendations of the five year assessment of the framework programmes have been taken into account in preparing this proposal, with a view to:

- placing EU research activities in the broader context of a European research policy;
- reinforcing the concentration of the programmes;
- continuing with the research needed to achieve the objectives of EU policies;
- the move towards an adapted range of instruments that are more flexible, taking account of all the possibilities offered by the Treaty.

5.2 Actions envisaged and arrangements for budget intervention

In the field of **fission and radiation protection**, the Community will contribute financially:

- in the priority thematic areas of research, to networks of excellence aimed at promoting excellence by means of deep and lasting integration of the excellence capacities existing in several Member States; and to integrated projects, of an order of magnitude of around EUR 10 million carried out by consortia often involving strong university/industry collaboration;

- to research activities carried out in support of Community policies in the fields of health, energy and the environment;
- to actions aimed at exploiting the results of research and transfer of knowledge;
- to the development of human resources and mobility of researchers through the granting of overall and individual support for research and training activities of the highest level of excellence and necessitating multinational expertise;
- to support for research infrastructures in all the fields of science and technology, from the point of view of transnational access, for implementing integrated initiatives, for carrying out feasibility studies, and, to a limited extent, for developing new infrastructures;
- to activities for coordinating research and technological development policies; mutual opening-up of national programmes, networking of national research activities, scientific cooperation initiatives in other European cooperation fora and collaboration between the organisations concerned.

In the field of **fusion energy research**, the particular nature of the activities in this area necessitates the implementation of special arrangements.

The projects undertaken will be carried out on the basis of procedures set out in:

- contracts of association,
- the European Fusion Development Agreement (EFDA);
- any other multilateral agreement concluded between the Community and associated organisations and/or legal entities which may be set up, after the competent consultative committee has given its opinion;
- other contracts of limited duration, in particular with bodies in the Member States or the States associated with the Euratom framework programme;
- international agreements covering projects carried out in the framework of cooperation with third countries, such as the ITER.

The activities to coordinate and support fusion energy research may concern studies in support of the activities described above, support for information exchange, recourse to external expertise capacities, including for the independent evaluation of activities, fellowships and training schemes, publications and other actions to promote technology transfer.

The Community's budgetary intervention is aimed at research centres, universities, businesses and national or international bodies situated in the Member States and the European Associated States which fund research activities. These latter may also act as intermediaries for the Community budgetary intervention. Where this proves necessary to achieve the objectives of the programme, international organisations and bodies in the Member States of the CIS may exceptionally receive Community funding. Such funding must be essential in order to achieve the objectives of the programme.

The Community carries out research and development activities directly through the Joint Research Centre.

5.3 Means of implementation

The framework programme sets out the maximum overall amount and the detailed rules for the Community's financial participation.

These amounts cover the funding of the research activities as well as staff and administrative expenditure.

6. FINANCIAL IMPACT

6.1. Total financial impact on Part B (over the entire programming period)

For the record, the reference allocation for the framework programme of the European Community is EUR 16 270 million. The total amount for the framework programmes 2002-2006 is EUR 17 500 million.

6.1.1 Financial intervention: Commitments in € million (to 3 decimal places)

Breakdown	Year n	n + 1	n + 2	n + 3	n+ 4	n + 5 and subs. years	Total
Action 1							
Action 2							
Etc.							
TOTAL							

6.1.2 Technical and administrative assistance, support expenditure and IT expenditure (commitments)

	Year n	n + 1	n + 2	n + 3	N + 4	n + 5 and subs. years	Total
1) Technical and administrative assistance							
a) Technical assistance offices							

b) Other technical and administrative assistance: - intra-muros: - extra-muros: <i>of which for construction and maintenance of computerised management systems</i>							
Subtotal 1							
2) Support expenditure							
a) Studies							
b) Meetings of experts							
c) Information and publications							
Subtotal 2							
TOTAL							

6.2. Calculation of costs by measure envisaged in Part B (over the entire programming period)

(Where there is more than one action, give sufficient detail of the specific measures to be taken for each one to allow the volume and costs of the outputs to be estimated.)

Commitments in € million (to 3 decimal places)

Breakdown	Type of outputs (projects, files)	Number of outputs (total for years 1...n)	Average unit cost	Total cost (total for years 1...n)
	1	2	3	4=(2X3)

<u>Action 1</u> - Measure 1 - Measure 2 <u>Action 2</u> - Measure 1 - Measure 2 - Measure 3 <i>Etc.</i>				
TOTAL COST				

If necessary explain the method of calculation

7. IMPACT ON STAFF AND ADMINISTRATIVE EXPENDITURE

With a view to prudent use of resources, staff costs and administrative expenses will be closely scrutinised in the light of the new structure of the framework programme. This examination will take place when the Decisions adopting the specific programmes implementing the framework programme are taken.

The envisaged move towards greater decentralisation of responsibilities for implementing research activities will enable the Commission to propose a reduction in the administrative costs of managing the programmes. Thanks to the new instruments and implementation methods, staff costs and administrative expenses will represent a smaller proportion of the resources than hitherto. Nevertheless, the administration of projects in progress under earlier framework programmes will still have to be assured.

8. FOLLOW-UP AND EVALUATION

8.1 Follow-up arrangements

Progress towards making a reality of the European Research Area will be regularly evaluated.

The new framework programme, the first to be designed to help bring about the European Research Area, is an instrument that will be implemented in parallel with other activities by the Community and the Member States in pursuit of the same objectives. The very nature of research and the different types of actions at different levels complicates monitoring and evaluation. They will be set out in more detail in the decisions on the specific programmes.

Nevertheless, a series of instruments has already been or is in the process of being developed to monitor and evaluate the results and impact of the framework programme. These instruments are based essentially on data from the specific programmes implementing the framework programmes.

A series of indicators specifically adapted to the framework programme will be developed, to make it possible to quantify in particular the production, management and networking, exploitation and impact of the knowledge arising from the activities carried out under the framework programme. They will be defined so as to take account of the objectives fixed by the Treaty, notably that of promoting equality between men and women mentioned in Article 3(2) and that of reinforcing economic and social cohesion, mentioned in Article 158.

8.2 Arrangements and schedule for the planned evaluation

- **Annual monitoring:** The Commission will, where appropriate by calling upon suitable expertise, continuously monitor the implementation of the framework programme in the light of the objectives set. It will assess, in particular, whether the objectives, priorities, instruments, financial resources and management are still appropriate to the changing situation.
- **Annual report :** Progress with implementing the framework programme will be published in the annual report submitted to the European Parliament and the Council pursuant to Article 173 of the Treaty. It will set out in particular the results of the annual monitoring, a description of the activities carried out in the field of research and technological development and dissemination of results during the preceding year, and the work programme for the current year.
- **Five-year assessment:** Before submitting its proposal for the next framework programme, the Commission will have an assessment carried out by independent high-level experts of the implementation of Community activities during the five years preceding that assessment in the light of the objectives applicable to the periods in question. The Commission will communicate the conclusions of this assessment, accompanied by its observations, to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions.

9. ANTI-FRAUD MEASURES

The anti-fraud arrangements will be described with the specific programmes implementing the framework programme.